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# PROJECT MANUAL

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## SUFFERN CENTRAL SCHOOL DISTRICT RP CONNOR ELEMENTARY SCHOOL HEATING SYSTEM CONVERSION

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CPL PROJECT NO.: 13296.23

DOCUMENT DATE: JUNE 15, 2023

SED PROJECT NO: 50-04-01-06-0-005-021

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### **DESIGN PROFESSIONAL'S CERTIFICATION**

*The undersigned certifies that, to the best of his or her knowledge, information and belief, the design conforms to all applicable provisions of the Building Code of New York State, the New York State Energy Conservation Construction Code, and the Manual of Planning Standards of the New York State Education Department.*

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#### **ARCHITECT/ENGINEER**

##### **CPL**

50 FRONT STREET  
NEWBURGH, NY 12550  
(800) 274-9000 - PH

#### **OWNER**

##### **SUFFERN CENTRAL SCHOOL DISTRICT**

45 MOUNTAIN AVENUE  
HILLBURN, NY 10931  
(845) 357-7783 - PH



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**SECTION 000110  
TABLE OF CONTENTS**

**PROCUREMENT AND CONTRACTING REQUIREMENTS**

**1.01 DIVISION 00 -- PROCUREMENT AND CONTRACTING REQUIREMENTS**

- A. 000110 - Table of Contents
- B. 000115 - List of Drawing Sheets
- C. 001116 - Invitation to Bid
- D. 002000 - Instructions to Bidders
- E. 003000 - Requests for Clarification of Bid Documents
- F. 003114 - Construction Schedule
- G. 004020 - Form of Proposal – Mechanical Construction
- H. 004040- Form of Proposal – Electrical Construction
- I. 00 4510 - Asbestos Notification
- J. 005100 - Agreement - AIA A101
- K. 006000 - Project Forms and Related Documents
- L. 007100 - General Conditions - AIA A201
- M. 007250 - Insurance Requirements - Contractor
- N. 007343 - Prevailing Wage Rates

**SPECIFICATIONS**

**2.01 DIVISION 01 -- GENERAL REQUIREMENTS**

- A. 011000 - Summary
- B. 011200 -Multiple Contract Summary
- C. 012100 - Allowances
- D. 012500 - Substitution Procedures
- E. 012600 - Contract Modification Procedures
- F. 012900 - Payment Procedures
- G. 013000 - Administrative Requirements
- H. 013100 - Project Management and Coordination
- I. 013200 - Construction Progress Documentation
- J. 013300 - Submittal Procedures
- K. 014000 - Quality Requirements
- L. 014119 - Regulatory Requirements - NYS EducationDepartment
- M. 014120 - Work Restrictions
- N. 014200 - References
- O. 014534 - Statement of Special Inspections and Tests
- P. 015000 - Temporary Facilities and Controls
- Q. 016000 - Product Requirements
- R. 017300 - Execution
- S. 017700 - Closeout Procedures
- T. 017823 - Operation and Maintenance Data

---

|             |                                                                         |
|-------------|-------------------------------------------------------------------------|
| U.          | 017839 - Project Record Documents                                       |
| V.          | 017900 - Demonstration and Training                                     |
| W.          | 019113 - General Commissioning Requirements                             |
| <b>2.02</b> | <b>DIVISION 02 -- EXISTING CONDITIONS</b>                               |
| A.          | 020800 - Asbestos Abatement                                             |
| B.          | 024119 - Selective Removal                                              |
| <b>2.03</b> | <b>DIVISION 03 -- CONCRETE</b>                                          |
| A.          | 033000 - Cast-in-Place Concrete                                         |
| <b>2.04</b> | <b>DIVISION 04 -- MASONRY</b>                                           |
| <b>2.05</b> | <b>DIVISION 05 -- METALS</b>                                            |
| <b>2.06</b> | <b>DIVISION 06 -- WOOD, PLASTICS, AND COMPOSITES</b>                    |
| <b>2.07</b> | <b>DIVISION 07 -- THERMAL AND MOISTURE PROTECTION</b>                   |
| A.          | 078400 - Firestopping                                                   |
| B.          | 078413 - Penetration Firestopping                                       |
| <b>2.08</b> | <b>DIVISION 08 -- OPENINGS</b>                                          |
| <b>2.09</b> | <b>DIVISION 09 -- FINISHES</b>                                          |
| A.          | 099123 - Interior Painting                                              |
| <b>2.10</b> | <b>DIVISION 10 -- SPECIALTIES</b>                                       |
| <b>2.11</b> | <b>DIVISION 11 -- EQUIPMENT</b>                                         |
| <b>2.12</b> | <b>DIVISION 12 -- FURNISHINGS</b>                                       |
| <b>2.13</b> | <b>DIVISION 13 -- SPECIAL CONSTRUCTION</b>                              |
| <b>2.14</b> | <b>DIVISION 14 -- CONVEYING EQUIPMENT</b>                               |
| <b>2.15</b> | <b>DIVISION 21 -- FIRE SUPPRESSION</b>                                  |
| <b>2.16</b> | <b>DIVISION 22 -- PLUMBING</b>                                          |
| A.          | 220716 - Plumbing Equipment Insulation                                  |
| B.          | 220719 - Plumbing Piping Insulation                                     |
| C.          | 221005 - Plumbing Piping                                                |
| D.          | 223000 - Plumbing Equipment                                             |
| <b>2.17</b> | <b>DIVISION 23 -- HEATING, VENTILATING, AND AIR-CONDITIONING (HVAC)</b> |
| A.          | 23 0000 - General Provisions for Mechanical Work                        |
| B.          | 23 0002 - Mechanical and Electrical Coordination                        |
| C.          | 230513 - Common Motor Requirements for HVAC Equipment                   |
| D.          | 230517 - Sleeves and Sleeve Seals for HVAC Piping                       |
| E.          | 23 0519 - Meters and Gauges for HVAC Piping                             |
| F.          | 230523 - General-Duty Valves for HVAC Piping                            |
| G.          | 230529 - Hangers and Supports for HVAC Piping and Equipment             |
| H.          | 23 0550 - Wind Restraint for HVAC Systems                               |
| I.          | 230553 - Identification for HVAC Piping and Equipment                   |
| J.          | 230593 - Testing, Adjusting, and Balancing for HVAC                     |
| K.          | 230716 - HVAC Equipment Insulation                                      |

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- 
- L. 230719 - HVAC Piping Insulation - Airex
  - M. 230800 - Commissioning of HVAC
  - N. 230913 - Instrumentation and Control Devices for HVAC
  - O. 230923 - Direct-Digital Control System for HVAC
  - P. 230934 - Variable-Frequency Motor Controllers
  - Q. 231123 - Facility Natural-Gas Piping
  - R. 232113 - Hydronic Piping
  - S. 232114 - Hydronic Specialties
  - T. 232123 - Hydronic Pumps
  - U. 232300 - Refrigerant Piping
  - V. 232500 - HVAC Water Treatment
  - W. 233100 - HVAC Ducts and Casings
  - X. 233300 - Air Duct Accessories
  - Y. 233423 - HVAC Power Ventilators
  - Z. 233700 - Air Outlets and Inlets
  - AA. 235100 - Breechings, Chimneys, and Stacks
  - BB. 235216 - Condensing Boilers
  - CC. 236213 - Packaged Air-Cooled Refrigerant Compressor and Condenser Units
  - DD. 238200 - Convection Heating and Cooling Units
  - EE. 238223 - Unit Ventilators
  - FF. 238236 - Finned-Tube Radiation Heaters

**2.18 DIVISION 25 -- INTEGRATED AUTOMATION**

**2.19 DIVISION 26 -- ELECTRICAL**

- A. 260505 - Selective Demolition for Electrical
- B. 260519 - Low-Voltage Electrical Power Conductors and Cables
- C. 260526 - Grounding and Bonding for Electrical Systems
- D. 260529 - Hangers and Supports for Electrical Systems
- E. 260533.13 - Conduit for Electrical Systems
- F. 260533.16 - Boxes for Electrical Systems
- G. 260533.23 - Surface Raceways for Electrical Systems
- H. 260553 - Identification for Electrical Systems
- I. 260583 - Wiring Connections
- J. 262726 - Wiring Devices

**2.20 DIVISION 27 -- COMMUNICATIONS**

**2.21 DIVISION 28 -- ELECTRONIC SAFETY AND SECURITY**

- A. 284601 - Fire Alarm System (Existing System)



**2.22 DIVISION 31 -- EARTHWORK**

**2.23 DIVISION 32 -- EXTERIOR IMPROVEMENTS**

**2.24 DIVISION 33 -- UTILITIES**

**2.25 DIVISION 46 -- WATER AND WASTEWATER EQUIPMENT**

**END OF SECTION 000110**

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**SECTION 000115**  
**LIST OF DRAWING SHEETS**

**1.01 T-001 TITLE SHEET**

- A. T-000 TITLE PAGE

**1.02 ABATEMENT**

- A. AA-000 BOILER ROOM ASBESTOS ABATEMENT NOTES
- B. AA-101 BOILER ROOM ASBESTOS ABATEMENT PLAN

**3.01 HVAC**

- A. H-000 HVAC SYMBOLS, LEGENDS & CONTRACTOR NOTES
- B. H-100A CRAWL SPACE HVAC DEMOLITION PLAN AREA A
- C. H-100B CRAWL SPACE DEMOLITION PLAN AREA B
- D. H-100C CRAWL SPACE HVAC DEMOLITION PLAN AREA C
- E. H-101A FIRST FLOOR HVAC DEMOLITION PLAN AREA A
- F. H-101B FIRST FLOOR HVAC DEMOLITION PLAN AREA B
- G. H-101C FIRST FLOOR HVAC DEMOLITION PLAN AREA C
- H. H-200A CRAWL SPACE HVAC NEW PLANS AREA A
- I. H-200C CRAWL SPACE HVAC NEW PLAN AREA C
- J. H-201A FIRST FLOOR HVAC MEW PLAN AREA A
- K. H-201B BASEMENT HVAC NEW WORK PLANS AREA B
- L. H-201C FIRST FLOOR HVAC NEW WORK PLAN AREA C
- M. H-202 HVAC ROOF PLAN NEW WORK
- N. H-500 BOILER CONTROLS DIAGRAM
- O. H-501 CONTROLS DIAGRAMS
- P. H-700 PHASE 1 BOILER ROOM DEMOLITION AND NEW WORK PLANS
- Q. H-701 PHASE 2 BOILER ROOM DEMOLITION AND NEW WORK PLANS
- R. H-800 HVAC DETAILS
- S. H-801 HVAC DETAILS
- T. H-900 HVAC SCHEDULES

**4.01 ELECTRICAL**

- A. E-000 ELECTRICAL SYMBOLS, LEGENDS AND CONTRACTOR NOTES
- B. E-100B BASEMENT ELECTRICAL DEMOLITION PLAN AREA B
- C. E-101A FIRST FLOOR ELECTRICAL DEMOLITION PLAN AREA A
- D. E-101C FIRST FLOOR ELECTRICAL DEMOLITION PLANS AREA C
- E. E-201A FIRST FLOOR ELECTRICAL PLAN AREA A
- F. E-201C FIRST FLOOR ELECTRICAL PLAN AREA C
- G. E-202 ELECTRICAL ROOF PLAN

H. E-900 ELECTRICAL SCHEDULES

**END OF SECTION 000115**

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**SECTION 001116  
INVITATION TO BID**

**THE SUFFERN CENTRAL SCHOOL DISTRICT INVITES BIDS FOR "HEATING SYSTEM CONVERSION", WHICH INVOLVES WORK AT THE RP CONNOR ELEMENTARY SCHOOL, 13 CYPRESS ROAD, SUFFERN, NY 10901. SEPARATE SEALED BIDS WILL BE RECEIVED AT THE SUFFERN CENTRAL SCHOOL DISTRICT, 45 MOUNTAIN AVENUE, HILLBURN, NEW YORK 10931 UNTIL 10:00 A.M, LOCAL TIME, ON 07-13-2023**

**1.01 PROJECT INFORMATION**

- A. Project Identification: Heating System Conversion
  - 1. Project Location: RP Connor Elementary School, 13 Cypress Road, Suffern, NY 10901, Suffern, New York 10901
- B. Owner: Suffern Central School District, 45 Mountain Avenue, Hillburn, New York 10931.
  - 1. Owner's Representative:
    - a. John Palma
    - b. PH: 845-222-8206
- C. Architect/Engineer: CPL (Clark Patterson Lee), at 50 Front Street, Newburgh, NY 12550.
- D. Project Description: Project consists of heating system conversion work as described in the Contract Documents.
- E. Construction Contract: Bids will be received for the following Work:
  - 1. Multiple Contract Project consisting of the following prime contracts:
    - a. Mechanical Construction.
    - b. Electrical Construction.

**1.02 BID SUBMITTAL AND OPENING**

- A. Owner will receive sealed lump sum bids until the bid time and date at the location given below. Owner will consider bids prepared in compliance with the Instructions to Bidders issued by Owner, and delivered as follows:
  - 1. Bid Date: 07-13-2023
  - 2. Bid Time: 10:00 a.m local time.
  - 3. Location: Suffern Central School District, 45 Mountain Avenue, Hillburn, New York 10931. Bids will be thereafter publicly opened.
- B. Bids will be thereafter publicly opened.

**1.03 BID SECURITY**

- A. Bid security shall be submitted with each bid in an amount not less than five percent (5%) of the base bid in the form and subject to the conditions provided in the "Instructions to Bidders".

**1.04 PREBID MEETING**

- A. Prebid Meeting: A Pre-Bid meeting/walk-thru for the Project will be held at 10:00 a.m., local time on 06/29/2023, convening at RP Connor elementary school, 13 Cypress road, Suffern NY 10901, convene in the main lobby. Prospective bidders are requested to attend. Prospective bidders may visit the site during business hours by appointment by contacting John Palma at 845-222-8206.

**1.05 DOCUMENTS**

- A. Complete digital sets of Bidding Documents may be obtained online as a download at [cplteamplanroom.com](http://cplteamplanroom.com) under 'public projects' for a non-refundable reproduction fee of \$100.00.
- B. Complete hard copy sets of Bidding Documents may be obtained from Rev, 330 Route 17A, Suite #2, Goshen, New York 10924 Tel: 1-877-272-0216, upon depositing the sum of \$100 for each combined set of documents. Checks or money orders shall be made payable to Suffern Central School District. Any bidder requiring documents to be shipped shall make

arrangements with the printer and pay for all packaging and shipping costs.

- C. All bid addenda will be transmitted to registered plan holders via email and will be available at [www.cplplanroom.com](http://www.cplplanroom.com). Plan holders who have paid for hard copies of the bid documents will need to make the determination if hard copies of the addenda are required for their use, and coordinate directly with the printer for hard copies of addenda to be issued. There will be no charge for registered plan holders to obtain hard copies of the bid addenda.
- D. A Bidder, upon 1) making the deposit required for the Bid Documents, 2) submitting a Proposal accompanied by a the required bid security, and 3) returning the plans and specifications used by such Bidder in good condition within thirty (30) days following the award of the Contract, or rejection of the Bid, shall have returned to them the full amount of the deposit for one copy of the plans and specifications.

#### **1.06 TIME OF COMPLETION**

- A. Successful bidder shall begin the Work upon receipt of the Notice to Proceed and shall complete the Work within the Contract Time.

#### **1.07 BIDDER'S QUALIFICATIONS**

- A. Bidders must be properly licensed under the laws governing their respective trades and be able to obtain insurance and bonds required for the Work. A Performance Bond, separate Labor and Material Payment Bond, and Insurance in a form acceptable to Owner will be required of the successful Bidder.

#### **1.08 NOTIFICATION**

- A. Attention of the Bidder is particularly called to the Owner's sales tax exemption, the requirements as to conditions of employment to be observed, and the minimum wage rates to be paid under the Contract. In addition, the Bidding Documents contain detailed requirements for the qualification of Bidders. These include, among other things, rigid bonding and insurance requirements, financial statements, bank references, lists of lawsuits, arbitrations or other proceedings in which the Bidder has been named as a party, a statement of surety's intent to issue Performance and Payment Bonds, and a description of other projects of similar size and scope completed by the Bidder.
- B. Bids shall be prepared as set forth in "Instructions to Bidders", enclosed in a sealed envelope bearing on its face the name and address of the Bidder and the title of the Work to which the bid enclosed relates.
- C. No bids may be withdrawn for a period of forty-five (45) days after opening of bids.

#### **1.09 AWARD OF BIDS**

- A. The Suffern Central School District hereby reserves the right to waive any informalities and reject any, or all, Bids or to accept the one that, in its judgement, will be in the best interest of Suffern Central School District.
- B. The Owner further reserves its right to disqualify Bidders for any material failure to comply with the "Instructions to Bidders".

**END OF SECTION 001116**

**SECTION 002000**  
**INSTRUCTIONS TO BIDDERS COVER**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Attached is AIA Document A701-2018, Instructions to Bidders.
  - 1. AIA Document A701-2018 defines the conditions affecting award of contract and procedures with which Bidders must comply.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION (NOT USED)**

**END OF SECTION 002000**

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# AIA® Document A701™ – 2018

## Instructions to Bidders

for the following Project:  
(Name, location, and detailed description)

RP Connor Elementary School  
Heating System Conversion  
13 Cypress Road  
Suffern, NY 10901  
SED #50-04-01-06-0-005-021

**THE OWNER:**  
(Name, legal status, address, and other information)

Suffern Central School District  
45 Mountain Avenue  
Hillburn, NY 10931

**THE ARCHITECT:**  
(Name, legal status, address, and other information)

CPL  
50 Front Street, Suite 202  
Newburgh, New York 12550

### TABLE OF ARTICLES

- |   |                                                |
|---|------------------------------------------------|
| 1 | DEFINITIONS                                    |
| 2 | BIDDER'S REPRESENTATIONS                       |
| 3 | BIDDING DOCUMENTS                              |
| 4 | BIDDING PROCEDURES                             |
| 5 | CONSIDERATION OF BIDS                          |
| 6 | POST-BID INFORMATION                           |
| 7 | PERFORMANCE BOND AND PAYMENT BOND              |
| 8 | ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS |

**ADDITIONS AND DELETIONS:**  
The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

FEDERAL, STATE, AND LOCAL LAWS MAY IMPOSE REQUIREMENTS ON PUBLIC PROCUREMENT CONTRACTS. CONSULT LOCAL AUTHORITIES OR AN ATTORNEY TO VERIFY REQUIREMENTS APPLICABLE TO THIS PROCUREMENT BEFORE COMPLETING THIS FORM.

It is intended that AIA Document G612™–2017, Owner's Instructions to the Architect, Parts A and B will be completed prior to using this document.



## ARTICLE 1 DEFINITIONS

§ 1.1 Bidding Documents include the Bidding Requirements and the Proposed Contract Documents. The Bidding Requirements consist of the advertisement or invitation to bid, Instructions to Bidders, supplementary instructions to bidders, the bid form, and any other bidding forms. The Proposed Contract Documents consist of the unexecuted form of Agreement between the Owner and Contractor and that Agreement's Exhibits, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, all Addenda, and all other documents enumerated in Article 8 of these Instructions.

§ 1.2 Definitions set forth in the General Conditions of the Contract for Construction, or in other Proposed Contract Documents apply to the Bidding Documents.

§ 1.3 Addenda are written or graphic instruments issued by the Architect, which, by additions, deletions, clarifications, or corrections, modify or interpret the Bidding Documents.

§ 1.4 A Bid is a complete and properly executed proposal to do the Work for the sums stipulated therein, submitted in accordance with the Bidding Documents.

§ 1.5 The Base Bid is the sum stated in the Bid for which the Bidder offers to perform the Work described in the Bidding Documents, to which Work may be added or deleted by sums stated in Alternate Bids.

§ 1.6 An Alternate Bid (or Alternate) is an amount stated in the Bid to be added to or deducted from, or that does not change, the Base Bid if the corresponding change in the Work, as described in the Bidding Documents, is accepted.

§ 1.7 A Unit Price is an amount stated in the Bid as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, as described in the Bidding Documents.

§ 1.8 A Bidder is a person or entity who submits a Bid and who meets the requirements set forth in the Bidding Documents.

§ 1.9 A Sub-bidder is a person or entity who submits a bid to a Bidder for materials, equipment, or labor for a portion of the Work.

## ARTICLE 2 BIDDER'S REPRESENTATIONS

§ 2.1 By submitting a Bid, the Bidder represents that:

- .1 the Bidder has read and understands the Bidding Documents;
- .2 the Bidder understands how the Bidding Documents relate to other portions of the Project, if any, being bid concurrently or presently under construction;
- .3 the Bid complies with the Bidding Documents;
- .4 the Bidder has visited the site, become familiar with local conditions under which the Work is to be performed, and has correlated the Bidder's observations with the requirements of the Proposed Contract Documents;
- .5 the Bid is based upon the materials, equipment, and systems required by the Bidding Documents without exception; and
- .6 the Bidder has read and understands the provisions for liquidated damages, if any, set forth in the form of Agreement between the Owner and Contractor.

## ARTICLE 3 BIDDING DOCUMENTS

### § 3.1 Distribution

§ 3.1.1 Bidders shall obtain complete Bidding Documents, from the issuing office designated in the advertisement or invitation to bid, for the deposit sum, if any, stated therein.

*(Indicate how, such as by email, website, host site/platform, paper copy, or other method Bidders shall obtain Bidding Documents.)*

*(Paragraph deleted)*

§ 3.1.2. Bidders may obtain one complete set of the Bidding Documents from the issuing office designated in the Advertisement or Invitation to Bid for the deposit sum of \$50.00. The deposit will be refunded to Bidders who submit a bona fide Bid and return the Bidding Documents in good condition within thirty (30) days following the award of the Contract or rejection of the Bids. The cost of replacement of missing or damaged documents will be deducted from the deposit. A Bidder receiving a Contract award may retain the Bidding Documents and the Bidder's deposit will be refunded. Good condition as used in this section means that the Bidding Documents must be returned bound as issued, legible, and containing only the markings necessary for bidding purposes.

§ 3.1.3 Bidding Documents will not be issued directly to Sub-bidders unless specifically offered in the advertisement or invitation to bid, or in supplementary instructions to bidders.

§ 3.1.4 Bidders shall use complete Bidding Documents in preparing Bids. Neither the Owner nor Architect assumes responsibility for errors or misinterpretations resulting from the use of incomplete Bidding Documents.

§ 3.1.5 The Bidding Documents will be available for the sole purpose of obtaining Bids on the Work. No license or grant of use is conferred by distribution of the Bidding Documents.

### § 3.2 Modification or Interpretation of Bidding Documents

§ 3.2.1 The Bidder shall carefully study the Bidding Documents, shall examine the site and local conditions, and shall notify the Architect of errors, inconsistencies, or ambiguities discovered and request clarification or interpretation pursuant to Section 3.2.2.

§ 3.2.2 Requests for clarification or interpretation of the Bidding Documents shall be submitted by the Bidder in writing and shall be received by the Architect at least seven calendar days prior to the date for receipt of Bids. The day the bids are due shall not be counted as one of the seven days referred to.

*(Indicate how, such as by email, website, host site/platform, paper copy, or other method Bidders shall submit requests for clarification and interpretation.)*

§ 3.2.3 Modifications and interpretations of the Bidding Documents shall be made by Addendum. Modifications and interpretations of the Bidding Documents made in any other manner shall not be binding, and Bidders shall not rely upon them.

### § 3.3 Substitutions

§ 3.3.1 The materials, products, and equipment described in the Bidding Documents establish a standard of required function, dimension, appearance, and quality to be met by any proposed substitution.

#### § 3.3.2 Substitution Process

§ 3.3.2.1 Written requests for substitutions shall be received by the Architect at least ten days prior to the date for receipt of Bids. Requests shall be submitted in the same manner as that established for submitting clarifications and interpretations in Section 3.2.2.

§ 3.3.2.2 Bidders shall submit substitution requests on the Substitution Request Form is provided in the Bidding Documents.

§ 3.3.2.3 If a Substitution Request Form is not provided, requests shall include (1) the name of the material or equipment specified in the Bidding Documents; (2) the reason for the requested substitution; (3) a complete description of the proposed substitution including the name of the material or equipment proposed as the substitute, performance and test data, and relevant drawings; and (4) any other information necessary for an evaluation. The request shall include a statement setting forth changes in other materials, equipment, or other portions of the Work, including changes in the work of other contracts or the impact on any Project Certifications (such as LEED), that will result from incorporation of the proposed substitution.

§ 3.3.3 The burden of proof of the merit of the proposed substitution is upon the proposer. The Architect's decision of approval or disapproval of a proposed substitution shall be final.

§ 3.3.4 If the Architect approves a proposed substitution prior to receipt of Bids, such approval shall be set forth in an Addendum. Approvals made in any other manner shall not be binding, and Bidders shall not rely upon them.

§ 3.3.5 No substitutions will be considered after the Contract award unless specifically provided for in the Contract Documents.

**§ 3.4 Addenda**

§ 3.4.1 Addenda will be transmitted to Bidders known by the issuing office to have received complete Bidding Documents.

*(Indicate how, such as by email, website, host site/platform, paper copy, or other method Addenda will be transmitted.)*

§ 3.4.2 Addenda will be available where Bidding Documents are on file.

§ 3.4.3 Addenda will be issued no later than four days prior to the date for receipt of Bids, except an Addendum withdrawing the request for Bids or one which includes postponement of the date for receipt of Bids. The day the bids are due shall be counted as one of the four days referred to.

§ 3.4.4 Prior to submitting a Bid, each Bidder shall ascertain that the Bidder has received all Addenda issued, and the Bidder shall acknowledge their receipt in the Bid.

**§ 3.5 EQUIVALENCY**

§ 3.5.1 In the Specifications, if two or more kinds, types, brands, or manufacturers or materials are named, they shall be regarded as the required standard of quality, and are presumed to be equal. The Contractor may select one of these items or, if the Contractor desires to use any kind, type, brand, manufacturer or material other than those named in the Specification, he shall indicate in writing to the Architect and Owner, and prior to the award of Contract, what kind, type, brand or manufacturer is included in the Base Bid for the specified item.

**ARTICLE 4 BIDDING PROCEDURES**

**§ 4.1 Preparation of Bids**

§ 4.1.1 Bids shall be submitted on the forms included with or identified in the Bidding Documents.

§ 4.1.2 All blanks on the bid form shall be legibly executed. Paper bid forms shall be executed in a non-erasable medium.

§ 4.1.3 Sums shall be expressed in both words and numbers, unless noted otherwise on the bid form. In case of discrepancy, the amount entered in words shall govern.

§ 4.1.4 Edits to entries made on paper bid forms must be initialed by the signer of the Bid.

§ 4.1.5 All requested Alternates shall be bid. If no change in the Base Bid is required, enter "No Change" or as required by the bid form.

§ 4.1.6 Where two or more Bids for designated portions of the Work have been requested, the Bidder may, without forfeiture of the bid security, state the Bidder's refusal to accept award of less than the combination of Bids stipulated by the Bidder. The Bidder shall neither make additional stipulations on the bid form nor qualify the Bid in any other manner.

§ 4.1.7 Each copy of the Bid shall state the legal name and legal status of the Bidder. As part of the documentation submitted with the Bid, the Bidder shall provide evidence of its legal authority to perform the Work in the jurisdiction where the Project is located. Each copy of the Bid shall be signed by the person or persons legally authorized to bind the Bidder to a contract. A Bid by a corporation shall further name the state of incorporation and have the corporate seal affixed. A Bid submitted by an agent shall have a current power of attorney attached, certifying the agent's authority to bind the Bidder.

§ 4.1.8 A Bidder shall incur all costs associated with the preparation of its Bid.

§ 4.1.9 Each bid must include a fully executed copy of the Insurance Certification Form (See Section 00 4980). Failure to include with the bid may result in the Owner finding the Contractor "non-responsive" to the bid documents.

## **§ 4.2 BID SECURITY**

**§ 4.2.1** Each Bid shall be accompanied by a Bid Security in the form and amount required. The Bidder pledges to enter into a Contract with the Owner on the terms stated in the Bid and will, if required, furnish bonds covering the faithful performance of the Contract and payment of all obligations arising thereunder. Should the Bidder refuse to enter into such Contract or fail to furnish such bonds if required, the amount of the bid security shall be forfeited to the Owner as liquidated damages, not as a penalty. The amount of the bid security shall not be forfeited to the Owner in the event the Owner fails to comply with Section 6.2. .

**§ 4.2.1.1** Bids shall be accompanied by a Bid Security of not less than five percent (5%) of the amount of the Bid. Such Bid Security shall be submitted in the form of a Bid Bond or a Certified Check made payable to the Owner. The submission shall be made with the understanding that the Bid Security shall guarantee that the Bidder will not withdraw its Bid for a period of forty-five (45) days after the scheduled closing time for the receipt of Bids, and that if its Bid is accepted, the Bidder will enter into a formal contract with the Owner in accordance with the terms stated in the Bid and will furnish any required performance and payment bonds at the time required. In the event of the withdrawal of said Bid within the forty-five (45) day period or the failure of the successful Bidder to enter into the Contract with the Owner or the failure of the successful Bidder to furnish required performance and payment bonds at the time required, the Bid Security shall be forfeited to the Owner as liquidated damages, not as a penalty, which represents the damage the Owner incurred as a result of the Bidder's default.

**§ 4.2.1.2** The Bid Securities shall be returned to all Bidders except the three (3) lowest Bidders within three (3) days after the formal opening of bids. The remaining Bid Securities will be returned within forty-eight (48) hours after the Owner and the successful Bidder have executed the Contract and executed performance and payment bonds have been approved by the Owner. If a Contract has not been executed or performance and payment bonds have not been approved by the Owner within forty-five (45) days after the scheduled closing time for the receipt of bids, then Bid Securities will be returned within three (3) days after the expiration of this forty-five (45) day period unless the Bid Security has been forfeited under § 4.2.1.1.

**§ 4.2.2** If the Bid Security is provided in the form of a Bid Bond (rather than a certified check), it shall be written on AIA Document A310, Bid Bond, and the attorney-in-fact who executes the bond on behalf of the surety shall affix to the bond a certified and current copy of the power of attorney.

*(Paragraphs deleted)*

## **§ 4.3 SUBMISSION OF BIDS**

### **§ 4.3.1**

*(Paragraphs deleted)*

All copies of the Bid, the bid security, if any, and any other documents required to be submitted with the Bid shall be enclosed in a sealed opaque envelope. The envelope shall be addressed to the party receiving the Bids and shall be identified with the Project name, the Bidder's name and address and, if applicable, the designated portion of the Work for which the Bid is submitted. If the Bid is sent by mail, the sealed envelope shall be enclosed in a separate mailing envelope with the notation "SEALED BID ENCLOSED" on the face thereof.

**§ 4.3.2** Bids shall be deposited at the designated location prior to the time and date for receipt of Bids. Bids received after the time and date for receipt of Bids will be returned unopened.

**§ 4.3.3** The Bidder shall assume full responsibility for timely delivery at the location designated for receipt of Bids.

**§ 4.3.4** Oral, telephonic, telegraphic, facsimile or other electronically transmitted bids will not be considered.

*(Paragraph deleted)*

## **§ 4.4 Modification or Withdrawal of Bid**

**§ 4.4.1** Prior to the date and time designated for receipt of Bids, a Bidder may submit a new Bid to replace a Bid previously submitted, or withdraw its Bid entirely, by notice to the party designated to receive the Bids. Such notice shall be received and duly recorded by the receiving party on or before the date and time set for receipt of Bids. The receiving party shall verify that replaced or withdrawn Bids are removed from the other submitted Bids and not considered. Notice of submission of a replacement Bid or withdrawal of a Bid shall be worded so as not to reveal the amount of the original Bid.

§ 4.4.2 Withdrawn Bids may be resubmitted up to the date and time designated for the receipt of Bids in the same format as that established in Section 4.3, provided they fully conform with these Instructions to Bidders. Bid security shall be in an amount sufficient for the Bid as resubmitted.

§ 4.4.3 After the date and time designated for receipt of Bids, a Bidder who discovers that it made a clerical error in its Bid shall notify the Architect of such error within two days, or pursuant to a timeframe specified by the law of the jurisdiction where the Project is located, requesting withdrawal of its Bid. Upon providing evidence of such error to the reasonable satisfaction of the Architect, the Bid shall be withdrawn and not resubmitted. If a Bid is withdrawn pursuant to this Section 4.4.3, the bid security will be attended to as follows:

*(State the terms and conditions, such as Bid rank, for returning or retaining the bid security.)*

## ARTICLE 5 CONSIDERATION OF BIDS

§ 5.1 OPENING OF BIDS At the discretion of the Owner, if stipulated in the Advertisement or Invitation to Bid, the properly identified Bids received on time will be publicly opened and will be read aloud. An abstract of the Bids may be made available to Bidders.

### § 5.2 REJECTION OF BIDS

The Owner shall have the right to reject any or all Bids. A Bid not accompanied by a required bid security or by other data required by the Bidding Documents, or a Bid which is in any way incomplete or irregular is subject to rejection.

### § 5.3 ACCEPTANCE OF BID (AWARD)

§ 5.3.1 It is the intent of the Owner to award a Contract to the lowest qualified Bidder provided the Bid has been submitted in accordance with the requirements of the Bidding Documents and does not exceed the funds available. The Owner shall have the right to waive informalities and irregularities in a Bid received and to accept the Bid which, in the Owner's judgment, is in the Owner's own best interests.

- .1 The Owner may also reject any Bid not prepared and submitted in accordance with all provisions of the Bidding Documents.

§ 5.3.2 The Owner shall have the right to accept Alternates in any order or combination, unless otherwise specifically provided in the Bidding Documents, and to determine the low Bidder on the basis of the sum of the Base Bid and Alternates accepted.

## ARTICLE 6 POST-BID INFORMATION

### § 6.1 Contractor's Qualification Statement

Bidders to whom award of a Contract is under consideration shall submit to the Architect, upon request a properly executed AIA Document A305™, Contractor's Qualification Statement, unless such a Statement has been previously required and submitted for this Bid.

*(Paragraphs deleted)*

### § 6.3 Submittals

§ 6.3.1 CONTRACTOR'S QUALIFICATION INFORMATION – The apparent low bidder must submit the required pre-award submittal package described below to the Construction Manager within 48 hours after the bids are opened.

Arris Contracting Co., Inc.  
189 Smith Street  
Poughkeepsie, NY 12601  
845-473-3600

Submissions must be emailed and must include the Project Name of this contract in the Subject Line of the Pre-Award submission email.

#### (1) Pre-award Submittal Package

- (i) Fully executed AIA A305 Contractors Qualification Statement (to be submitted with the bid).
- (ii) Most recent financial statement certified by CPA.
- (iii) References and Experience:



1. List of all past contracts with K-12 Public School Districts (Provide Architect & CM Contact Information)
  2. Provide three (3) references (Name, Title, and Phone Number) associated with three (3) different projects (public or private sector) of similar scope and size to the one identified in this contract. Additionally, include the names of two major suppliers used for each of these three (3) projects.
- (2) Workforce and Work Plan – Provide a detailed written Work Plan which shall demonstrate the contractor’s understanding of overall project scope and shall include, but not be limited to, the following
- (i) Sequential listing of specific project activities required to successfully complete the Work of the contract.
    1. Include Critical Milestones
    2. Narrative of project work plan, sequencing, etc.
    3. Include phasing of the Work, if required.
    4. Include listing of long lead items.
    5. Statement that the project can be completed in established time.
  - (ii) Resumes for Contractor’s proposed supervisory staff, including qualifications for specialized expertise or any certification(s) required to perform the Work.
  - (iii) Names of proposed sub-contractors and a listing of the related trade of work and value.
  - (iv) Any special coordination requirements with other trades.
  - (v) Any special storage and staging requirements for construction materials.
- (3) Detailed Cost Estimate:
- (i) A copy of a Detailed Cost Estimate outlined in CSI format.

**§ 6.3.2** The Bidder will be required to establish to the satisfaction of the Architect and Owner the reliability and responsibility of the persons or entities proposed to furnish and perform the Work described in the Bidding Documents.

**§ 6.3.3** Prior to the execution of the Contract, the Architect will notify the Bidder if either the Owner or Architect, after due investigation, has reasonable objection to a person or entity proposed by the Bidder. If the Owner or Architect has reasonable objection to a proposed person or entity, the Bidder may, at the Bidder’s option, withdraw the Bid or submit an acceptable substitute person or entity. The Bidder may also submit any required adjustment in the Base Bid or Alternate Bid to account for the difference in cost occasioned by such substitution. The Owner may accept the adjusted bid price or disqualify the Bidder. In the event of either withdrawal or disqualification, bid security will not be forfeited.

**§ 6.3.4** Persons and entities proposed by the Bidder and to whom the Owner and Architect have made no reasonable objection must be used on the Work for which they were proposed and shall not be changed except with the written consent of the Owner and Architect.

## **ARTICLE 7 PERFORMANCE BOND AND PAYMENT BOND**

### **§ 7.1 BOND REQUIREMENTS**

**§ 7.1.1** The Bidder shall furnish bonds covering the faithful performance of the Contract (performance bond) and payment of all obligations arising thereunder (payment bond). Bonds may be secured through the Bidder’s usual sources unless otherwise required in writing. Bonds may be obtained through the Contractor’s usual source and the cost thereof shall be included in the Bid and Contract Sum. The amount of each bond shall be equal to one hundred (100) percent of the Contract Sum.

**§ 7.1.2** The cost of furnishing performance and payment bonds shall be included in the Bid and Contract Sum.

**§ 7.1.3** If the Owner requires that bonds be secured from other than the Bidder’s usual sources, changes in cost shall be adjusted and included in the Bid and Contract Sum.

*(Paragraphs deleted)*

### **§ 7.2 TIME OF DELIVERY AND FORM OF BONDS**

**§ 7.2.1** The Bidder shall deliver the required bonds to the Owner not later than ten (10) days after the Bidder has received notice of the acceptance of its Bid but in no event shall bonds be delivered later than the date of the executed Contract. If the Work is to be commenced prior thereto in response to a letter of intent, the Bidder shall, prior to commencement of the

Work, submit evidence satisfactory to the Owner that such bonds will be furnished and delivered in accordance with this Section 7.2.1.

§ 7.2.2 Unless otherwise required in writing, the bonds shall be written on AIA Document A312, Performance Bond and Payment Bond. The amount of each bond shall be equal to one hundred (100) percent of the Contract Sum.

- .1 The Performance and Payment Bonds shall have as surety thereunder such surety company or companies as are acceptable to Treasury Department of the United States on Bonds given to the United States Government, and are authorized to do business in the State of New York. Premium on such Bonds shall be included in the Bid.

§ 7.2.3 The bonds shall be dated on or after the date of the Contract.

§ 7.2.4 The Bidder shall require the attorney-in-fact who executes the required bonds on behalf of the surety to affix thereto a certified and current copy of the power of attorney.

## **ARTICLE 8 ENUMERATION OF THE PROPOSED CONTRACT DOCUMENTS**

§ 8.1 Copies of the proposed Contract Documents have been made available to the Bidder and consist of the following documents:

- .1 All Specification Sections and Drawings Listed in Section 00 0110 Table of Contents.

## **ARTICLE 9: TAXES**

*(Paragraphs deleted)*

9.1 The Owner is an organization, which is exempt from New York State and Local Sales and Use Taxes. Materials purchased for use in fulfilling this Contract will be exempt from New York Sales Tax. The Owner will provide the Contractor with a completed Form ST-121.1, Exempt Organization Certification. The Contractor shall present a copy of this Form and a completed Form ST-120.1, Contractor Exempt Purchase Certificate, to each supplier. Should sales tax be assessed, the Owner agrees that the Contract Sum shall be increased by the full amount of such assessment.

REQUESTS FOR  
CLARIFICATION OF BID  
DOCUMENTS**SECTION 003000**  
**REQUESTS FOR CLARIFICATION OF BID DOCUMENTS****PART 1 GENERAL****1.01 SUMMARY**

- A. Requests for clarifications of the Bid Documents shall be submitted by Bidders to the Architect/Engineer via email (send to [arsmith@cplteam.com](mailto:arsmith@cplteam.com)). Requests shall include the following information:
  - 1. Project Name: Suffern Central School District, RP Connor Elementary School, RP Connor - Boiler Conversion.
  - 2. Bidder's name and full contact information.
  - 3. Subject Specification Number.
  - 4. Subject Drawing Number.
  - 5. Clarification request/question.
- B. All valid request for clarifications will be answered via written addendum.

**PART 2 PRODUCTS (NOT USED)****PART 3 EXECUTION (NOT USED)****END OF SECTION 003000**



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**SECTION 003114  
CONSTRUCTION SCHEDULE**

**PART 1 GENERAL**

**1.01 CONSTRUCTION SCHEDULE**

- A. Contractor shall complete work of their Contract per the following Schedule:

| <b>Work</b>   | <b>Start Date<br/>(Date listed or earlier if<br/>permitted by Owner)</b> | <b>Completion Date</b> |
|---------------|--------------------------------------------------------------------------|------------------------|
| Submittals:   | Submittals to begin upon<br>award of Contract.                           |                        |
| Construction: | Upon award of Contract                                                   | September 15, 2024     |

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION (NOT USED)**

**END OF SECTION 003114**

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- B. Liquidated Damages: Suffern Central School District and Contractor recognize that time is of the essence of this Agreement and that Suffern Central School District will suffer financial loss if the Work is not completed by the date specified, plus any extensions thereof allowed in accordance with the General Conditions. They also recognize the delays, expense and difficulties involved in proving in a legal or arbitration proceeding the actual loss suffered by Suffern Central School District if the work is not completed on time. Accordingly, instead of requiring any such proof, Suffern Central School District and Contractor agree that as Liquidated Damages for delay (but not as a penalty) Contractor shall pay Suffern Central School District Five Hundred Dollars (\$500) for each day that expires after the specified.

#### 1.05 SCHEDULE OF WORK

- A. Scheduling of all work shall be coordinated through the District and/or the District's Representative. Contractor shall coordinate their work around the District's needs.
- B. It is the District's intent to work with the Contractor and make the building available for the work to be performed within the time frame allowed.

#### 1.06 ALLOWANCES (REFERENCE SPECIFICATION SECTION 012100)

- A. Specified Allowance as indicated in Specification Section 012100. This amount is to be included in the Base Bid above.

1. Allowance Amount:

|    |                 |
|----|-----------------|
| \$ | (Insert Amount) |
|----|-----------------|

#### 1.07 ALTERNATES (REFERENCE SPECIFICATION SECTION 012300.)

- A. Enter a whole dollar amount, even if it is zero (\$ 0), for each Alternate. Circle "ADD" or "DEDUCT" for each Alternate Bid. If neither is circled, "DEDUCT" will be assumed. Do not leave any Alternate amount blank. If any amount is blank, it will be assumed the Bidder will provide that Alternate for no change, neither increase nor decrease, in Contract Price.

1. Alternate No. MC-1; Remove and upsize each of the unit ventilators existing intake louvers with the manufactures wall louvers per the unit ventilator schedule. Provide manufactures louver with bird screen and grille. Provide new lintels and patch with like construction.:

|            |      |         |
|------------|------|---------|
| ADD/DEDUCT | ( \$ | )       |
|            |      | DOLLARS |

#### 1.08 BID SECURITY

- A. Bid Security in the form of a Certified or Cashier's Check or a Bid Bond in the form required by the Contract Documents is attached to and made a part of this Proposal.

#### 1.09 IRAN DIVESTMENT ACT CERTIFICATION

- A. Contractor to submit with the bid, Iran Divestment Act Certification which hereto is made a part of this Form of Proposal and is attached at the end of this Form of Proposal.

#### 1.10 REPRESENTATIONS

- A. By submitting this Proposal the Bidder represents and certifies to the Owner and the Architect that
1. It has examined the Contract Documents, the site of the proposed Work, is familiar with the local conditions at the place where the Work is to be performed and fully comprehends the requirements and intent of the plans and specifications for this Project in accordance with the drawings, specifications and other Contract Documents prepared by CPL the Owners Consultant, for this Project.
  2. It has examined and reviewed, where applicable, all information and data in the Contract Documents related to existing underground facilities at or contiguous to the site. Bidder shall require of the Owner or Architect no further investigations, explorations, tests or reports with respect to such underground facilities in order for the Bidder to perform the

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Work of the Proposal within the Contract Time and in accordance with the Contract Documents.

3. It has given notice to the Architect, as required by the Contract Documents of any and all discrepancies it has discovered and accepts the resolution of those discrepancies offered by the Architect.
4. Pursuant to New York State General Municipal Law section 103-d, by submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that to the best of knowledge and belief:
  - a. The prices in this bid have been arrived at independently without collusion, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor;
  - b. Unless otherwise required by law, the prices which have been quoted in this bid have not been knowingly disclosed by the bidder and will not be knowingly disclosed by the bidder prior to opening, directly or indirectly, to any other bidder or competitor; and
  - c. No attempt has been made or will be made by bidder to induce any other person, partnership or corporation to submit or not to submit a bid for the purpose of restricting competition.
  - d. The proposal is based upon the materials, equipment and systems required by the Contract Documents, without exception, unless otherwise set forth in this Proposal in detail.

#### **1.11 CHANGE ORDERS**

- A. We propose and agree that the above lump sum shall be adjusted for changes in the Contract Work not included in unit prices by addition of the following costs:
  1. Profit and overhead as permitted in the General Conditions.

#### **1.12 NON-COLLUSIVE BIDDING CERTIFICATION**

- A. By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that to the best of knowledge and belief:
  1. The prices in this bid have been arrived at independently without collusion, consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor;
  2. Unless otherwise required by law, the prices which have been quoted in this bid have not been knowingly disclosed by the bidder and will not knowingly be disclosed by the bidder prior to opening, directly or indirectly, to any other bidder or to any competitor; and
  3. No attempt has been made or will be made by the bidder to induce any other person, partnership or corporation to submit or not to submit a bid for the purpose of restricting competition.

#### **1.13 ACCEPTANCE**

- A. When this Proposal is accepted, the undersigned agrees to enter into a Contract with the Owner as provided in the Form of Agreement.

#### **1.14 AFFIRMS**

- A. The undersigned affirms and agrees that this Proposal is a firm one which remains in effect and will be irrevocable for a period of forty-five (45) days after opening of Bids.

#### **1.15 TYPE OF BUSINESS**

- A. The undersigned hereby represents that it is a (select with circle):
    1. Corporation, Partnership, Individual.
    2. If a Corporation, then the undersigned further represents that it is duly qualified as a Corporation under the laws of New York State and it is authorized to do business in this State.
-

**1.16 PLACE OF BUSINESS**

- A. The following is the name and address of the person to whom all notices required in connection with this Proposal may be telephoned, mailed, or delivered.

|                                            |     |
|--------------------------------------------|-----|
| Name of Contact Person:                    |     |
| Name of Business or Firm:                  |     |
| Address:                                   |     |
| Address:                                   |     |
| Telephone:                                 | Fax |
| Email Address:                             |     |
| FEIN: Federal Employer Identification No.: |     |

**1.17 EXECUTION OF CONTRACT**

- A. When written Notice of Acceptance of the Proposal is mailed or delivered to the undersigned within forty-five (45) days after the opening of Bids, or anytime thereafter should the Proposal not be withdrawn, the undersigned, within ten (10) days, will execute the Form of Agreement with the Owner.

**1.18 ADDENDA**

- A. Any addenda issued by the Architect and mailed or delivered to the undersigned prior to the Bid opening date shall become part of the Contract Documents. The Bidder shall enter on this list any addenda issued after this Form of Proposal has been received and shall fill in the addenda number and date.

|            |        |
|------------|--------|
| Addendum # | Dated: |
| Addendum # | Dated: |
| Addendum # | Dated: |
| Addendum # | Dated: |

**1.19 ASBESTOS**

- A. The bidder certifies that no asbestos or asbestos-containing materials will be incorporated into the Work of this Contract.

**1.20 AUTHORIZED SIGNATURES FOR PROPOSALS**

|                                                     |
|-----------------------------------------------------|
| Individual or Legal Name of Firm or Corporation:    |
| Signature of Representative of Firm or Corporation: |
| Printed Name and Title:                             |
| Date:                                               |
| If Corporation – provide Seal:                      |

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**1.21 IRAN DIVESTMENT ACT CERTIFICATION**

- A. By submission of this bid, (DL & AV Equip 1315), or by assuming the responsibility of a Contract awarded hereunder, each bidder and each person signing on behalf of any bidders, certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that to the best of its knowledge and belief:
1. That each bidder/contractor/assignee is not on the "Entities Determined To Be Non-Responsive Bidders/Offerers Pursuant to The New York State Iran Divestment Act of 2012" list created pursuant to paragraph (b) subdivision 3 of section 165-a of the New York State Finance Law and posted on the OGS website at <http://www.ogs.ny.gov/about/regs/docs/ListofEntities.pdf> and further certifies that it will not utilize on such Contract any subcontractor that is identified on the Prohibited Entities List. Additionally, Bidder/Contractor is advised that should it seek to renew or extend a Contract awarded in response to the solicitation, it must provide the same certification at the time the Contract is renewed or extended. (See Article in the Instructions to Bidders.)

|                                                  |
|--------------------------------------------------|
| Individual or Legal Name of Firm or Corporation: |
|--------------------------------------------------|

|                  |
|------------------|
| Mailing Address: |
|------------------|

|                                                     |
|-----------------------------------------------------|
| Signature of Representative of Firm or Corporation: |
|-----------------------------------------------------|

|                         |
|-------------------------|
| Printed Name and Title: |
|-------------------------|

|       |
|-------|
| Date: |
|-------|

|                               |
|-------------------------------|
| SWORN to before me this date: |
|-------------------------------|

|                                    |
|------------------------------------|
| Notary Public Signature and Stamp: |
|------------------------------------|

**1.22 SEXUAL HARASSMENT POLICY/TRAINING AFFIRMATION**

- A. By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that the bidder has and has implemented a written policy addressing sexual harassment prevention in the workplace and provides annual sexual harassment prevention training to all its employees.

|                     |
|---------------------|
| Name of Contractor: |
|---------------------|

|                           |
|---------------------------|
| Name of Business or Firm: |
|---------------------------|

|          |
|----------|
| Address: |
|----------|

|            |
|------------|
| Telephone: |
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|     |
|-----|
| Fax |
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|                |
|----------------|
| Email Address: |
|----------------|

|                                    |
|------------------------------------|
| Signature and Title of Contractor: |
|------------------------------------|

|       |
|-------|
| Date: |
|-------|

**END OF SECTION 004020**



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**1.05 SCHEDULE OF WORK**

- A. Scheduling of all work shall be coordinated through the District and/or the District's Representative. Contractor shall coordinate their work around the District's needs.
- B. It is the District's intent to work with the Contractor and make the building available for the work to be performed within the time frame allowed.

**1.06 ALLOWANCES (REFERENCE SPECIFICATION SECTION 012100)**

- A. Specified Allowance as indicated in Specification Section 012100. This amount is to be included in the Base Bid above.

- 1. Allowance Amount:

\$

(Insert Amount)

**1.07 BID SECURITY**

- A. Bid Security in the form of a Certified or Cashier's Check or a Bid Bond in the form required by the Contract Documents is attached to and made a part of this Proposal.

**1.08 IRAN DIVESTMENT ACT CERTIFICATION**

- A. Contractor to submit with the bid, Iran Divestment Act Certification which hereto is made a part of this Form of Proposal and is attached at the end of this Form of Proposal.

**1.09 REPRESENTATIONS**

- A. By submitting this Proposal the Bidder represents and certifies to the Owner and the Architect that
  - 1. It has examined the Contract Documents, the site of the proposed Work, is familiar with the local conditions at the place where the Work is to be performed and fully comprehends the requirements and intent of the plans and specifications for this Project in accordance with the drawings, specifications and other Contract Documents prepared by CPL the Owners Consultant, for this Project.
  - 2. It has examined and reviewed, where applicable, all information and data in the Contract Documents related to existing underground facilities at or contiguous to the site. Bidder shall require of the Owner or Architect no further investigations, explorations, tests or reports with respect to such underground facilities in order for the Bidder to perform the Work of the Proposal within the Contract Time and in accordance with the Contract Documents.
  - 3. It has given notice to the Architect, as required by the Contract Documents of any and all discrepancies it has discovered and accepts the resolution of those discrepancies offered by the Architect.
  - 4. Pursuant to New York State General Municipal Law section 103-d, by submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that to the best of knowledge and belief:
    - a. The prices in this bid have been arrived at independently without collusion, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor;
    - b. Unless otherwise required by law, the prices which have been quoted in this bid have not been knowingly disclosed by the bidder and will not be knowingly disclosed by the bidder prior to opening, directly or indirectly, to any other bidder or competitor; and
    - c. No attempt has been made or will be made by bidder to induce any other person, partnership or corporation to submit or not to submit a bid for the purpose of restricting competition.
    - d. The proposal is based upon the materials, equipment and systems required by the Contract Documents, without exception, unless otherwise set forth in this Proposal in detail.

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**1.10 CHANGE ORDERS**

- A. We propose and agree that the above lump sum shall be adjusted for changes in the Contract Work not included in unit prices by addition of the following costs:
1. Profit and overhead as permitted in the General Conditions.

**1.11 NON-COLLUSIVE BIDDING CERTIFICATION**

- A. By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that to the best of knowledge and belief:
1. The prices in this bid have been arrived at independently without collusion, consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices with any other bidder or with any competitor;
  2. Unless otherwise required by law, the prices which have been quoted in this bid have not been knowingly disclosed by the bidder and will not knowingly be disclosed by the bidder prior to opening, directly or indirectly, to any other bidder or to any competitor; and
  3. No attempt has been made or will be made by the bidder to induce any other person, partnership or corporation to submit or not to submit a bid for the purpose of restricting competition.

**1.12 ACCEPTANCE**

- A. When this Proposal is accepted, the undersigned agrees to enter into a Contract with the Owner as provided in the Form of Agreement.

**1.13 AFFIRMS**

- A. The undersigned affirms and agrees that this Proposal is a firm one which remains in effect and will be irrevocable for a period of forty-five (45) days after opening of Bids.

**1.14 TYPE OF BUSINESS**

- A. The undersigned hereby represents that it is a (select with circle):
1. Corporation, Partnership, Individual.
  2. If a Corporation, then the undersigned further represents that it is duly qualified as a Corporation under the laws of New York State and it is authorized to do business in this State.

**1.15 PLACE OF BUSINESS**

- A. The following is the name and address of the person to whom all notices required in connection with this Proposal may be telephoned, mailed, or delivered.

|                                            |     |
|--------------------------------------------|-----|
| Name of Contact Person:                    |     |
| Name of Business or Firm:                  |     |
| Address:                                   |     |
| Address:                                   |     |
| Telephone:                                 | Fax |
| Email Address:                             |     |
| FEIN: Federal Employer Identification No.: |     |

**1.16 EXECUTION OF CONTRACT**

- A. When written Notice of Acceptance of the Proposal is mailed or delivered to the undersigned within forty-five (45) days after the opening of Bids, or anytime thereafter should the Proposal not be withdrawn, the undersigned, within ten (10) days, will execute the Form of Agreement with the Owner.

**1.17 ADDENDA**

- A. Any addenda issued by the Architect and mailed or delivered to the undersigned prior to the Bid opening date shall become part of the Contract Documents. The Bidder shall enter on this list any addenda issued after this Form of Proposal has been received and shall fill in the addenda number and date.

|            |        |
|------------|--------|
| Addendum # | Dated: |
| Addendum # | Dated: |
| Addendum # | Dated: |
| Addendum # | Dated: |

**1.18 ASBESTOS**

- A. The bidder certifies that no asbestos or asbestos-containing materials will be incorporated into the Work of this Contract.

**1.19 AUTHORIZED SIGNATURES FOR PROPOSALS**

|                                                     |
|-----------------------------------------------------|
| Individual or Legal Name of Firm or Corporation:    |
| Signature of Representative of Firm or Corporation: |
| Printed Name and Title:                             |
| Date:                                               |
| If Corporation – provide Seal:                      |

**1.20 IRAN DIVESTMENT ACT CERTIFICATION**

- A. By submission of this bid, (DL & AV Equip 1315), or by assuming the responsibility of a Contract awarded hereunder, each bidder and each person signing on behalf of any bidders, certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that to the best of its knowledge and belief:
- That each bidder/contractor/assignee is not on the "Entities Determined To Be Non-Responsive Bidders/Offerers Pursuant to The New York State Iran Divestment Act of 2012" list created pursuant to paragraph (b) subdivision 3 of section 165-a of the New York State Finance Law and posted on the OGS website at <http://www.ogs.ny.gov/about/regs/docs/ListofEntities.pdf> and further certifies that it will not utilize on such Contract any subcontractor that is identified on the Prohibited Entities List. Additionally, Bidder/Contractor is advised that should it seek to renew or extend a Contract awarded in response to the solicitation, it must provide the same certification at the time the Contract is renewed or extended. (See Article in the Instructions to Bidders.)

|                                                     |
|-----------------------------------------------------|
| Individual or Legal Name of Firm or Corporation:    |
| Mailing Address:                                    |
| Signature of Representative of Firm or Corporation: |

---

|                                    |
|------------------------------------|
| Printed Name and Title:            |
| Date:                              |
| SWORN to before me this date:      |
| Notary Public Signature and Stamp: |

**1.21 SEXUAL HARASSMENT POLICY/TRAINING AFFIRMATION**

- A. By submission of this bid, each bidder and each person signing on behalf of any bidder certifies, and in the case of a joint bid each party thereto certifies as to its own organization, under penalty of perjury, that the bidder has and has implemented a written policy addressing sexual harassment prevention in the workplace and provides annual sexual harassment prevention training to all its employees.

|                                                   |
|---------------------------------------------------|
| Name of Contractor:                               |
| Name of Business or Firm:                         |
| Address:                                          |
| Telephone: <span style="float: right;">Fax</span> |
| Email Address:                                    |
| Signature and Title of Contractor:                |
| Date:                                             |

**END OF SECTION 004040**

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**SECTION 004510  
ASBESTOS NOTIFICATION**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Attached Asbestos Notification form.
  - 1. The attached form shall be submitted to the Architect/Engineer by each Contractor in accordance with the Contract Documents prior to performing any work.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION (NOT USED)**

**END OF SECTION**



---

**ASBESTOS NOTIFICATION**

**THE ASBESTOS HAZARD EMERGENCY RESPONSE ACT (AHERA) REQUIRES SCHOOL DISTRICTS TO INFORM ALL NON-DISTRICT EMPLOYEES (CONTRACTORS, VENDORS, ETC.) WHO PERFORM SHORT TERM WORK IN A SCHOOL BUILDING OF THE LOCATIONS OF ANY KNOWN OR ASSUMED ASBESTOS CONTAINING BUILDING MATERIALS IN THE SCHOOL.**

**EXPOSURE TO ASBESTOS FIBERS CAN BE HAZARDOUS TO ONE'S HEALTH AND TO THE HEALTH OF THE BUILDING OCCUPANTS. *PRECAUTIONS MUST BE TAKEN TO PREVENT THE DISTURBANCE OF ASBESTOS CONTAINING BUILDING MATERIALS.***

**THE OWNER HAS AN ASBESTOS MANAGEMENT PLAN THAT INDICATES THE SPECIFIC LOCATIONS WHERE ASBESTOS IS KNOWN TO EXIST.**

**PLEASE PROCEED WITH CAUTION AND REMEMBER THAT THE OWNER'S BUILDINGS ARE FOR CHILDREN. NO WORK MAY BEGIN, UNTIL THE CONTRACTOR CERTIFIES, BY SIGNATURE BELOW, THAT THEY:**

Have contacted the Owner's Facilities Director to inform him/her of the scope of work.

Have been informed by the Owner's Facilities Director of any known asbestos containing materials.

Will take adequate measures to prevent the disturbance of asbestos fibers to the largest extent possible.

Will inform any sub-contractors of the location of any asbestos containing materials and will require these sub-contractors to take adequate measures to prevent the disturbance of asbestos fibers.

Will immediately contact the Owner's Facilities Director if asbestos fibers are disturbed.

|                                     |  |
|-------------------------------------|--|
| <b>NAME OF CONTRACTOR (PRINTED)</b> |  |
|                                     |  |

|                        |  |
|------------------------|--|
| <b>TITLE (PRINTED)</b> |  |
|                        |  |

|                                        |  |
|----------------------------------------|--|
| <b>ADDRESS OF CONTRACTOR (PRINTED)</b> |  |
|                                        |  |

|                                        |  |
|----------------------------------------|--|
| <b>ADDRESS OF CONTRACTOR (PRINTED)</b> |  |
|                                        |  |

|                  |  |
|------------------|--|
| <b>SIGNATURE</b> |  |
|------------------|--|

|  |             |
|--|-------------|
|  | <b>DATE</b> |
|--|-------------|

**SECTION 005100  
A101 AGREEMENT COVER**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. The "Standard Form of Agreement Between Owner and Contractor where the Basis of Payment is a Stipulated Sum," AIA Document A101-2017, is bound with this Section. AIA Document A101 adopts by reference, and is designed for use with, AIA Document A201-2017, General Conditions of the Contract for Construction.

**PART 2 PRODUCTS (NOT APPLICABLE)**

**PART 3 EXECUTION (NOT APPLICABLE)**

**END OF SECTION 005100**

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# AIA® Document A101® – 2017

## **Standard Form of Agreement Between Owner and Contractor where the basis of payment is a Stipulated Sum**

**AGREEMENT** made as of the       day of       in the year  
(In words, indicate day, month and year.)

**BETWEEN** the Owner:  
(Name, legal status, address and other information)

SUFFERN CENTRAL SCHOOL DISTRICT  
45 Mountain Avenue  
Hillburn, New York 10931

and the Contractor:  
(Name, legal status, address and other information)

for the following Project:  
(Name, location and detailed description)

RP Connor Elementary School  
Heating System Conversion  
13 Cypress Road  
Suffern, NY 10901  
SED #50-04-01-06-0-005-021

The Architect:  
(Name, legal status, address and other information)

CPL  
50 Front Street, Suite 202  
Newburgh, NY 12550

The Owner and Contractor agree as follows.

### **ADDITIONS AND DELETIONS:**

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

The parties should complete A101®-2017, Exhibit A, Insurance and Bonds, contemporaneously with this Agreement. AIA Document A201®-2017, General Conditions of the Contract for Construction, is adopted in this document by reference. Do not use with other general conditions unless this document is modified.

Init.

## TABLE OF ARTICLES

|   |                                                 |
|---|-------------------------------------------------|
| 1 | THE CONTRACT DOCUMENTS                          |
| 2 | THE WORK OF THIS CONTRACT                       |
| 3 | DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION |
| 4 | CONTRACT SUM                                    |
| 5 | PAYMENTS                                        |
| 6 | DISPUTE RESOLUTION                              |
| 7 | TERMINATION OR SUSPENSION                       |
| 8 | MISCELLANEOUS PROVISIONS                        |
| 9 | ENUMERATION OF CONTRACT DOCUMENTS               |

### ARTICLE 1 THE CONTRACT DOCUMENTS

The Contract Documents consist of this Agreement, Conditions of the Contract (General, Supplementary, and other Conditions), Drawings, Specifications, Addenda issued prior to execution of this Agreement, other documents listed in this Agreement, and Modifications issued after execution of this Agreement, all of which form the Contract, and are as fully a part of the Contract as if attached to this Agreement or repeated herein. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. An enumeration of the Contract Documents, other than a Modification, appears in Article 9.

### ARTICLE 2 THE WORK OF THIS CONTRACT

The Contractor shall fully execute the Work described in the Contract Documents, except as specifically indicated in the Contract Documents to be the responsibility of others.

### ARTICLE 3 DATE OF COMMENCEMENT AND SUBSTANTIAL COMPLETION

§ 3.1 The date of commencement of the Work shall be:

*(Check one of the following boxes.)*

- ☒ [ X ] The date of this Agreement.
- ☐ [ ] A date set forth in a notice to proceed issued by the Owner.
- ☐ [ ] Established as follows:  
*(Insert a date or a means to determine the date of commencement of the Work.)*

If a date of commencement of the Work is not selected, then the date of commencement shall be the date of this Agreement.

§ 3.2 The Contract Time shall be measured from the date of commencement of the Work.

#### § 3.3 Substantial Completion

§ 3.3.1 Subject to adjustments of the Contract Time as provided in the Contract Documents, the Contractor shall achieve Substantial Completion of the entire Work:

*(Check one of the following boxes and complete the necessary information.)*

- ☐ [ ] Not later than ( ) calendar days from the date of commencement of the Work.

Init.

[ ] By the following date:

§ 3.3.2 Subject to adjustments of the Contract Time as provided in the Contract Documents, if portions of the Work are to be completed prior to Substantial Completion of the entire Work, the Contractor shall achieve Substantial Completion of such portions by the following dates:

| Portion of Work | Substantial Completion Date |
|-----------------|-----------------------------|
|-----------------|-----------------------------|

§ 3.3.3 If the Contractor fails to achieve Substantial Completion as provided in this Section 3.3, liquidated damages, if any, shall be assessed as set forth in Section 4.5.

#### ARTICLE 4 CONTRACT SUM

§ 4.1 The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be (\$ ), subject to additions and deductions as provided in the Contract Documents.

##### § 4.2 Alternates

§ 4.2.1 Alternates, if any, included in the Contract Sum:

| Item | Price |
|------|-------|
|------|-------|

§ 4.2.2 Subject to the conditions noted below, the following alternates may be accepted by the Owner following execution of this Agreement. Upon acceptance, the Owner shall issue a Modification to this Agreement.  
(Insert below each alternate and the conditions that must be met for the Owner to accept the alternate.)

| Item | Price | Conditions for Acceptance |
|------|-------|---------------------------|
|------|-------|---------------------------|

§ 4.3 Allowances, if any, included in the Contract Sum:  
(Identify each allowance.)

| Item | Price |
|------|-------|
|------|-------|

§ 4.4 Unit prices, if any:  
(Identify the item and state the unit price and quantity limitations, if any, to which the unit price will be applicable.)

| Item | Units and Limitations | Price per Unit (\$0.00) |
|------|-----------------------|-------------------------|
|------|-----------------------|-------------------------|

§ 4.5 Liquidated damages, if any:  
(Insert terms and conditions for liquidated damages, if any.)

§ 4.6 Other:  
(Insert provisions for bonus or other incentives, if any, that might result in a change to the Contract Sum.)

#### ARTICLE 5 PAYMENTS

##### § 5.1 Progress Payments

§ 5.1.1 Based upon Applications for Payment submitted to the Architect by the Contractor and Certificates for Payment issued by the Architect, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

Init.

§ 5.1.2 The period covered by each Application for Payment shall be one calendar month ending on the last day of the month, or as follows:

§ 5.1.3 Provided that an Application for Payment is received by the Architect not later than the 25th day of a month, the Owner shall make payment of the amount certified to the Contractor not later than the 15th day of the next month. If an Application for Payment is received by the Architect after the application date fixed above, payment of the amount certified shall be made by the Owner not later than thirty ( 30 ) days after the Architect receives the Application for Payment.

*(Federal, state or local laws may require payment within a certain period of time.)*

§ 5.1.4 Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form, and supported by such data to substantiate its accuracy, as the Architect may require. This schedule of values shall be used as a basis for reviewing the Contractor's Applications for Payment.

§ 5.1.5 Applications for Payment shall show the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.

§ 5.1.6 In accordance with AIA Document A201, General Conditions of the Contract for Construction, and subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:

§ 5.1.6.1 The amount of each progress payment shall first include:

- .1 That portion of the Contract Sum properly allocable to completed Work;
- .2 That portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction, or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing; and
- .3 That portion of Construction Change Directives that the Architect determines, in the Architect's professional judgment, to be reasonably justified.

§ 5.1.6.2 The amount of each progress payment shall then be reduced by:

- .1 The aggregate of any amounts previously paid by the Owner;
- .2 The amount, if any, for Work that remains uncorrected and for which the Architect has previously withheld a Certificate for Payment as provided in Article 9 of AIA Document A201;
- .3 Any amount for which the Contractor does not intend to pay a Subcontractor or material supplier, unless the Work has been performed by others the Contractor intends to pay;
- .4 For Work performed or defects discovered since the last payment application, any amount for which the Architect may withhold payment, or nullify a Certificate of Payment in whole or in part, as provided in Article 9 of AIA Document A201; and
- .5 Retainage withheld pursuant to Section 5.1.7.

#### § 5.1.7 Retainage

§ 5.1.7.1 For each progress payment made prior to Substantial Completion of the Work, the Owner may withhold the following amount, as retainage, from the payment otherwise due:

*(Insert a percentage or amount to be withheld as retainage from each Application for Payment. The amount of retainage may be limited by governing law.)*

Five Percent (5%)

§ 5.1.7.1.1 The following items are not subject to retainage:

*(Insert any items not subject to the withholding of retainage, such as general conditions, insurance, etc.)*

Init.

§ 5.1.7.2 Reduction or limitation of retainage, if any, shall be as follows:

*(If the retainage established in Section 5.1.7.1 is to be modified prior to Substantial Completion of the entire Work, including modifications for Substantial Completion of portions of the Work as provided in Section 3.3.2, insert provisions for such modifications.)*

None.

§ 5.1.7.3 Except as set forth in this Section 5.1.7.3, upon Substantial Completion of the Work, the Contractor may submit an Application for Payment that includes the retainage withheld from prior Applications for Payment pursuant to this Section 5.1.7. The Application for Payment submitted at Substantial Completion shall not include retainage as follows:

*(Insert any other conditions for release of retainage upon Substantial Completion.)*

§ 5.1.8 If final completion of the Work is materially delayed through no fault of the Contractor, the Owner shall pay the Contractor any additional amounts in accordance with Article 9 of AIA Document A201.

§ 5.1.9 Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

## § 5.2 Final Payment

§ 5.2.1 Final payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when

- .1 the Contractor has fully performed the Contract except for the Contractor's responsibility to correct Work as provided in Article 12 of AIA Document A201, and to satisfy other requirements, if any, which extend beyond final payment; and
- .2 a final Certificate for Payment has been issued by the Architect.

§ 5.2.2 The Owner's final payment to the Contractor shall be made no later than 30 days after the issuance of the Architect's final Certificate for Payment, or as follows:

## § 5.3 Interest

Payments due and unpaid under the Contract shall bear interest from the date payment is due at the rate stated below, or in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

*(Insert rate of interest agreed upon, if any.)*

As per Section 106-b of the General Municipal Law.

## ARTICLE 6 DISPUTE RESOLUTION

### § 6.1 Initial Decision Maker

The Architect will serve as the Initial Decision Maker pursuant to Article 15 of AIA Document A201-2017, unless the parties appoint below another individual, not a party to this Agreement, to serve as the Initial Decision Maker.

*(If the parties mutually agree, insert the name, address and other contact information of the Initial Decision Maker, if other than the Architect.)*

### § 6.2 Binding Dispute Resolution

For any Claim subject to, but not resolved by, mediation pursuant to Article 15 of AIA Document A201-2017, the method of binding dispute resolution shall be as follows:

*(Check the appropriate box.)*

Init.



- ☐ Arbitration pursuant to Section 15.4 of AIA Document A201–2017
- ☒ Litigation in a court of competent jurisdiction
- ☐ Other *(Specify)*

If the Owner and Contractor do not select a method of binding dispute resolution, or do not subsequently agree in writing to a binding dispute resolution method other than litigation, Claims will be resolved by litigation in a court of competent jurisdiction.

#### ARTICLE 7 TERMINATION OR SUSPENSION

§ 7.1 The Contract may be terminated by the Owner or the Contractor as provided in Article 14 of AIA Document A201.

§ 7.1.1 If the Contract is terminated for the Owner's convenience in accordance with Article 14 of AIA Document A201, then the Owner shall pay the Contractor a termination fee as follows:

*(Insert the amount of, or method for determining, the fee, if any, payable to the Contractor following a termination for the Owner's convenience.)*

§ 7.2 The Work may be suspended by the Owner as provided in Article 14 of AIA Document A201.

#### ARTICLE 8 MISCELLANEOUS PROVISIONS

§ 8.1 Where reference is made in this Agreement to a provision of AIA Document A201 or another Contract Document, the reference refers to that provision as amended or supplemented by other provisions of the Contract Documents.

§ 8.2 The Owner's representative:

*(Name, address, email address, and other information)*

John Palma  
Director of Facilities  
Suffern Central School District  
45 Mountain Avenue  
Hillburn, NY 10931

§ 8.3 The Contractor's representative:

*(Name, address, email address, and other information)*

§ 8.4 Neither the Owner's nor the Contractor's representative shall be changed without ten days' prior notice to the other party.

#### § 8.5 Insurance and Bonds

§ 8.5.1 The Owner and the Contractor shall purchase and maintain insurance as set forth in the Contract Documents.

§ 8.5.2 The Contractor shall provide bonds as set forth in the Contract Documents.

Init.

§ 8.6 Notice in electronic format, pursuant to Article 1 of AIA Document A201, may be given in accordance with AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, if completed, or as otherwise set forth below:

*(If other than in accordance with AIA Document E203–2013, insert requirements for delivering notice in electronic format such as name, title, and email address of the recipient and whether and how the system will be required to generate a read receipt for the transmission.)*

§ 8.7 Other provisions:

## ARTICLE 9 ENUMERATION OF CONTRACT DOCUMENTS

§ 9.1 This Agreement is comprised of the following documents:

- .1 AIA Document A101, Standard Form of Agreement Between Owner and Contractor
- .2 AIA Document A101, Exhibit A, Insurance and Bonds
- .3 AIA Document A201, General Conditions of the Contract for Construction
- .4 AIA Document E203, Building Information Modeling and Digital Data Exhibit, dated as indicated below:

*(Insert the date of the E203-2013 incorporated into this Agreement.)*

.5 Drawings

| Number | Title | Date |
|--------|-------|------|
|--------|-------|------|

.6 Specifications

| Section | Title | Date | Pages |
|---------|-------|------|-------|
|---------|-------|------|-------|

.7 Addenda, if any:

| Number | Date | Pages |
|--------|------|-------|
|--------|------|-------|

Portions of Addenda relating to bidding or proposal requirements are not part of the Contract Documents unless the bidding or proposal requirements are also enumerated in this Article 9.

.8 Other Exhibits:

*(Check all boxes that apply and include appropriate information identifying the exhibit where required.)*

☐ AIA Document E204, Sustainable Projects Exhibit, dated as indicated below:  
*(Insert the date of the E204-2017 incorporated into this Agreement.)*

☐ The Sustainability Plan:

| Title | Date | Pages |
|-------|------|-------|
|-------|------|-------|

Init.

[ ] Supplementary and other Conditions of the Contract:

| Document | Title | Date | Pages |
|----------|-------|------|-------|
|----------|-------|------|-------|

**.9 Other documents, if any, listed below:**

*(List here any additional documents that are intended to form part of the Contract Documents. AIA Document A201 provides that the advertisement or invitation to bid, Instructions to Bidders, sample forms, the Contractor's bid or proposal, portions of Addenda relating to bidding or proposal requirements, and other information furnished by the Owner in anticipation of receiving bids or proposals, are not part of the Contract Documents unless enumerated in this Agreement. Any such documents should be listed here only if intended to be part of the Contract Documents.)*

The Contract Documents also include the Advertisement or Invitation to Bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, and portions of Addenda relating to bidding.

This Agreement entered into as of the day and year first written above.

\_\_\_\_\_  
**OWNER (Signature)**

\_\_\_\_\_  
**CONTRACTOR (Signature)**

\_\_\_\_\_  
*(Printed name and title)*

\_\_\_\_\_  
*(Printed name and title)*

Init.

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**SECTION 006000**  
**PROJECT FORMS AND RELATED DOCUMENTS**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. This Section lists the project forms used for administration of the project.

**1.02 FORMS**

- A. The following forms are provided in this Section:
1. FRONT END SUBMITTAL LOG
  2. REQUEST FOR INFORMATION (RFI) FORM
  3. SUBCONTRACTOR LIST
  4. ALLOWANCE DISBURSEMENT AUTHORIZATION FORM
  5. SUBSTITUTION REQUEST FORM
  6. SUBMITTAL COVER
  7. INFORMATION BULLETIN
  8. AIA FORMS (Forms provided are samples. Original AIA Documents shall be used):
    - a. Contractor's Qualification Statement (AIA Document A305).
    - b. Bid Bond (AIA Document A310).
    - c. Performance Bond (AIA Document A312).
    - d. Change Order (AIA Document G701).
    - e. Application and Certificate for Payment (AIA Document G702 and Continuation Sheet (AIA Document G703).
    - f. Certification of Substantial Completion (AIA Document G704).
    - g. Contractor's Affidavit of Payment of Debts and Claims (AIA Document G706).
    - h. Contractor's Affidavit of Release of Liens (AIA Document G706A).
    - i. Consent of Surety to Final Payment (AIA Document G707).
    - j. Work Changes Proposal Request (AIA Document G709).
    - k. Architect's Supplemental Instructions (AIA Document G710).
    - l. Construction Change Directive (AIA Document G714).
    - m. Supplemental Attachment for ACORD Certificate of Insurance 25-S (AIA Document G715).

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION**

**3.01 PROCEDURES**

- A. Front End Submittal Log: This document is a checklist of the required submissions. Refer to Bidding Requirements, Section entitled "Instructions to Bidders" and Division 1, Specification Section entitled "SUBMITTAL PROCEDURES" for submission procedures.
- B. Project Request For Information (RFI) Form: This form is to be used for information requests. The forms are filled out by any party to the contract and sent to the Architect/Engineer. The Architect/Engineer shall number RFI before processing.
- C. Subcontractor List: This document is to be used identify subcontractors. The forms are filled out by each Prime Contractor for all proposed subcontractors and sent to the Architect/Engineer in accordance with. Division 1, section entitled "SUBMITTAL PROCEDURES"
- D. Allowance Disbursement Authorization Form: the Architect/Engineer shall issue this document after all parties have agreed to the conditions of change to be charged to the Allowance Amount in accordance with Division 1, section entitled "ALLOWANCES", if required.
-

- 
- E. Substitution Request Form: This document is to be used for a Contractor to propose substitutions. The forms are filled out by each Prime Contractor and sent to the Architect/Engineer in accordance with. Division 1, section entitled "SUBMITTAL PROCEDURES" and "PRODUCT REQUIREMENTS".
  - F. Submittal Cover: This document is to be used for submittal submissions. The forms are filled out by each Prime Contractor and sent to the Architect/Engineer in accordance with. Division 1, section entitled "SUBMITTAL PROCEDURES"
  - G. Information Bulletin: The Architect/Engineer shall issue this document for 3 actions.
    - 1. PROPOSAL REQUEST: A quotations for changes in the Contract Sum and / or proposed modifications to the Contract Documents
    - 2. SUPPLEMENTAL INSTRUCTIONS: Instructions for changes to the Contract Documents without additional cost or time
    - 3. CONSTRUCTION CHANGE AUTHORIZATION: A directive to immediately proceed with changes to the work of the contract and to submit final cost for inclusion into a Change Order

**END OF SECTION 006000**



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## FRONT END SUBMITTAL LOG

---

### SUFFERN CENTRAL SCHOOL DISTRICT RP CONNOR ELEMENTARY SCHOOL HEATING SYSTEM CONVERSION

---

Contractor Name: \_\_\_\_\_

---

#### SUBMISSIONS

---

| Submission             | Date      |          | Remarks |
|------------------------|-----------|----------|---------|
|                        | Submitted | Approved |         |
| Contract:              |           |          |         |
| Schedule of Values:    |           |          |         |
| Bonds:                 |           |          |         |
| Insurance:             |           |          |         |
| Workers Compensation:  |           |          |         |
| Automobile Insurance:  |           |          |         |
| Safety Program:        |           |          |         |
| Construction Schedule: |           |          |         |
| Submittal Schedule:    |           |          |         |
| Emergency Contact:     |           |          |         |
| Substitution List:     |           |          |         |
| Subcontractor List:    |           |          |         |
| Project Manager:       |           |          |         |
| Superintendent:        |           |          |         |

*This log is to be used by the Contractor to monitor and complete the required front-end submissions.*



|                                |                |
|--------------------------------|----------------|
| <b>REQUEST FOR INFORMATION</b> | <b>RFI No:</b> |
|                                | <b>Date:</b>   |

**SUFFERN CENTRAL SCHOOL DISTRICT  
RP CONNOR ELEMENTARY SCHOOL  
HEATING SYSTEM CONVERSION**

Contract: \_\_\_\_\_

To: \_\_\_\_\_

From: \_\_\_\_\_

Copies to: \_\_\_\_\_

**WE REQUEST YOUR ATTENTION (OR CONFIRMATION) REGARDING THE FOLLOWING:**

*(Fully describe the question or type of information requested)*

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

*(List specific documents researched when seeking the information requested.)*

Specifications: \_\_\_\_\_ Drawings: \_\_\_\_\_

Other: \_\_\_\_\_

Sender's Recommendation: \_\_\_\_\_

Receiver's Reply: \_\_\_\_\_

Note: This reply is not an authorization to proceed with work involving additional cost, time or both. If any reply requires a change to the Contract Documents, a Change Order or a Construction Change Directive must be executed in accordance with the Contract Documents.

By: \_\_\_\_\_ Date: \_\_\_\_\_







---

**SUBCONTRACTOR LIST**

---

**SUFFERN CENTRAL SCHOOL DISTRICT  
RP CONNOR ELEMENTARY SCHOOL  
HEATING SYSTEM CONVERSION**

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To:

**CPL**

50 Front Street, Suite 202  
Newburgh, New York 12550

From:

(Contractor) \_\_\_\_\_

Contractors No.: \_\_\_\_\_

Contract For: \_\_\_\_\_

---

List Subcontractors proposed for use on this Project as required by the Construction Documents.  
Attach supplemental sheets if necessary.

Section

No.: \_\_\_\_\_

Section Title: \_\_\_\_\_

Firm

Name: \_\_\_\_\_

Con-

tact: \_\_\_\_\_

Address: \_\_\_\_\_

---

Section

No.: \_\_\_\_\_

Section Title: \_\_\_\_\_

Firm

Name: \_\_\_\_\_

Con-

tact: \_\_\_\_\_

Address: \_\_\_\_\_

---

Section

No.: \_\_\_\_\_

Section Title: \_\_\_\_\_

Firm

Name: \_\_\_\_\_

Con-

tact: \_\_\_\_\_

Address: \_\_\_\_\_

---

Section

No.: \_\_\_\_\_

Section Title: \_\_\_\_\_

Firm

Name: \_\_\_\_\_

Con-

tact: \_\_\_\_\_

Address: \_\_\_\_\_

---

Section

No.: \_\_\_\_\_

Section Title: \_\_\_\_\_

---

☐ Attachment(s)

Signed by: \_\_\_\_\_

Date: \_\_\_\_\_

Copies: ☐ Owner

☐ Consultants

☐ File

☐

☐

☐

---



## Allowance Disbursement Authorization

Owner  
Construction Manager  
Architect  
Contractor  
Field  
Other

|   |
|---|
| X |
|   |
| X |
| X |
|   |
|   |

### Project:

Suffern Central School District  
RP Connor Elementary School  
Heating System Conversion

**Allowance Disbursement No.** \_\_\_\_\_

**Initiation Date:** \_\_\_\_\_

**Original Contract For:** \_\_\_\_\_

**Contract Date:** \_\_\_\_\_

### TO CONTRACTOR:

Name  
Address

### Description of work to be charged to Contract is as follows:

1. xxx.

\$ \_\_\_\_\_ -  
\$ \_\_\_\_\_ -

### Not valid until signed by Owner, Architect, CM, and Contractor

|                                                                 |            |
|-----------------------------------------------------------------|------------|
| The Original Contract Allowance:                                | \$ _____ - |
| Net Allowance Disbursements previously authorized:              | \$ _____ - |
| Contract Allowance prior to this Allowance:                     | \$ _____ - |
| Charges to Contract Allowance as a result of this authorization | \$ _____ - |
| New Contract Allowance Balance including this authorization     | \$ _____ - |

### Owner:

Suffern Central School District  
45 Mountain Avenue  
Hillburn, NY 10931

### Architect:

CPL  
50 Front Street, Suite 202  
Newburgh, NY 12550

### Contractor:

Name  
Address  
0

\_\_\_\_\_  
Name Date

\_\_\_\_\_  
Name Date

\_\_\_\_\_  
Name Date





SUBSTITUTION REQUEST FORM

**SUFFERN CENTRAL SCHOOL DISTRICT  
RP CONNOR ELEMENTARY SCHOOL  
HEATING SYSTEM CONVERSION**

To: **CPL** From: \_\_\_\_\_  
(Contractor) \_\_\_\_\_  
50 Front Street, Suite 202  
Newburgh, New York 12550

Re: \_\_\_\_\_ Substitution Request Number: \_\_\_\_\_

Contract For: \_\_\_\_\_

Specification Title: \_\_\_\_\_ Description: \_\_\_\_\_

Section Number: \_\_\_\_\_ Page: \_\_\_\_\_ Part/Paragraph: \_\_\_\_\_

Proposed Substitution: \_\_\_\_\_

Manufacturer: \_\_\_\_\_ Address: \_\_\_\_\_ Phone: \_\_\_\_\_

Trade Name: \_\_\_\_\_ Model No.: \_\_\_\_\_

Installer: \_\_\_\_\_ Address: \_\_\_\_\_ Phone: \_\_\_\_\_

History: ☐ New product ☐ 2-5 years old ☐ 5-10 yrs old ☐ More than 10 years old

Differences between proposed substitution and specified product: \_\_\_\_\_

☐ Point-by-point comparative data attached

Reason for not providing specified item: \_\_\_\_\_

Similar Installation:

Project: \_\_\_\_\_ Architect/Engineer: \_\_\_\_\_

Contractor: \_\_\_\_\_ Owner: \_\_\_\_\_

\_\_\_\_\_ Date Installed: \_\_\_\_\_

Proposed substitution affects other parts of Work:

☐ No

☐ Yes, explain \_\_\_\_\_

Savings to Owner for accepting substitution: \_\_\_\_\_ (\$ \_\_\_\_\_)

Proposed substitution changes Contract Time: ☐ Yes, explain ☐ No ☐ Yes [Add] [Deduct] \_\_\_\_\_ days

Supporting Data Attached: ☐ Drawings ☐ Product Data ☐ Samples ☐ Tests ☐ Reports ☐ \_\_\_\_\_

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted By: \_\_\_\_\_

Signed By: \_\_\_\_\_

Firm: \_\_\_\_\_

Address \_\_\_\_\_

Phone: \_\_\_\_\_

Attachments: \_\_\_\_\_

---

#### REVIEW AND ACTION

- ☐ Substitution approved - Make submittals in accordance with Specification Section 013300.
- ☐ Substitution approved as noted - Make submittals in accordance with Specification Section 013300.
- ☐ Substitution rejected - Use specified materials.
- ☐ Substitution Request received too late - Use specified materials.

Signed By: \_\_\_\_\_ Date: \_\_\_\_\_

---

#### Additional

Comments: ☐ Contractor ☐ Subcontractor ☐ Supplier ☐ Manufacturer ☐ Architect/Engineer

☐ \_\_\_\_\_

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# SUBMITTAL COVER SHEET

(Attach to each copy of each submittal)

## CPL

50 Front Street, Suite 202  
Newburgh, New York 12550  
Phone: (800) 274 - 9000



**Clark Patterson Lee**  
DESIGN PROFESSIONALS

Submittal No. \_\_\_\_\_

Contractor: \_\_\_\_\_

Address: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Phone / Fax: ( ) \_\_\_\_\_ ( ) \_\_\_\_\_

Architect Project No: 13296.23

Contractor's Number: \_\_\_\_\_

Project Name:  
Suffern Central School District  
RP Connor Elementary School  
Heating System Conversion

### TYPE OF SUBMITTAL

(Check one)

- |                                        |                                          |                                          |
|----------------------------------------|------------------------------------------|------------------------------------------|
| <input type="checkbox"/> Product Data  | <input type="checkbox"/> Color Samples   | <input type="checkbox"/> O&M Manual      |
| <input type="checkbox"/> Shop Drawings | <input type="checkbox"/> Product Samples | <input type="checkbox"/> Record Document |
| <input type="checkbox"/> Other         |                                          |                                          |

**DATE RECEIVED BY  
ARCHITECT:** \_\_\_\_\_

**DATE RETURNED TO  
CONTRACTOR:** \_\_\_\_\_

### SUBSTITUTION

See General Conditions

☐ YES ☐ NO

### PRODUCT IDENTIFICATION

Specification Section No: \_\_\_\_\_

Part/Paragraph: \_\_\_\_\_

Contract Dwg. Number: \_\_\_\_\_

Detail Reference: \_\_\_\_\_

Product: \_\_\_\_\_

Manufacturer: \_\_\_\_\_

### CONTRACTOR'S APPROVAL

This submittal has been reviewed and approved by the Contractor in accordance with the General Conditions.

**By:** \_\_\_\_\_ **Date:** \_\_\_\_\_

### DEVIATION FROM CONTRACT DOCUMENTS:

### CONTRACTOR COMMENTS:

### FOR USE BY CPL

#### ARCHITECT/ENGINEER'S STAMP

- |                                               |                                            |
|-----------------------------------------------|--------------------------------------------|
| <input type="checkbox"/> No Exception Taken   | <input type="checkbox"/> Revise & Resubmit |
| <input type="checkbox"/> Furnish as Corrected | <input type="checkbox"/> Rejected          |

Corrections or comments made on the submittal during this review do not relieve the Contractor from compliance with the requirements of the Contract Documents. This review is only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor is responsible for: confirming and correlating all quantities and dimensions; selecting fabrication processes and techniques of construction; coordinating his work with that of all other trades; and performing his work in a safe and satisfactory manner.

**Clark Patterson Lee**

Date: \_\_\_\_\_ By: \_\_\_\_\_

### ARCHITECT/ENGINEER'S COMMENTS:







Clark Patterson Lee  
DESIGN PROFESSIONALS

## INFORMATION BULLETIN

PROJECT: Suffern Central School District INFORMATION BULLETIN NO.: \_\_\_\_\_  
RP Connor Elementary School  
Heating System Conversion  
DATE: \_\_\_\_\_

OWNER: \_\_\_\_\_ ARCHITECT'S PROJECT NO.: 13296.23

CONTRACTOR: \_\_\_\_\_ CONTRACT NO.: \_\_\_\_\_

CONTRACT DATE: \_\_\_\_\_

DESCRIPTION:

ATTACHMENT(S): \_\_\_\_\_

### ACTION

- ☐ 1. **PROPOSAL REQUEST:** Submit an itemized quotation for changes in the Contract Sum and/or time required to implement the above proposed modifications to the Contract Documents. This is not authorization to proceed with the work.
- ☐ 2. **SUPPLEMENTAL INSTRUCTIONS:** Implement the above instructions without change to the Contract Sum and/or Time. Prior to proceeding, indicate acceptance below and return one copy to the Architect.
- ☐ 3. **CONSTRUCTION CHANGE AUTHORIZATION:** Proceed with the above described changes to the Contract Documents immediately. Submit final costs and/or change in Contract Time for inclusion in a subsequent Change Order.

Methods: ☐ Lump Sum ☐ Unit Price ☐ Time & Material Not-to-Exceed

Change in Contract Sum of \_\_\_\_\_

Change in Contract Time of \_\_\_\_\_ days

ISSUED:

ACCEPTED:

AUTHORIZED:

BY: \_\_\_\_\_ BY: \_\_\_\_\_ BY: \_\_\_\_\_

Architect Date  
Required for Actions 1,2,3

Owner Date  
Required for Action 3

Contractor Date  
Required for Actions 2,3

☐ Owner  
☐ Contractor

☐ Architect  
☐ Field

☐ Structural  
☐ Mechanical/Electrical

☐ Civil  
☐ Other (Roofing)



# AIA® Document A305™ – 1986

## Contractor's Qualification Statement

The Undersigned certifies under oath that the information provided herein is true and sufficiently complete so as not to be misleading.

**SUBMITTED TO:**

**ADDRESS:**

**SUBMITTED BY:**

**NAME:**

**ADDRESS:**

**PRINCIPAL OFFICE:**

- ☐ Corporation
- ☐ Partnership
- ☐ Individual
- ☐ Joint Venture
- ☐ Other

**NAME OF PROJECT (if applicable):**

**TYPE OF WORK** (file separate form for each Classification of Work):

- ☐ General Construction
- ☐ HVAC
- ☐ Electrical
- ☐ Plumbing
- ☐ Other (please specify)

### § 1. ORGANIZATION

§ 1.1 How many years has your organization been in business as a Contractor?

§ 1.2 How many years has your organization been in business under its present business name?

§ 1.2.1 Under what other or former names has your organization operated?

§ 1.3 If your organization is a corporation, answer the following:

§ 1.3.1 Date of incorporation:

### ADDITIONS AND DELETIONS:

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

This form is approved and recommended by the American Institute of Architects (AIA) and The Associated General Contractors of America (AGC) for use in evaluating the qualifications of contractors. No endorsement of the submitting party or verification of the information is made by AIA or AGC.

- § 1.3.2 State of incorporation:
- § 1.3.3 President's name:
- § 1.3.4 Vice-president's name(s)

- § 1.3.5 Secretary's name:
- § 1.3.6 Treasurer's name:

§ 1.4 If your organization is a partnership, answer the following:

- § 1.4.1 Date of organization:
- § 1.4.2 Type of partnership (if applicable):
- § 1.4.3 Name(s) of general partner(s)

§ 1.5 If your organization is individually owned, answer the following:

- § 1.5.1 Date of organization:
- § 1.5.2 Name of owner:

§ 1.6 If the form of your organization is other than those listed above, describe it and name the principals:

## § 2. LICENSING

§ 2.1 List jurisdictions and trade categories in which your organization is legally qualified to do business, and indicate registration or license numbers, if applicable.

§ 2.2 List jurisdictions in which your organization's partnership or trade name is filed.

## § 3. EXPERIENCE

§ 3.1 List the categories of work that your organization normally performs with its own forces.

§ 3.2 Claims and Suits. (If the answer to any of the questions below is yes, please attach details.)

§ 3.2.1 Has your organization ever failed to complete any work awarded to it?

§ 3.2.2 Are there any judgments, claims, arbitration proceedings or suits pending or outstanding against your organization or its officers?

§ 3.2.3 Has your organization filed any law suits or requested arbitration with regard to construction contracts within the last five years?

§ 3.3 Within the last five years, has any officer or principal of your organization ever been an officer or principal of another organization when it failed to complete a construction contract? (If the answer is yes, please attach details.)

§ 3.4 On a separate sheet, list major construction projects your organization has in progress, giving the name of project, owner, architect, contract amount, percent complete and scheduled completion date.

§ 3.4.1 State total worth of work in progress and under contract:

§ 3.5 On a separate sheet, list the major projects your organization has completed in the past five years, giving the name of project, owner, architect, contract amount, date of completion and percentage of the cost of the work performed with your own forces.

§ 3.5.1 State average annual amount of construction work performed during the past five years:

§ 3.6 On a separate sheet, list the construction experience and present commitments of the key individuals of your organization.

#### § 4. REFERENCES

§ 4.1 Trade References:

§ 4.2 Bank References:

§ 4.3 Surety:

§ 4.3.1 Name of bonding company:

§ 4.3.2 Name and address of agent:

#### § 5. FINANCING

§ 5.1 Financial Statement.

§ 5.1.1 Attach a financial statement, preferably audited, including your organization's latest balance sheet and income statement showing the following items:

Current Assets (e.g., cash, joint venture accounts, accounts receivable, notes receivable, accrued income, deposits, materials inventory and prepaid expenses);

Net Fixed Assets;

Other Assets;

Current Liabilities (e.g., accounts payable, notes payable, accrued expenses, provision for income taxes, advances, accrued salaries and accrued payroll taxes);

Other Liabilities (e.g., capital, capital stock, authorized and outstanding shares par values, earned surplus and retained earnings).

§ 5.1.2 Name and address of firm preparing attached financial statement, and date thereof:

§ 5.1.3 Is the attached financial statement for the identical organization named on page one?

§ 5.1.4 If not, explain the relationship and financial responsibility of the organization whose financial statement is provided (e.g., parent-subsiary).

§ 5.2 Will the organization whose financial statement is attached act as guarantor of the contract for construction?

**§ 6. SIGNATURE**

§ 6.1 Dated at this       day of

Name of Organization:

By:

Title:

§ 6.2

M       being duly sworn deposes and says that the information provided herein is true and sufficiently complete so as not to be misleading.

|       Subscribed and sworn before me this       day of       20

Notary Public:

My Commission Expires:



# AIA® Document A310™ – 1970

## ***Bid Bond***

KNOW ALL MEN BY THESE PRESENTS, that we  
(Here insert full name and address or legal title of Contractor)

as Principal, hereinafter called the Principal, and  
(Here insert full name and address or legal title of Surety)

a corporation duly organized under the laws of the State of \_\_\_\_\_ as Surety, hereinafter  
called the Surety, are held and firmly bound unto  
(Here insert full name and address or legal title of Owner)

as Oblige, hereinafter called the Oblige, in the sum of (\$ \_\_\_\_\_), for the payment of  
which sum well and truly to be made, the said Principal and the said Surety, bind  
ourselves, our heirs, executors, administrators, successors and assigns, jointly and  
severally, firmly by these presents.

WHEREAS, the Principal has submitted a bid for  
(Here insert full name, address and description of project)

NOW, THEREFORE, if the Oblige shall accept the bid of the Principal and the  
Principal shall enter into a Contract with the Oblige in accordance with the terms of  
such bid, and give such bond or bonds as may be specified in the bidding or Contract  
Documents with good and sufficient surety for the faithful performance of such Contract  
and for the prompt payment of labor and material furnished in the prosecution thereof, or  
in the event of the failure of the Principal to enter such Contract and give such bond or  
bonds, if the Principal shall pay to the Oblige the difference not to exceed the penalty  
hereof between the amount specified in said bid and such larger amount for which the  
Oblige may in good faith contract with another party to perform the Work covered by  
said bid, then this obligation shall be null and void, otherwise to remain in full force and  
effect.

### **ADDITIONS AND DELETIONS:**

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Signed and sealed this       day of       ,

|           |                    |
|-----------|--------------------|
| _____     | _____              |
| (Witness) | (Principal) (Seal) |
| _____     | _____              |
| (Witness) | (Title)            |
| _____     | _____              |
| (Witness) | (Surety)           |
| _____     | _____              |
|           | (Title) (Seal)     |



**AIA®****Document A312™ – 1984****Performance Bond****CONTRACTOR** (*Name and Address*):**SURETY** (*Name and Principal Place of Business*):**OWNER** (*Name and Address*):**CONSTRUCTION CONTRACT**

Date:

Amount:

Description (*Name and Location*):**BOND**Date (*Not earlier than Construction Contract Date*):

Amount:

Modifications to this Bond: ☒ None ☐ See Last Page**CONTRACTOR AS PRINCIPAL**

Company: (Corporate Seal)

Signature: \_\_\_\_\_

Name and

Title:

*(Any additional signatures appear on the last page)***SURETY**

Company: (Corporate Seal)

Signature: \_\_\_\_\_

Name and

Title:

*(FOR INFORMATION ONLY - Name, Address and Telephone)***AGENT or BROKER:****OWNER'S REPRESENTATIVE***(Architect, Engineer or other party):***ADDITIONS AND DELETIONS:**

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

Any singular reference to Contract, Surety, Owner or other party shall be considered plural where applicable.

§ 1 The Contractor and the Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to the Owner for the performance of the Construction Contract, which is incorporated herein by reference.

§ 2 If the Contractor performs the Construction Contract, the Surety and the Contractor shall have no obligation under this Bond, except to participate in conferences as provided in Section 3.1.

§ 3 If there is no Owner Default, the Surety's obligation under this Bond shall arise after:

§ 3.1 The Owner has notified the Contractor and the Surety at its address described in Section 10 below that the Owner is considering declaring a Contractor Default and has requested and attempted to arrange a conference with the Contractor and the Surety to be held not later than fifteen days after receipt of such notice to discuss methods of performing the Construction Contract. If the Owner, the Contractor and the Surety agree, the Contractor shall be allowed a reasonable time to perform the Construction Contract, but such an agreement shall not waive the Owner's right, if any, subsequently to declare a Contractor Default; and

§ 3.2 The Owner has declared a Contractor Default and formally terminated the Contractor's right to complete the contract. Such Contractor Default shall not be declared earlier than twenty days after the Contractor and the Surety have received notice as provided in Section 3.1; and

§ 3.3 The Owner has agreed to pay the Balance of the Contract Price to the Surety in accordance with the terms of the Construction Contract or to a contractor selected to perform the Construction Contract in accordance with the terms of the contract with the Owner.

§ 4 When the Owner has satisfied the conditions of Section 3, the Surety shall promptly and at the Surety's expense take one of the following actions:

§ 4.1 Arrange for the Contractor, with consent of the Owner, to perform and complete the Construction Contract; or

§ 4.2 Undertake to perform and complete the Construction Contract itself, through its agents or through independent contractors; or

§ 4.3 Obtain bids or negotiated proposals from qualified contractors acceptable to the Owner for a contract for performance and completion of the Construction Contract, arrange for a contract to be prepared for execution by the Owner and the contractor selected with the Owner's concurrence, to be secured with performance and payment bonds executed by a qualified surety equivalent to the bonds issued on the Construction Contract, and pay to the Owner the amount of damages as described in Section 6 in excess of the Balance of the Contract Price incurred by the Owner resulting from the Contractor's default; or

§ 4.4 Waive its right to perform and complete, arrange for completion, or obtain a new contractor and with reasonable promptness under the circumstances:

- .1 After investigation, determine the amount for which it may be liable to the Owner and, as soon as practicable after the amount is determined, tender payment therefor to the Owner; or
- .2 Deny liability in whole or in part and notify the Owner citing reasons therefor.

§ 5 If the Surety does not proceed as provided in Section 4 with reasonable promptness, the Surety shall be deemed to be in default on this Bond fifteen days after receipt of an additional written notice from the Owner to the Surety demanding that the Surety perform its obligations under this Bond, and the Owner shall be entitled to enforce any remedy available to the Owner. If the Surety proceeds as provided in Section 4.4, and the Owner refuses the payment tendered or the Surety has denied liability, in whole or in part, without further notice the Owner shall be entitled to enforce any remedy available to the Owner.

§ 6 After the Owner has terminated the Contractor's right to complete the Construction Contract, and if the Surety elects to act under Section 4.1, 4.2, or 4.3 above, then the responsibilities of the Surety to the Owner shall not be greater than those of the Contractor under the Construction Contract, and the responsibilities of the Owner to the Surety shall not be greater than those of the Owner under the Construction Contract. To the limit of the amount of this Bond, but subject to commitment by the Owner of the Balance of the Contract Price to mitigation of costs and damages on the Construction Contract, the Surety is obligated without duplication for:

**§ 6.1** The responsibilities of the Contractor for correction of defective work and completion of the Construction Contract;

**§ 6.2** Additional legal, design professional and delay costs resulting from the Contractor's Default, and resulting from the actions or failure to act of the Surety under Section 4; and

**§ 6.3** Liquidated damages, or if no liquidated damages are specified in the Construction Contract, actual damages caused by delayed performance or non-performance of the Contractor.

**§ 7** The Surety shall not be liable to the Owner or others for obligations of the Contractor that are unrelated to the Construction Contract, and the Balance of the Contract Price shall not be reduced or set off on account of any such unrelated obligations. No right of action shall accrue on this Bond to any person or entity other than the Owner or its heirs, executors, administrators or successors.

**§ 8** The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

**§ 9** Any proceeding, legal or equitable, under this Bond may be instituted in any court of competent jurisdiction in the location in which the work or part of the work is located and shall be instituted within two years after Contractor Default or within two years after the Contractor ceased working or within two years after the Surety refuses or fails to perform its obligations under this Bond, whichever occurs first. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

**§ 10** Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the signature page.

**§ 11** When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted here from and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

## **§ 12 DEFINITIONS**

**§ 12.1** Balance of the Contract Price: The total amount payable by the Owner to the Contractor under the Construction Contract after all proper adjustments have been made, including allowance to the Contractor of any amounts received or to be received by the Owner in settlement of insurance or other claims for damages to which the Contractor is entitled, reduced by all valid and proper payments made to or on behalf of the Contractor under the Construction Contract.

**§ 12.2** Construction Contract: The agreement between the Owner and the Contractor identified on the signature page, including all Contract Documents and changes thereto.

**§ 12.3** Contractor Default: Failure of the Contractor, which has neither been remedied nor waived, to perform or otherwise to comply with the terms of the Construction Contract.

**§ 12.4** Owner Default: Failure of the Owner, which has neither been remedied nor waived, to pay the Contractor as required by the Construction Contract or to perform and complete or comply with the other terms thereof.

**§ 13 MODIFICATIONS TO THIS BOND ARE AS FOLLOWS:**

*(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)*

**CONTRACTOR AS PRINCIPAL**

Company: \_\_\_\_\_  
(Corporate Seal)

Signature: \_\_\_\_\_  
Name and Title:  
Address:

**SURETY**

Company: \_\_\_\_\_  
(Corporate Seal)

Signature: \_\_\_\_\_  
Name and Title:  
Address:

**Payment Bond**

**CONTRACTOR** *(Name and Address):*

**SURETY** *(Name and Principal Place of Business):*

**OWNER** *(Name and Address):*

**CONSTRUCTION CONTRACT**

Date:

Amount:

Description *(Name and Location):*

**BOND**

Date *(Not earlier than Construction Contract Date):*

Amount:

Modifications to this Bond: ☒ None ☐ See Last Page

**CONTRACTOR AS PRINCIPAL**

Company: *(Corporate Seal)*

**SURETY**

Company: *(Corporate Seal)*

Signature: \_\_\_\_\_

Name and Title:

*(Any additional signatures appear on the last page)*

Signature: \_\_\_\_\_

Name and Title:

*(FOR INFORMATION ONLY - Name, Address and Telephone)*

**AGENT or BROKER:**

**OWNER'S REPRESENTATIVE** *(Architect, Engineer or other party):*

§ 1 The Contractor and the Surety, jointly and severally bind themselves, their heirs, executors, administrators, successors and assigns to the Owner to pay for labor, materials and equipment furnished for use in the performance of the Construction Contract, which is incorporated herein by reference.

§ 2 With respect to the Owner, this obligation shall be null and void if the Contractor:

§ 2.1 Promptly makes payment, directly or indirectly, for all sums due Claimants, and

§ 2.2 Defends, indemnifies and holds harmless the Owner from claims, demands, liens or suits by any person or entity whose claim, demand, lien or suit is for the payment for labor, materials or equipment furnished for use in the performance of the Construction Contract, provided the Owner has promptly notified the Contractor and the Surety (at the address described in Section 12) of any claims, demands, liens or suits and tendered defense of such claims, demands, liens or suits to the Contractor and the Surety, and provided there is no Owner Default.

§ 3 With respect to Claimants, this obligation shall be null and void if the Contractor promptly makes payment, directly or indirectly, for all sums due.

§ 4 The Surety shall have no obligation to Claimants under this Bond until:

§ 4.1 Claimants who are employed by or have a direct contract with the Contractor have given notice to the Surety (at the address described in Section 12) and sent a copy, or notice thereof, to the Owner, stating that a claim is being made under this Bond and, with substantial accuracy, the amount of the claim.

§ 4.2 Claimants who do not have a direct contract with the Contractor:

- .1 Have furnished written notice to the Contractor and sent a copy, or notice thereof, to the Owner, within 90 days after having last performed labor or last furnished materials or equipment included in the claim stating, with substantial accuracy, the amount of the claim and the name of the party to whom the materials were furnished or supplied or for whom the labor was done or performed; and
- .2 Have either received a rejection in whole or in part from the Contractor, or not received within 30 days of furnishing the above notice any communication from the Contractor by which the Contractor has indicated the claim will be paid directly or indirectly; and
- .3 Not having been paid within the above 30 days, have sent a written notice to the Surety (at the address described in Section 12) and sent a copy, or notice thereof, to the Owner, stating that a claim is being made under this Bond and enclosing a copy of the previous written notice furnished to the Contractor.

§ 5 If a notice required by Section 4 is given by the Owner to the Contractor or to the Surety, that is sufficient compliance.

§ 6 When the Claimant has satisfied the conditions of Section 4, the Surety shall promptly and at the Surety's expense take the following actions:

§ 6.1 Send an answer to the Claimant, with a copy to the Owner, within 45 days after receipt of the claim, stating the amounts that are undisputed and the basis for challenging any amounts that are disputed.

§ 6.2 Pay or arrange for payment of any undisputed amounts.

§ 7 The Surety's total obligation shall not exceed the amount of this Bond, and the amount of this Bond shall be credited for any payments made in good faith by the Surety.

§ 8 Amounts owed by the Owner to the Contractor under the Construction Contract shall be used for the performance of the Construction Contract and to satisfy claims, if any, under any Construction Performance Bond. By the Contractor furnishing and the Owner accepting this Bond, they agree that all funds earned by the Contractor in the performance of the Construction Contract are dedicated to satisfy obligations of the Contractor and the Surety under this Bond, subject to the Owner's priority to use the funds for the completion of the work.

§ 9 The Surety shall not be liable to the Owner, Claimants or others for obligations of the Contractor that are unrelated to the Construction Contract. The Owner shall not be liable for payment of any costs or expenses of any Claimant under this Bond, and shall have under this Bond no obligations to make payments to, give notices on behalf of, or otherwise have obligations to Claimants under this Bond.

§ 10 The Surety hereby waives notice of any change, including changes of time, to the Construction Contract or to related subcontracts, purchase orders and other obligations.

§ 11 No suit or action shall be commenced by a Claimant under this Bond other than in a court of competent jurisdiction in the location in which the work or part of the work is located or after the expiration of one year from the date (1) on which the Claimant gave the notice required by Section 4.1 or Section 4.2.3, or (2) on which the last labor or service was performed by anyone or the last materials or equipment were furnished by anyone under the Construction Contract, whichever of (1) or (2) first occurs. If the provisions of this Paragraph are void or prohibited by law, the minimum period of limitation available to sureties as a defense in the jurisdiction of the suit shall be applicable.

§ 12 Notice to the Surety, the Owner or the Contractor shall be mailed or delivered to the address shown on the signature page. Actual receipt of notice by Surety, the Owner or the Contractor, however accomplished, shall be sufficient compliance as of the date received at the address shown on the signature page.

§ 13 When this Bond has been furnished to comply with a statutory or other legal requirement in the location where the construction was to be performed, any provision in this Bond conflicting with said statutory or legal requirement shall be deemed deleted herefrom and provisions conforming to such statutory or other legal requirement shall be deemed incorporated herein. The intent is that this Bond shall be construed as a statutory bond and not as a common law bond.

§ 14 Upon request by any person or entity appearing to be a potential beneficiary of this Bond, the Contractor shall promptly furnish a copy of this Bond or shall permit a copy to be made.

#### § 15 DEFINITIONS

§ 15.1 Claimant: An individual or entity having a direct contract with the Contractor or with a subcontractor of the Contractor to furnish labor, materials or equipment for use in the performance of the Contract. The intent of this Bond shall be to include without limitation in the terms "labor, materials or equipment" that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment used in the Construction Contract, architectural and engineering services required for performance of the work of the Contractor and the Contractor's subcontractors, and all other items for which a mechanic's lien may be asserted in the jurisdiction where the labor, materials or equipment were furnished.

§ 15.2 Construction Contract: The agreement between the Owner and the Contractor identified on the signature page, including all Contract Documents and changes thereto.

§ 15.3 Owner Default: Failure of the Owner, which has neither been remedied nor waived, to pay the Contractor as required by the Construction Contract or to perform and complete or comply with the other terms thereof.

#### § 16 MODIFICATIONS TO THIS BOND ARE AS FOLLOWS:

*(Space is provided below for additional signatures of added parties, other than those appearing on the cover page.)*

##### CONTRACTOR AS PRINCIPAL

Company: \_\_\_\_\_ (Corporate Seal)

Signature: \_\_\_\_\_  
Name and Title: \_\_\_\_\_  
Address: \_\_\_\_\_

##### SURETY

Company: \_\_\_\_\_ (Corporate Seal)

Signature: \_\_\_\_\_  
Name and Title: \_\_\_\_\_  
Address: \_\_\_\_\_

**AIA**<sup>®</sup>**Document G701<sup>™</sup> – 2001****Change Order**

|                                          |                                                                |                                                                                                                                                                                      |
|------------------------------------------|----------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PROJECT <i>(Name and address):</i>       | CHANGE ORDER NUMBER:<br>DATE:                                  | OWNER: <input type="checkbox"/><br>ARCHITECT: <input type="checkbox"/><br>CONTRACTOR: <input type="checkbox"/><br>FIELD: <input type="checkbox"/><br>OTHER: <input type="checkbox"/> |
| TO CONTRACTOR <i>(Name and address):</i> | ARCHITECT'S PROJECT NUMBER:<br>CONTRACT DATE:<br>CONTRACT FOR: |                                                                                                                                                                                      |

**THE CONTRACT IS CHANGED AS FOLLOWS:***(Include, where applicable, any undisputed amount attributable to previously executed Construction Change Directives)*

The original Contract Sum was \_\_\_\_\_ \$

The net change by previously authorized Change Orders \_\_\_\_\_ \$

The Contract Sum prior to this Change Order was \_\_\_\_\_ \$

The Contract Sum will be \_\_\_\_\_ by this Change Order in the amount of \_\_\_\_\_ \$

The new Contract Sum including this Change Order will be \_\_\_\_\_ \$

The Contract Time will be \_\_\_\_\_ by \_\_\_\_\_ ( ) days.

The date of Substantial Completion as of the date of this Change Order therefore is \_\_\_\_\_

**NOTE:** This Change Order does not include changes in the Contract Sum, Contract Time or Guaranteed Maximum Price which have been authorized by Construction Change Directive until the cost and time have been agreed upon by both the Owner and Contractor, in which case a Change Order is executed to supersede the Construction Change Directive.

**NOT VALID UNTIL SIGNED BY THE ARCHITECT, CONTRACTOR AND OWNER.**

|                              |                               |                          |
|------------------------------|-------------------------------|--------------------------|
| ARCHITECT <i>(Firm name)</i> | CONTRACTOR <i>(Firm name)</i> | OWNER <i>(Firm name)</i> |
| ADDRESS                      | ADDRESS                       | ADDRESS                  |
| BY <i>(Signature)</i>        | BY <i>(Signature)</i>         | BY <i>(Signature)</i>    |
| <i>(Typed name)</i>          | <i>(Typed name)</i>           | <i>(Typed name)</i>      |
| DATE                         | DATE                          | DATE                     |



## Application and Certificate for Payment

**TO OWNER:** PROJECT: \_\_\_\_\_

**FROM CONTRACTOR:** VIA ARCHITECT: \_\_\_\_\_

**APPLICATION NO:** \_\_\_\_\_

**PERIOD TO:** \_\_\_\_\_

**CONTRACT FOR:** \_\_\_\_\_

**CONTRACT DATE:** \_\_\_\_\_

**PROJECT NOS:** \_\_\_\_\_

**Distribution to:**

OWNER: ☐ ARCHITECT: ☐

CONTRACTOR: ☐ FIELD: ☐

OTHER: ☐

### CONTRACTOR'S APPLICATION FOR PAYMENT

Application is made for payment, as shown below, in connection with the Contract. Continuation Sheet, AIA Document G703, is attached.

1. ORIGINAL CONTRACT SUM ..... \$
2. Net change by Change Orders ..... \$
3. CONTRACT SUM TO DATE (Line 1 + 2) ..... \$
4. TOTAL COMPLETED & STORED TO DATE (Column G on G703) ..... \$

#### 5. RETAINAGE:

- a. \_\_\_\_\_ % of Completed Work  
(Column D + E on G703) \$
- b. \_\_\_\_\_ % of Stored Material  
(Column F on G703) \$

Total Retainage (Lines 5a + 5b or Total in Column I of G703) ..... \$

6. TOTAL EARNED LESS RETAINAGE ..... \$  
(Line 4 Less Line 5 Total)

7. LESS PREVIOUS CERTIFICATES FOR PAYMENT ..... \$  
(Line 6 from prior Certificate)

8. CURRENT PAYMENT DUE ..... \$

9. BALANCE TO FINISH, INCLUDING RETAINAGE  
(Line 3 less Line 6) \$

| CHANGE ORDER SUMMARY                               | ADDITIONS | DEDUCTIONS |
|----------------------------------------------------|-----------|------------|
| Total changes approved in previous months by Owner | \$        | \$         |
| Total approved this Month                          | \$        | \$         |
| <b>TOTALS</b>                                      | \$        | \$         |
| NET CHANGES by Change Order                        | \$        |            |

The undersigned Contractor certifies that to the best of the Contractor's knowledge, information and belief the Work covered by this Application for Payment has been completed in accordance with the Contract Documents, that all amounts have been paid by the Contractor for Work for which previous Certificates for Payment were issued and payments received from the Owner, and that current payment shown herein is now due.

#### CONTRACTOR:

By: \_\_\_\_\_ Date: \_\_\_\_\_

State of: \_\_\_\_\_

County of: \_\_\_\_\_

Subscribed and sworn to before  
me this \_\_\_\_\_ day of \_\_\_\_\_

Notary Public:

My Commission expires: \_\_\_\_\_

### ARCHITECT'S CERTIFICATE FOR PAYMENT

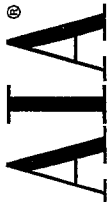
In accordance with the Contract Documents, based on on-site observations and the data comprising this application, the Architect certifies to the Owner that to the best of the Architect's knowledge, information and belief the Work has progressed as indicated, the quality of the Work is in accordance with the Contract Documents, and the Contractor is entitled to payment of the AMOUNT CERTIFIED.

AMOUNT CERTIFIED ..... \$  
(Attach explanation if amount certified differs from the amount applied. Initial all figures on this Application and on the Continuation Sheet that are changed to conform with the amount certified.)

#### ARCHITECT:

By: \_\_\_\_\_ Date: \_\_\_\_\_

This Certificate is not negotiable. The AMOUNT CERTIFIED is payable only to the Contractor named herein. Issuance, payment and acceptance of payment are without prejudice to any rights of the Owner or Contractor under this Contract



# Document G703™ - 1992

AIA Document G702, APPLICATION AND CERTIFICATION FOR PAYMENT, containing Contractor's signed certification is attached.

containing Contractor's signed certification is attached. In tabulations below, amounts are stated to the nearest dollar.

Use Column I on Contracts where variable retainage for line items may apply.

APPLICATION NO:

**APPLICATION DATE:**

**PERIOD TO:**

ARCHITECT'S PROJECT NO:

| A        | B                   | C               | D                                                | E                          | F                                          | G                                          | H                         | I                            |
|----------|---------------------|-----------------|--------------------------------------------------|----------------------------|--------------------------------------------|--------------------------------------------|---------------------------|------------------------------|
| ITEM NO. | DESCRIPTION OF WORK | SCHEDULED VALUE | WORK COMPLETED FROM PREVIOUS APPLICATION (D + E) | WORK COMPLETED THIS PERIOD | MATERIALS PRESENTLY STORED (NOT IN D OR E) | TOTAL COMPLETED AND STORED TO DATE (D+E+F) | BALANCE TO FINISH (C - G) | RETAINAGE (IF VARIABLE RATE) |
|          |                     |                 |                                                  |                            |                                            | %<br>(G ÷ C)                               |                           |                              |
|          |                     |                 |                                                  |                            |                                            |                                            |                           |                              |
|          | GRAND TOTAL         |                 |                                                  |                            |                                            |                                            | %                         |                              |

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**User Notes:**

(2811165891)



# AIA® Document G704™ – 2017

## Certificate of Substantial Completion

**PROJECT:** *(name and address)*

**CONTRACT INFORMATION:**

Contract For:

Date:

**CERTIFICATE INFORMATION:**

Certificate Number: 001

Date:

**OWNER:** *(name and address)*

**ARCHITECT:** *(name and address)*

**CONTRACTOR:** *(name and address)*

The Work identified below has been reviewed and found, to the Architect's best knowledge, information, and belief, to be substantially complete. Substantial Completion is the stage in the progress of the Work when the Work or designated portion is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use. The date of Substantial Completion of the Project or portion designated below is the date established by this Certificate.

*(Identify the Work, or portion thereof, that is substantially complete.)*

**ARCHITECT** *(Firm Name)*

**SIGNATURE**

**PRINTED NAME AND TITLE**

**DATE OF SUBSTANTIAL COMPLETION**

### WARRANTIES

The date of Substantial Completion of the Project or portion designated above is also the date of commencement of applicable warranties required by the Contract Documents, except as stated below:

*(Identify warranties that do not commence on the date of Substantial Completion, if any, and indicate their date of commencement.)*

### WORK TO BE COMPLETED OR CORRECTED

A list of items to be completed or corrected is attached hereto, or transmitted as agreed upon by the parties, and identified as follows:

*(Identify the list of Work to be completed or corrected.)*

The failure to include any items on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents. Unless otherwise agreed to in writing, the date of commencement of warranties for items on the attached list will be the date of issuance of the final Certificate of Payment or the date of final payment, whichever occurs first. The Contractor will complete or correct the Work on the list of items attached hereto within ( ) days from the above date of Substantial Completion.

Cost estimate of Work to be completed or corrected: \$

The responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work, insurance, and other items identified below shall be as follows:

*(Note: Owner's and Contractor's legal and insurance counsel should review insurance requirements and coverage.)*

The Owner and Contractor hereby accept the responsibilities assigned to them in this Certificate of Substantial Completion:

**CONTRACTOR** *(Firm Name)*

**SIGNATURE**

**PRINTED NAME AND TITLE**

**DATE**

**OWNER** *(Firm Name)*

**SIGNATURE**

**PRINTED NAME AND TITLE**

**DATE**



# AIA<sup>®</sup> Document G706<sup>™</sup> – 1994

## Contractor's Affidavit of Payment of Debts and Claims

PROJECT: *(Name and address)*

ARCHITECT'S PROJECT NUMBER:

OWNER: ☐  
ARCHITECT: ☐  
CONTRACTOR: ☐  
SURETY: ☐  
OTHER: ☐

CONTRACT FOR:

TO OWNER: *(Name and address)*

CONTRACT DATED:

STATE OF:  
COUNTY OF:

The undersigned hereby certifies that, except as listed below, payment has been made in full and all obligations have otherwise been satisfied for all materials and equipment furnished, for all work, labor, and services performed, and for all known indebtedness and claims against the Contractor for damages arising in any manner in connection with the performance of the Contract referenced above for which the Owner or Owner's property might in any way be held responsible or encumbered.

### EXCEPTIONS:

#### SUPPORTING DOCUMENTS ATTACHED HERETO:

1. Consent of Surety to Final Payment. Whenever Surety is involved, Consent of Surety is required. AIA Document G707, Consent of Surety, may be used for this purpose

Indicate Attachment ☐ Yes ☐ No

CONTRACTOR: *(Name and address)*

BY: \_\_\_\_\_  
*(Signature of authorized representative)*

*The following supporting documents should be attached hereto if required by the Owner:*

1. Contractor's Release or Waiver of Liens, conditional upon receipt of final payment.
2. Separate Releases or Waivers of Liens from Subcontractors and material and equipment suppliers, to the extent required by the Owner, accompanied by a list thereof.
3. Contractor's Affidavit of Release of Liens (AIA Document G706A).

\_\_\_\_\_  
*(Printed name and title)*

Subscribed and sworn to before me on this date:

Notary Public:  
My Commission Expires:



## Contractor's Affidavit of Release of Liens

OTHER: ☐

•



# AIA® Document G707™ – 1994

## Consent Of Surety to Final Payment

PROJECT: *(Name and address)*

ARCHITECT'S PROJECT NUMBER:

OWNER: ☐

ARCHITECT: ☐

CONTRACT FOR:

CONTRACTOR: ☐

TO OWNER: *(Name and address)*

CONTRACT DATED:

SURETY: ☐

OTHER: ☐

In accordance with the provisions of the Contract between the Owner and the Contractor as indicated above, the  
*(Insert name and address of Surety)*

on bond of

*(Insert name and address of Contractor)*

, SURETY,

hereby approves of the final payment to the Contractor, and agrees that final payment to the Contractor shall not relieve the  
Surety of any of its obligations to  
*(Insert name and address of Owner)*

, CONTRACTOR,

, OWNER,

as set forth in said Surety's bond.

IN WITNESS WHEREOF, the Surety has hereunto set its hand on this date:  
*(Insert in writing the month followed by the numeric date and year.)*

\_\_\_\_\_  
*(Surety)*

\_\_\_\_\_  
*(Signature of authorized representative)*

\_\_\_\_\_  
*(Printed name and title)*

Attest:

(Seal):



# AIA® Document G709™ – 2001

## Work Changes Proposal Request

PROJECT (Name and address):

PROPOSAL REQUEST NUMBER:

OWNER: ☐

ARCHITECT: ☐

DATE OF ISSUANCE:

CONSULTANT: ☐

CONTRACTOR: ☐

OWNER (Name and address):

CONTRACT FOR:

FIELD: ☐

OTHER: ☐

CONTRACT DATE:

FROM ARCHITECT (Name and address):

ARCHITECT'S PROJECT NUMBER:

TO CONTRACTOR (Name and address):

Please submit an itemized proposal for changes in the Contract Sum and Contract Time for proposed modifications to the Contract Documents described herein. Within ( ) days, the Contractor must submit this proposal or notify the Architect, in writing, of the date on which proposal submission is anticipated.

**THIS IS NOT A CHANGE ORDER, A CONSTRUCTION CHANGE DIRECTIVE OR A DIRECTION TO PROCEED WITH THE WORK DESCRIBED IN THE PROPOSED MODIFICATIONS.**

DESCRIPTION (Insert a written description of the Work):

ATTACHMENTS (List attached documents that support description):

REQUESTED BY THE ARCHITECT:

\_\_\_\_\_  
(Signature)

\_\_\_\_\_  
(Printed name and title)



# AIA<sup>®</sup> Document G710<sup>™</sup> – 2017

## Architect's Supplemental Instructions

---

**PROJECT:** *(name and address)*

**CONTRACT INFORMATION:**

Contract For:

Date:

**ASI INFORMATION:**

ASI Number: 001

Date:

**OWNER:** *(name and address)*

**ARCHITECT:** *(name and address)*

**CONTRACTOR:** *(name and address)*

---

The Contractor shall carry out the Work in accordance with the following supplemental instructions without change in Contract Sum or Contract Time. Proceeding with the Work in accordance with these instructions indicates your acknowledgment that there will be no change in the Contract Sum or Contract Time.

*(Insert a detailed description of the Architect's supplemental instructions and, if applicable, attach or reference specific exhibits.)*

---

**ISSUED BY THE ARCHITECT:**

\_\_\_\_\_  
**ARCHITECT** *(Firm name)*

\_\_\_\_\_  
**SIGNATURE**

\_\_\_\_\_  
**PRINTED NAME AND TITLE**

\_\_\_\_\_  
**DATE**





# AIA® Document G714™ – 2017

## Construction Change Directive

**PROJECT:** *(name and address)*

**CONTRACT INFORMATION:**

Contract For:

Date:

**CCD INFORMATION:**

Directive Number: 001

Date:

**OWNER:** *(name and address)*

**ARCHITECT:** *(name and address)*

**CONTRACTOR:** *(name and address)*

The Contractor is hereby directed to make the following change(s) in this Contract:

*(Insert a detailed description of the change and, if applicable, attach or reference specific exhibits.)*

### PROPOSED ADJUSTMENTS

1. The proposed basis of adjustment to the Contract Sum or Guaranteed Maximum Price is:

☒ Lump Sum decrease of \$0.00

☐ Unit Price of \$        per

☐ Cost, as defined below, plus the following fee:

*(Insert a definition of, or method for determining, cost)*

☐ As follows:

2. The Contract Time is proposed to remain unchanged. The proposed adjustment, if any, is (0 days).

**NOTE:** *The Owner, Architect and Contractor should execute a Change Order to supersede this Construction Change Directive to the extent they agree upon adjustments to the Contract Sum, Contract Time, or Guaranteed Maximum price for the change(s) described herein.*

When signed by the Owner and Architect and received by the Contractor, this document becomes effective IMMEDIATELY as a Construction Change Directive (CCD), and the Contractor shall proceed with the change(s) described above.

Contractor signature indicates agreement with the proposed adjustments in Contract Sum and Contract Time set forth in this CCD.

\_\_\_\_\_  
**ARCHITECT** *(Firm name)*

\_\_\_\_\_  
**OWNER** *(Firm name)*

\_\_\_\_\_  
**CONTRACTOR** *(Firm name)*

\_\_\_\_\_  
**SIGNATURE**

\_\_\_\_\_  
**SIGNATURE**

\_\_\_\_\_  
**SIGNATURE**

\_\_\_\_\_  
**PRINTED NAME AND TITLE**

\_\_\_\_\_  
**PRINTED NAME AND TITLE**

\_\_\_\_\_  
**PRINTED NAME AND TITLE**

\_\_\_\_\_  
**DATE**

\_\_\_\_\_  
**DATE**

\_\_\_\_\_  
**DATE**



# AIA® Document G715™ – 2017

## Supplemental Attachment for ACORD Certificate of Insurance 25

|                                    |                                                        |                                                                   |
|------------------------------------|--------------------------------------------------------|-------------------------------------------------------------------|
| <b>PROJECT:</b> (name and address) | <b>CONTRACT INFORMATION:</b><br>Contract For:<br>Date: | <b>CERTIFICATE INFORMATION:</b><br>Producer:<br>Insured:<br>Date: |
| <b>OWNER:</b> (name and address)   | <b>ARCHITECT:</b> (name and address)                   | <b>CONTRACTOR:</b> (name and address)                             |

| A. General Liability        |                                                                                                                                                                                                                 | Yes                      | No                       | N/A                      |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|--------------------------|
| 1.                          | Does this policy include coverage for:                                                                                                                                                                          |                          |                          |                          |
| a                           | Damages because of bodily injury, sickness, or disease, including occupational sickness or disease, and death of any person?                                                                                    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b                           | Personal injury and advertising injury?                                                                                                                                                                         | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| c                           | Damages because of physical damage to or destruction of tangible property, including the loss of use of such property?                                                                                          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| d                           | Bodily injury or property damage arising out of completed operations?                                                                                                                                           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| e                           | The Contractor's indemnity obligations included in the Contract Documents?                                                                                                                                      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2.                          | Does this policy contain an exclusion or restriction of coverage for:                                                                                                                                           |                          |                          |                          |
| a                           | Claims by one insured against another insured, where the exclusion or restrictions is based solely on the fact that the claimant is an insured, and there would otherwise be coverage for the claim?            | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b                           | Claims for property damage to the Contractor's Work arising out of the products-completed operations hazard where the damaged Work or the Work out of which the damage arises was performed by a Subcontractor? | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| c                           | Claims for bodily injury other than to employees of the insured?                                                                                                                                                | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| d                           | Claims for the Contractor's indemnity obligations included in the Contract Documents arising out of injury to employees of the insured?                                                                         | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| e                           | Claims for loss excluded under a prior work endorsement or other similar exclusionary language?                                                                                                                 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| f                           | Claims or loss due to physical damage under a prior injury endorsement or similar exclusionary language?                                                                                                        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| g                           | Claims related to residential, multi-family, or other habitational projects?                                                                                                                                    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| h                           | Claims related to roofing?                                                                                                                                                                                      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| i                           | Claims related to exterior insulation finish systems, synthetic stucco, or similar exterior coatings or surfaces?                                                                                               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| j                           | Claims related to earth subsistence or movement?                                                                                                                                                                | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| k                           | Claims related to explosion, collapse, and underground hazards?                                                                                                                                                 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| B. Other Insurance Coverage |                                                                                                                                                                                                                 | Yes                      | No                       | N/A                      |
| 1.                          | Indicate whether the Contractor has the following insurance coverages and, if so, indicate the coverage limits for each.                                                                                        |                          |                          |                          |
| a                           | Professional liability insurance<br>Coverage limits:                                                                                                                                                            | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| b                           | Pollution liability insurance<br>Coverage limits:                                                                                                                                                               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| c                           | Insurance for maritime liability risks associated with the operation of a vessel<br>Coverage limits:                                                                                                            | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

- |   |                                                                                                          |                          |                          |                          |
|---|----------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|--------------------------|
| d | Insurance for the use or operation of manned or unmanned aircraft                                        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|   | Coverage limits:                                                                                         |                          |                          |                          |
| e | Property insurance                                                                                       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|   | Coverage limits:                                                                                         |                          |                          |                          |
| f | Railroad protective liability insurance                                                                  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|   | Coverage limits:                                                                                         |                          |                          |                          |
| g | Asbestos abatement liability insurance                                                                   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|   | Coverage limits:                                                                                         |                          |                          |                          |
| h | Insurance for physical damage to property while it is in storage and in transit to the construction site | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
|   | Coverage limits:                                                                                         |                          |                          |                          |
| i | Other:                                                                                                   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

---

*(Authorized Representative)*

---

*(Date of Issue)*

**SECTION 007100  
A201 GENERAL CONDITIONS COVER**

**SUMMARY**

- 1.01 THE "GENERAL CONDITIONS OF THE CONTRACT FOR CONSTRUCTION," AIA DOCUMENT A201-2017, IS BOUND WITH THIS SECTION. AIA DOCUMENT A201-2017 SETS FORTH THE RIGHTS, RESPONSIBILITIES, AND RELATIONSHIPS OF THE OWNER, CONTRACTOR, AND ARCHITECT.**

**END OF SECTION 007100**

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# **AIA® Document A201® – 2017**

## **General Conditions of the Contract for Construction**

### **for the following PROJECT:**

*(Name and location or address)*

RP Connor Elementary School  
Heating System Conversion  
13 Cypress Road  
Suffern, NY 10901  
SED #50-04-01-06-0-005-021

### **THE OWNER:**

*(Name, legal status and address)*

Suffern Central School District  
45 Mountain Avenue  
Hillburn, NY 10931

### **THE ARCHITECT:**

*(Name, legal status and address)*

CPL  
50 Front Street, Suite 202  
Newburgh, NY 12550

### **TABLE OF ARTICLES**

- 1 GENERAL PROVISIONS**
- 2 OWNER**
- 3 CONTRACTOR**
- 4 ARCHITECT**
- 5 SUBCONTRACTORS**
- 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS**
- 7 CHANGES IN THE WORK**
- 8 TIME**
- 9 PAYMENTS AND COMPLETION**
- 10 PROTECTION OF PERSONS AND PROPERTY**
- 11 INSURANCE AND BONDS**
- 12 UNCOVERING AND CORRECTION OF WORK**
- 13 MISCELLANEOUS PROVISIONS**

### **ADDITIONS AND DELETIONS:**

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

For guidance in modifying this document to include supplementary conditions, see AIA Document A503™, Guide for Supplementary Conditions.

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User Notes:

(3B9ADA3D)

## 14 TERMINATION OR SUSPENSION OF THE CONTRACT

## 15 CLAIMS AND DISPUTES



## INDEX

(Topics and numbers in bold are Section headings.)

### Acceptance of Nonconforming Work

9.6.6, 9.9.3, 12.3

### Acceptance of Work

9.6.6, 9.8.2, 9.9.3, 9.10.1, 9.10.3, 12.3

### Access to Work

3.16, 6.2.1, 12.1

### Accident Prevention

10

### Acts and Omissions

3.2, 3.3.2, 3.12.8, 3.18, 4.2.3, 8.3.1, 9.5.1, 10.2.5, 10.2.8, 13.3.2, 14.1, 15.1.2, 15.2

### Addenda

1.1.1

### Additional Costs, Claims for

3.7.4, 3.7.5, 10.3.2, 15.1.5

### Additional Inspections and Testing

9.4.2, 9.8.3, 12.2.1, 13.4

### Additional Time, Claims for

3.2.4, 3.7.4, 3.7.5, 3.10.2, 8.3.2, 15.1.6

### Administration of the Contract

3.1.3, 4.2, 9.4, 9.5

### Advertisement or Invitation to Bid

1.1.1

### Aesthetic Effect

4.2.13

### Allowances

3.8

### Applications for Payment

4.2.5, 7.3.9, 9.2, 9.3, 9.4, 9.5.1, 9.5.4, 9.6.3, 9.7, 9.10

### Approvals

2.1.1, 2.3.1, 2.5, 3.1.3, 3.10.2, 3.12.8, 3.12.9, 3.12.10.1, 4.2.7, 9.3.2, 13.4.1

### Arbitration

8.3.1, 15.3.2, 15.4

## ARCHITECT

4

### Architect, Definition of

4.1.1

### Architect, Extent of Authority

2.5, 3.12.7, 4.1.2, 4.2, 5.2, 6.3, 7.1.2, 7.3.4, 7.4, 9.2, 9.3.1, 9.4, 9.5, 9.6.3, 9.8, 9.10.1, 9.10.3, 12.1, 12.2.1, 13.4.1, 13.4.2, 14.2.2, 14.2.4, 15.1.4, 15.2.1

### Architect, Limitations of Authority and Responsibility

2.1.1, 3.12.4, 3.12.8, 3.12.10, 4.1.2, 4.2.1, 4.2.2, 4.2.3, 4.2.6, 4.2.7, 4.2.10, 4.2.12, 4.2.13, 5.2.1, 7.4, 9.4.2, 9.5.4, 9.6.4, 15.1.4, 15.2

### Architect's Additional Services and Expenses

2.5, 12.2.1, 13.4.2, 13.4.3, 14.2.4

### Architect's Administration of the Contract

3.1.3, 3.7.4, 15.2, 9.4.1, 9.5

### Architect's Approvals

2.5, 3.1.3, 3.5, 3.10.2, 4.2.7

### Architect's Authority to Reject Work

3.5, 4.2.6, 12.1.2, 12.2.1

### Architect's Copyright

1.1.7, 1.5

### Architect's Decisions

3.7.4, 4.2.6, 4.2.7, 4.2.11, 4.2.12, 4.2.13, 4.2.14, 6.3, 7.3.4, 7.3.9, 8.1.3, 8.3.1, 9.2, 9.4.1, 9.5, 9.8.4, 9.9.1, 13.4.2, 15.2

### Architect's Inspections

3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.8.3, 9.9.2, 9.10.1, 13.4

### Architect's Instructions

3.2.4, 3.3.1, 4.2.6, 4.2.7, 13.4.2

### Architect's Interpretations

4.2.11, 4.2.12

### Architect's Project Representative

4.2.10

### Architect's Relationship with Contractor

1.1.2, 1.5, 2.3.3, 3.1.3, 3.2.2, 3.2.3, 3.2.4, 3.3.1, 3.4.2, 3.5, 3.7.4, 3.7.5, 3.9.2, 3.9.3, 3.10, 3.11, 3.12, 3.16, 3.18, 4.1.2, 4.2, 5.2, 6.2.2, 7, 8.3.1, 9.2, 9.3, 9.4, 9.5, 9.7, 9.8, 9.9, 10.2.6, 10.3, 11.3, 12, 13.3.2, 13.4, 15.2

### Architect's Relationship with Subcontractors

1.1.2, 4.2.3, 4.2.4, 4.2.6, 9.6.3, 9.6.4, 11.3

### Architect's Representations

9.4.2, 9.5.1, 9.10.1

### Architect's Site Visits

3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.5.1, 9.9.2, 9.10.1, 13.4

### Asbestos

10.3.1

### Attorneys' Fees

3.18.1, 9.6.8, 9.10.2, 10.3.3

### Award of Separate Contracts

6.1.1, 6.1.2

### Award of Subcontracts and Other Contracts for Portions of the Work

5.2

### Basic Definitions

1.1

### Bidding Requirements

1.1.1

### Binding Dispute Resolution

8.3.1, 9.7, 11.5, 13.1, 15.1.2, 15.1.3, 15.2.1, 15.2.5, 15.2.6.1, 15.3.1, 15.3.2, 15.3.3, 15.4.1

### Bonds, Lien

7.3.4.4, 9.6.8, 9.10.2, 9.10.3

### Bonds, Performance, and Payment

7.3.4.4, 9.6.7, 9.10.3, 11.1.2, 11.1.3, 11.5

### Building Information Models Use and Reliance

1.8

### Building Permit

3.7.1

### Capitalization

1.3

### Certificate of Substantial Completion

9.8.3, 9.8.4, 9.8.5

Init.



Certificates for Payment  
4.2.1, 4.2.5, 4.2.9, 9.3.3, 9.4, 9.5, 9.6.1, 9.6.6, 9.7,  
9.10.1, 9.10.3, 14.1.1.3, 14.2.4, 15.1.4  
Certificates of Inspection, Testing or Approval  
13.4.4  
Certificates of Insurance  
9.10.2  
Change Orders  
1.1.1, 3.4.2, 3.7.4, 3.8.2.3, 3.11, 3.12.8, 4.2.8, 5.2.3,  
7.1.2, 7.1.3, 7.2, 7.3.2, 7.3.7, 7.3.9, 7.3.10, 8.3.1,  
9.3.1.1, 9.10.3, 10.3.2, 11.2, 11.5, 12.1.2  
Change Orders, Definition of  
7.2.1  
CHANGES IN THE WORK  
2.2.2, 3.11, 4.2.8, 7, 7.2.1, 7.3.1, 7.4, 8.3.1, 9.3.1.1,  
11.5  
Claims, Definition of  
15.1.1  
Claims, Notice of  
1.6.2, 15.1.3  
CLAIMS AND DISPUTES  
3.2.4, 6.1.1, 6.3, 7.3.9, 9.3.3, 9.10.4, 10.3.3, 15, 15.4  
Claims and Timely Assertion of Claims  
15.4.1  
Claims for Additional Cost  
3.2.4, 3.3.1, 3.7.4, 7.3.9, 9.5.2, 10.2.5, 10.3.2, 15.1.5  
Claims for Additional Time  
3.2.4, 3.3.1, 3.7.4, 6.1.1, 8.3.2, 9.5.2, 10.3.2, 15.1.6  
Concealed or Unknown Conditions, Claims for  
3.7.4  
Claims for Damages  
3.2.4, 3.18, 8.3.3, 9.5.1, 9.6.7, 10.2.5, 10.3.3, 11.3,  
11.3.2, 14.2.4, 15.1.7  
Claims Subject to Arbitration  
15.4.1  
Cleaning Up  
3.15, 6.3  
Commencement of the Work, Conditions Relating to  
2.2.1, 3.2.2, 3.4.1, 3.7.1, 3.10.1, 3.12.6, 5.2.1, 5.2.3,  
6.2.2, 8.1.2, 8.2.2, 8.3.1, 11.1, 11.2, 15.1.5  
Commencement of the Work, Definition of  
8.1.2  
Communications  
3.9.1, 4.2.4  
Completion, Conditions Relating to  
3.4.1, 3.11, 3.15, 4.2.2, 4.2.9, 8.2, 9.4.2, 9.8, 9.9.1,  
9.10, 12.2, 14.1.2, 15.1.2  
COMPLETION, PAYMENTS AND  
9  
Completion, Substantial  
3.10.1, 4.2.9, 8.1.1, 8.1.3, 8.2.3, 9.4.2, 9.8, 9.9.1,  
9.10.3, 12.2, 15.1.2  
Compliance with Laws  
2.3.2, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 9.6.4, 10.2.2,  
13.1, 13.3, 13.4.1, 13.4.2, 13.5, 14.1.1, 14.2.1.3,  
15.2.8, 15.4.2, 15.4.3  
Concealed or Unknown Conditions

3.7.4, 4.2.8, 8.3.1, 10.3  
Conditions of the Contract  
1.1.1, 6.1.1, 6.1.4  
Consent, Written  
3.4.2, 3.14.2, 4.1.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3, 13.2,  
15.4.4.2  
Consolidation or Joinder  
15.4.4  
CONSTRUCTION BY OWNER OR BY  
SEPARATE CONTRACTORS  
1.1.4, 6  
Construction Change Directive, Definition of  
7.3.1  
Construction Change Directives  
1.1.1, 3.4.2, 3.11, 3.12.8, 4.2.8, 7.1.1, 7.1.2, 7.1.3,  
7.3, 9.3.1.1  
Construction Schedules, Contractor's  
3.10, 3.11, 3.12.1, 3.12.2, 6.1.3, 15.1.6.2  
Contingent Assignment of Subcontracts  
5.4, 14.2.2.2  
Continuing Contract Performance  
15.1.4  
Contract, Definition of  
1.1.2  
CONTRACT, TERMINATION OR SUSPENSION  
OF THE  
5.4.1.1, 5.4.2, 11.5, 14  
Contract Administration  
3.1.3, 4, 9.4, 9.5  
Contract Award and Execution, Conditions Relating  
to  
3.7.1, 3.10, 5.2, 6.1  
Contract Documents, Copies Furnished and Use of  
1.5.2, 2.3.6, 5.3  
Contract Documents, Definition of  
1.1.1  
Contract Sum  
2.2.2, 2.2.4, 3.7.4, 3.7.5, 3.8, 3.10.2, 5.2.3, 7.3, 7.4,  
9.1, 9.2, 9.4.2, 9.5.1.4, 9.6.7, 9.7, 10.3.2, 11.5, 12.1.2,  
12.3, 14.2.4, 14.3.2, 15.1.4.2, 15.1.5, 15.2.5  
Contract Sum, Definition of  
9.1  
Contract Time  
1.1.4, 2.2.1, 2.2.2, 3.7.4, 3.7.5, 3.10.2, 5.2.3, 6.1.5,  
7.2.1.3, 7.3.1, 7.3.5, 7.3.6, 7, 7, 7.3.10, 7.4, 8.1.1,  
8.2.1, 8.2.3, 8.3.1, 9.5.1, 9.7, 10.3.2, 12.1.1, 12.1.2,  
14.3.2, 15.1.4.2, 15.1.6.1, 15.2.5  
Contract Time, Definition of  
8.1.1  
CONTRACTOR  
3  
Contractor, Definition of  
3.1, 6.1.2  
Contractor's Construction and Submittal Schedules  
3.10, 3.12.1, 3.12.2, 4.2.3, 6.1.3, 15.1.6.2  
Contractor's Employees

Init.

2.2.4, 3.3.2, 3.4.3, 3.8.1, 3.9, 3.18.2, 4.2.3, 4.2.6,  
10.2, 10.3, 11.3, 14.1, 14.2.1.1  
Contractor's Liability Insurance  
11.1  
Contractor's Relationship with Separate Contractors  
and Owner's Forces  
3.12.5, 3.14.2, 4.2.4, 6, 11.3, 12.2.4  
Contractor's Relationship with Subcontractors  
1.2.2, 2.2.4, 3.3.2, 3.18.1, 3.18.2, 4.2.4, 5, 9.6.2,  
9.6.7, 9.10.2, 11.2, 11.3, 11.4  
Contractor's Relationship with the Architect  
1.1.2, 1.5, 2.3.3, 3.1.3, 3.2.2, 3.2.3, 3.2.4, 3.3.1, 3.4.2,  
3.5.1, 3.7.4, 3.10, 3.11, 3.12, 3.16, 3.18, 4.2, 5.2,  
6.2.2, 7, 8.3.1, 9.2, 9.3, 9.4, 9.5, 9.7, 9.8, 9.9, 10.2.6,  
10.3, 11.3, 12, 13.4, 15.1.3, 15.2.1  
Contractor's Representations  
3.2.1, 3.2.2, 3.5, 3.12.6, 6.2.2, 8.2.1, 9.3.3, 9.8.2  
Contractor's Responsibility for Those Performing the  
Work  
3.3.2, 3.18, 5.3, 6.1.3, 6.2, 9.5.1, 10.2.8  
Contractor's Review of Contract Documents  
3.2  
Contractor's Right to Stop the Work  
2.2.2, 9.7  
Contractor's Right to Terminate the Contract  
14.1  
Contractor's Submittals  
3.10, 3.11, 3.12, 4.2.7, 5.2.1, 5.2.3, 9.2, 9.3, 9.8.2,  
9.8.3, 9.9.1, 9.10.2, 9.10.3  
Contractor's Superintendent  
3.9, 10.2.6  
Contractor's Supervision and Construction  
Procedures  
1.2.2, 3.3, 3.4, 3.12.10, 4.2.2, 4.2.7, 6.1.3, 6.2.4,  
7.1.3, 7.3.4, 7.3.6, 8.2, 10, 12, 14, 15.1.4  
Coordination and Correlation  
1.2, 3.2.1, 3.3.1, 3.10, 3.12.6, 6.1.3, 6.2.1  
Copies Furnished of Drawings and Specifications  
1.5, 2.3.6, 3.11  
Copyrights  
1.5, 3.17  
Correction of Work  
2.5, 3.7.3, 9.4.2, 9.8.2, 9.8.3, 9.9.1, 12.1.2, 12.2, 12.3,  
15.1.3.1, 15.1.3.2, 15.2.1  
Correlation and Intent of the Contract Documents  
1.2  
Cost, Definition of  
7.3.4  
Costs  
2.5, 3.2.4, 3.7.3, 3.8.2, 3.15.2, 5.4.2, 6.1.1, 6.2.3,  
7.3.3.3, 7.3.4, 7.3.8, 7.3.9, 9.10.2, 10.3.2, 10.3.6,  
11.2, 12.1.2, 12.2.1, 12.2.4, 13.4, 14  
Cutting and Patching  
3.14, 6.2.5  
Damage to Construction of Owner or Separate  
Contractors  
3.14.2, 6.2.4, 10.2.1.2, 10.2.5, 10.4, 12.2.4

Damage to the Work  
3.14.2, 9.9.1, 10.2.1.2, 10.2.5, 10.4, 12.2.4  
Damages, Claims for  
3.2.4, 3.18, 6.1.1, 8.3.3, 9.5.1, 9.6.7, 10.3.3, 11.3.2,  
11.3, 14.2.4, 15.1.7  
Damages for Delay  
6.2.3, 8.3.3, 9.5.1.6, 9.7, 10.3.2, 14.3.2  
Date of Commencement of the Work, Definition of  
8.1.2  
Date of Substantial Completion, Definition of  
8.1.3  
Day, Definition of  
8.1.4  
Decisions of the Architect  
3.7.4, 4.2.6, 4.2.7, 4.2.11, 4.2.12, 4.2.13, 6.3, 7.3.4,  
7.3.9, 8.1.3, 8.3.1, 9.2, 9.4, 9.5.1, 9.8.4, 9.9.1, 13.4.2,  
14.2.2, 14.2.4, 15.1, 15.2  
Decisions to Withhold Certification  
9.4.1, 9.5, 9.7, 14.1.1.3  
Defective or Nonconforming Work, Acceptance,  
Rejection and Correction of  
2.5, 3.5, 4.2.6, 6.2.3, 9.5.1, 9.5.3, 9.6.6, 9.8.2, 9.9.3,  
9.10.4, 12.2.1  
Definitions  
1.1, 2.1.1, 3.1.1, 3.5, 3.12.1, 3.12.2, 3.12.3, 4.1.1, 5.1,  
6.1.2, 7.2.1, 7.3.1, 8.1, 9.1, 9.8.1, 15.1.1  
Delays and Extensions of Time  
3.2, 3.7.4, 5.2.3, 7.2.1, 7.3.1, 7.4, 8.3, 9.5.1, 9.7,  
10.3.2, 10.4, 14.3.2, 15.1.6, 15.2.5  
Digital Data Use and Transmission  
1.7  
Disputes  
6.3, 7.3.9, 15.1, 15.2  
Documents and Samples at the Site  
3.11  
Drawings, Definition of  
1.1.5  
Drawings and Specifications, Use and Ownership of  
3.11  
Effective Date of Insurance  
8.2.2  
Emergencies  
10.4, 14.1.1.2, 15.1.5  
Employees, Contractor's  
3.3.2, 3.4.3, 3.8.1, 3.9, 3.18.2, 4.2.3, 4.2.6, 10.2,  
10.3.3, 11.3, 14.1, 14.2.1.1  
Equipment, Labor, or Materials  
1.1.3, 1.1.6, 3.4, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1,  
4.2.6, 4.2.7, 5.2.1, 6.2.1, 7.3.4, 9.3.2, 9.3.3, 9.5.1.3,  
9.10.2, 10.2.1, 10.2.4, 14.2.1.1, 14.2.1.2  
Execution and Progress of the Work  
1.1.3, 1.2.1, 1.2.2, 2.3.4, 2.3.6, 3.1, 3.3.1, 3.4.1, 3.7.1,  
3.10.1, 3.12, 3.14, 4.2, 6.2.2, 7.1.3, 7.3.6, 8.2, 9.5.1,  
9.9.1, 10.2, 10.3, 12.1, 12.2, 14.2, 14.3.1, 15.1.4  
Extensions of Time  
3.2.4, 3.7.4, 5.2.3, 7.2.1, 7.3, 7.4, 9.5.1, 9.7, 10.3.2,  
10.4, 14.3, 15.1.6, 15.2.5

Init.



Failure of Payment  
 9.5.1.3, 9.7, 9.10.2, 13.5, 14.1.1.3, 14.2.1.2  
 Faulty Work  
 (See Defective or Nonconforming Work)  
 Final Completion and Final Payment  
 4.2.1, 4.2.9, 9.8.2, 9.10, 12.3, 14.2.4, 14.4.3  
 Financial Arrangements, Owner's  
 2.2.1, 13.2.2, 14.1.1.4  
**GENERAL PROVISIONS**  
 1  
 Governing Law  
 13.1  
 Guarantees (See Warranty)  
 Hazardous Materials and Substances  
 10.2.4, 10.3  
 Identification of Subcontractors and Suppliers  
 5.2.1  
 Indemnification  
 3.17, 3.18, 9.6.8, 9.10.2, 10.3.3, 11.3  
 Information and Services Required of the Owner  
 2.1.2, 2.2, 2.3, 3.2.2, 3.12.10.1, 6.1.3, 6.1.4, 6.2.5,  
 9.6.1, 9.9.2, 9.10.3, 10.3.3, 11.2, 13.4.1, 13.4.2,  
 14.1.1.4, 14.1.4, 15.1.4  
 Initial Decision  
 15.2  
 Initial Decision Maker, Definition of  
 1.1.8  
 Initial Decision Maker, Decisions  
 14.2.4, 15.1.4.2, 15.2.1, 15.2.2, 15.2.3, 15.2.4, 15.2.5  
 Initial Decision Maker, Extent of Authority  
 14.2.4, 15.1.4.2, 15.2.1, 15.2.2, 15.2.3, 15.2.4, 15.2.5  
 Injury or Damage to Person or Property  
 10.2.8, 10.4  
 Inspections  
 3.1.3, 3.3.3, 3.7.1, 4.2.2, 4.2.6, 4.2.9, 9.4.2, 9.8.3,  
 9.9.2, 9.10.1, 12.2.1, 13.4  
 Instructions to Bidders  
 1.1.1  
 Instructions to the Contractor  
 3.2.4, 3.3.1, 3.8.1, 5.2.1, 7, 8.2.2, 12, 13.4.2  
 Instruments of Service, Definition of  
 1.1.7  
 Insurance  
 6.1.1, 7.3.4, 8.2.2, 9.3.2, 9.8.4, 9.9.1, 9.10.2, 10.2.5,  
 11  
 Insurance, Notice of Cancellation or Expiration  
 11.1.4, 11.2.3  
 Insurance, Contractor's Liability  
 11.1  
 Insurance, Effective Date of  
 8.2.2, 14.4.2  
 Insurance, Owner's Liability  
 11.2  
 Insurance, Property  
 10.2.5, 11.2, 11.4, 11.5  
 Insurance, Stored Materials  
 9.3.2

**INSURANCE AND BONDS**  
 11  
 Insurance Companies, Consent to Partial Occupancy  
 9.9.1  
 Insured loss, Adjustment and Settlement of  
 11.5  
 Intent of the Contract Documents  
 1.2.1, 4.2.7, 4.2.12, 4.2.13  
 Interest  
 13.5  
 Interpretation  
 1.1.8, 1.2.3, 1.4, 4.1.1, 5.1, 6.1.2, 15.1.1  
 Interpretations, Written  
 4.2.11, 4.2.12  
 Judgment on Final Award  
 15.4.2  
 Labor and Materials, Equipment  
 1.1.3, 1.1.6, 3.4, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1,  
 5.2.1, 6.2.1, 7.3.4, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1,  
 10.2.4, 14.2.1.1, 14.2.1.2  
 Labor Disputes  
 8.3.1  
 Laws and Regulations  
 1.5, 2.3.2, 3.2.3, 3.2.4, 3.6, 3.7, 3.12.10, 3.13, 9.6.4,  
 9.9.1, 10.2.2, 13.1, 13.3.1, 13.4.2, 13.5, 14, 15.2.8,  
 15.4  
 Liens  
 2.1.2, 9.3.1, 9.3.3, 9.6.8, 9.10.2, 9.10.4, 15.2.8  
 Limitations, Statutes of  
 12.2.5, 15.1.2, 15.4.1.1  
 Limitations of Liability  
 3.2.2, 3.5, 3.12.10, 3.12.10.1, 3.17, 3.18.1, 4.2.6,  
 4.2.7, 6.2.2, 9.4.2, 9.6.4, 9.6.7, 9.6.8, 10.2.5, 10.3.3,  
 11.3, 12.2.5, 13.3.1  
 Limitations of Time  
 2.1.2, 2.2, 2.5, 3.2.2, 3.10, 3.11, 3.12.5, 3.15.1, 4.2.7,  
 5.2, 5.3, 5.4.1, 6.2.4, 7.3, 7.4, 8.2, 9.2, 9.3.1, 9.3.3,  
 9.4.1, 9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 12.2, 13.4, 14, 15,  
 15.1.2, 15.1.3, 15.1.5  
 Materials, Hazardous  
 10.2.4, 10.3  
 Materials, Labor, Equipment and  
 1.1.3, 1.1.6, 3.4.1, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1,  
 5.2.1, 6.2.1, 7.3.4, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2,  
 10.2.1.2, 10.2.4, 14.2.1.1, 14.2.1.2  
 Means, Methods, Techniques, Sequences and  
 Procedures of Construction  
 3.3.1, 3.12.10, 4.2.2, 4.2.7, 9.4.2  
 Mechanic's Lien  
 2.1.2, 9.3.1, 9.3.3, 9.6.8, 9.10.2, 9.10.4, 15.2.8  
 Mediation  
 8.3.1, 15.1.3.2, 15.2.1, 15.2.5, 15.2.6, 15.3, 15.4.1,  
 15.4.1.1  
 Minor Changes in the Work  
 1.1.1, 3.4.2, 3.12.8, 4.2.8, 7.1, 7.4  
**MISCELLANEOUS PROVISIONS**  
 13

Init.

Modifications, Definition of  
 1.1.1  
 Modifications to the Contract  
 1.1.1, 1.1.2, 2.5, 3.11, 4.1.2, 4.2.1, 5.2.3, 7, 8.3.1, 9.7,  
 10.3.2  
 Mutual Responsibility  
 6.2  
 Nonconforming Work, Acceptance of  
 9.6.6, 9.9.3, 12.3  
 Nonconforming Work, Rejection and Correction of  
 2.4, 2.5, 3.5, 4.2.6, 6.2.4, 9.5.1, 9.8.2, 9.9.3, 9.10.4,  
 12.2  
 Notice  
 1.6, 1.6.1, 1.6.2, 2.1.2, 2.2.2., 2.2.3, 2.2.4, 2.5, 3.2.4,  
 3.3.1, 3.7.4, 3.7.5, 3.9.2, 3.12.9, 3.12.10, 5.2.1, 7.4,  
 8.2.2, 9.6.8, 9.7, 9.10.1, 10.2.8, 10.3.2, 11.5, 12.2.2.1,  
 13.4.1, 13.4.2, 14.1, 14.2.2, 14.4.2, 15.1.3, 15.1.5,  
 15.1.6, 15.4.1  
 Notice of Cancellation or Expiration of Insurance  
 11.1.4, 11.2.3  
 Notice of Claims  
 1.6.2, 2.1.2, 3.7.4, 9.6.8, 10.2.8, 15.1.3, 15.1.5,  
 15.1.6, 15.2.8, 15.3.2, 15.4.1  
 Notice of Testing and Inspections  
 13.4.1, 13.4.2  
 Observations, Contractor's  
 3.2, 3.7.4  
 Occupancy  
 2.3.1, 9.6.6, 9.8  
 Orders, Written  
 1.1.1, 2.4, 3.9.2, 7, 8.2.2, 11.5, 12.1, 12.2.2.1, 13.4.2,  
 14.3.1  
 OWNER  
 2  
 Owner, Definition of  
 2.1.1  
 Owner, Evidence of Financial Arrangements  
 2.2, 13.2.2, 14.1.1.4  
 Owner, Information and Services Required of the  
 2.1.2, 2.2, 2.3, 3.2.2, 3.12.10, 6.1.3, 6.1.4, 6.2.5,  
 9.3.2, 9.6.1, 9.6.4, 9.9.2, 9.10.3, 10.3.3, 11.2, 13.4.1,  
 13.4.2, 14.1.1.4, 14.1.4, 15.1.4  
 Owner's Authority  
 1.5, 2.1.1, 2.3.32.4, 2.5, 3.4.2, 3.8.1, 3.12.10, 3.14.2,  
 4.1.2, 4.2.4, 4.2.9, 5.2.1, 5.2.4, 5.4.1, 6.1, 6.3, 7.2.1,  
 7.3.1, 8.2.2, 8.3.1, 9.3.2, 9.5.1, 9.6.4, 9.9.1, 9.10.2,  
 10.3.2, 11.4, 11.5, 12.2.2, 12.3, 13.2.2, 14.3, 14.4,  
 15.2.7  
 Owner's Insurance  
 11.2  
 Owner's Relationship with Subcontractors  
 1.1.2, 5.2, 5.3, 5.4, 9.6.4, 9.10.2, 14.2.2  
 Owner's Right to Carry Out the Work  
 2.5, 14.2.2  
 Owner's Right to Clean Up  
 6.3  
 Owner's Right to Perform Construction and to Award

Separate Contracts  
 6.1  
 Owner's Right to Stop the Work  
 2.4  
 Owner's Right to Suspend the Work  
 14.3  
 Owner's Right to Terminate the Contract  
 14.2, 14.4  
 Ownership and Use of Drawings, Specifications and  
 Other Instruments of Service  
 1.1.1, 1.1.6, 1.1.7, 1.5, 2.3.6, 3.2.2, 3.11, 3.17, 4.2.12,  
 5.3  
 Partial Occupancy or Use  
 9.6.6, 9.9  
 Patching, Cutting and  
 3.14, 6.2.5  
 Patents  
 3.17  
 Payment, Applications for  
 4.2.5, 7.3.9, 9.2, 9.3, 9.4, 9.5, 9.6.3, 9.7, 9.8.5, 9.10.1,  
 14.2.3, 14.2.4, 14.4.3  
 Payment, Certificates for  
 4.2.5, 4.2.9, 9.3.3, 9.4, 9.5, 9.6.1, 9.6.6, 9.7, 9.10.1,  
 9.10.3, 14.1.1.3, 14.2.4  
 Payment, Failure of  
 9.5.1.3, 9.7, 9.10.2, 13.5, 14.1.1.3, 14.2.1.2  
 Payment, Final  
 4.2.1, 4.2.9, 9.10, 12.3, 14.2.4, 14.4.3  
 Payment Bond, Performance Bond and  
 7.3.4.4, 9.6.7, 9.10.3, 11.1.2  
 Payments, Progress  
 9.3, 9.6, 9.8.5, 9.10.3, 14.2.3, 15.1.4  
 PAYMENTS AND COMPLETION  
 9  
 Payments to Subcontractors  
 5.4.2, 9.5.1.3, 9.6.2, 9.6.3, 9.6.4, 9.6.7, 14.2.1.2  
 PCB  
 10.3.1  
 Performance Bond and Payment Bond  
 7.3.4.4, 9.6.7, 9.10.3, 11.1.2  
 Permits, Fees, Notices and Compliance with Laws  
 2.3.1, 3.7, 3.13, 7.3.4.4, 10.2.2  
 PERSONS AND PROPERTY, PROTECTION OF  
 10  
 Polychlorinated Biphenyl  
 10.3.1  
 Product Data, Definition of  
 3.12.2  
 Product Data and Samples, Shop Drawings  
 3.11, 3.12, 4.2.7  
 Progress and Completion  
 4.2.2, 8.2, 9.8, 9.9.1, 14.1.4, 15.1.4  
 Progress Payments  
 9.3, 9.6, 9.8.5, 9.10.3, 14.2.3, 15.1.4  
 Project, Definition of  
 1.1.4  
 Project Representatives

Init.

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4.2.10  
 Property Insurance  
 10.2.5, 11.2  
 Proposal Requirements  
 1.1.1  
**PROTECTION OF PERSONS AND PROPERTY**  
 10  
 Regulations and Laws  
 1.5, 2.3.2, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 9.6.4, 9.9.1,  
 10.2.2, 13.1, 13.3, 13.4.1, 13.4.2, 13.5, 14, 15.2.8,  
 15.4  
 Rejection of Work  
 4.2.6, 12.2.1  
 Releases and Waivers of Liens  
 9.3.1, 9.10.2  
 Representations  
 3.2.1, 3.5, 3.12.6, 8.2.1, 9.3.3, 9.4.2, 9.5.1, 9.10.1  
 Representatives  
 2.1.1, 3.1.1, 3.9, 4.1.1, 4.2.10, 13.2.1  
 Responsibility for Those Performing the Work  
 3.3.2, 3.18, 4.2.2, 4.2.3, 5.3, 6.1.3, 6.2, 6.3, 9.5.1, 10  
 Retainage  
 9.3.1, 9.6.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3  
 Review of Contract Documents and Field Conditions  
 by Contractor  
 3.2, 3.12.7, 6.1.3  
 Review of Contractor's Submittals by Owner and  
 Architect  
 3.10.1, 3.10.2, 3.11, 3.12, 4.2, 5.2, 6.1.3, 9.2, 9.8.2  
 Review of Shop Drawings, Product Data and  
 Samples by Contractor  
 3.12  
 Rights and Remedies  
 1.1.2, 2.4, 2.5, 3.5, 3.7.4, 3.15.2, 4.2.6, 5.3, 5.4, 6.1,  
 6.3, 7.3.1, 8.3, 9.5.1, 9.7, 10.2.5, 10.3, 12.2.1, 12.2.2,  
 12.2.4, 13.3, 14, 15.4  
 Royalties, Patents and Copyrights  
 3.17  
 Rules and Notices for Arbitration  
 15.4.1  
 Safety of Persons and Property  
 10.2, 10.4  
 Safety Precautions and Programs  
 3.3.1, 4.2.2, 4.2.7, 5.3, 10.1, 10.2, 10.4  
 Samples, Definition of  
 3.12.3  
 Samples, Shop Drawings, Product Data and  
 3.11, 3.12, 4.2.7  
 Samples at the Site, Documents and  
 3.11  
 Schedule of Values  
 9.2, 9.3.1  
 Schedules, Construction  
 3.10, 3.12.1, 3.12.2, 6.1.3, 15.1.6.2  
 Separate Contracts and Contractors  
 1.1.4, 3.12.5, 3.14.2, 4.2.4, 4.2.7, 6, 8.3.1, 12.1.2  
 Separate Contractors, Definition of

6.1.1  
 Shop Drawings, Definition of  
 3.12.1  
 Shop Drawings, Product Data and Samples  
 3.11, 3.12, 4.2.7  
 Site, Use of  
 3.13, 6.1.1, 6.2.1  
 Site Inspections  
 3.2.2, 3.3.3, 3.7.1, 3.7.4, 4.2, 9.9.2, 9.4.2, 9.10.1, 13.4  
 Site Visits, Architect's  
 3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.5.1, 9.9.2, 9.10.1, 13.4  
 Special Inspections and Testing  
 4.2.6, 12.2.1, 13.4  
 Specifications, Definition of  
 1.1.6  
 Specifications  
 1.1.1, 1.1.6, 1.2.2, 1.5, 3.12.10, 3.17, 4.2.14  
 Statute of Limitations  
 15.1.2, 15.4.1.1  
 Stopping the Work  
 2.2.2, 2.4, 9.7, 10.3, 14.1  
 Stored Materials  
 6.2.1, 9.3.2, 10.2.1.2, 10.2.4  
 Subcontractor, Definition of  
 5.1.1  
**SUBCONTRACTORS**  
 5  
 Subcontractors, Work by  
 1.2.2, 3.3.2, 3.12.1, 3.18, 4.2.3, 5.2.3, 5.3, 5.4,  
 9.3.1.2, 9.6.7  
 Subcontractual Relations  
 5.3, 5.4, 9.3.1.2, 9.6, 9.10, 10.2.1, 14.1, 14.2.1  
 Submittals  
 3.10, 3.11, 3.12, 4.2.7, 5.2.1, 5.2.3, 7.3.4, 9.2, 9.3,  
 9.8, 9.9.1, 9.10.2, 9.10.3  
 Submittal Schedule  
 3.10.2, 3.12.5, 4.2.7  
 Subrogation, Waivers of  
 6.1.1, 11.3  
 Substances, Hazardous  
 10.3  
 Substantial Completion  
 4.2.9, 8.1.1, 8.1.3, 8.2.3, 9.4.2, 9.8, 9.9.1, 9.10.3,  
 12.2, 15.1.2  
 Substantial Completion, Definition of  
 9.8.1  
 Substitution of Subcontractors  
 5.2.3, 5.2.4  
 Substitution of Architect  
 2.3.3  
 Substitutions of Materials  
 3.4.2, 3.5, 7.3.8  
 Sub-subcontractor, Definition of  
 5.1.2  
 Subsurface Conditions  
 3.7.4  
 Successors and Assigns

Init.

13.2  
 Superintendent  
 3.9, 10.2.6  
 Supervision and Construction Procedures  
 1.2.2, 3.3, 3.4, 3.12.10, 4.2.2, 4.2.7, 6.1.3, 6.2.4,  
 7.1.3, 7.3.4, 8.2, 8.3.1, 9.4.2, 10, 12, 14, 15.1.4  
 Suppliers  
 1.5, 3.12.1, 4.2.4, 4.2.6, 5.2.1, 9.3, 9.4.2, 9.5.4, 9.6,  
 9.10.5, 14.2.1  
 Surety  
 5.4.1.2, 9.6.8, 9.8.5, 9.10.2, 9.10.3, 11.1.2, 14.2.2,  
 15.2.7  
 Surety, Consent of  
 9.8.5, 9.10.2, 9.10.3  
 Surveys  
 1.1.7, 2.3.4  
 Suspension by the Owner for Convenience  
 14.3  
 Suspension of the Work  
 3.7.5, 5.4.2, 14.3  
 Suspension or Termination of the Contract  
 5.4.1.1, 14  
 Taxes  
 3.6, 3.8.2.1, 7.3.4.4  
 Termination by the Contractor  
 14.1, 15.1.7  
 Termination by the Owner for Cause  
 5.4.1.1, 14.2, 15.1.7  
 Termination by the Owner for Convenience  
 14.4  
 Termination of the Architect  
 2.3.3  
 Termination of the Contractor Employment  
 14.2.2

## TERMINATION OR SUSPENSION OF THE CONTRACT

14  
 Tests and Inspections  
 3.1.3, 3.3.3, 3.7.1, 4.2.2, 4.2.6, 4.2.9, 9.4.2, 9.8.3,  
 9.9.2, 9.10.1, 10.3.2, 12.2.1, 13.4  
 TIME  
 8  
 Time, Delays and Extensions of  
 3.2.4, 3.7.4, 5.2.3, 7.2.1, 7.3.1, 7.4, 8.3, 9.5.1, 9.7,  
 10.3.2, 10.4, 14.3.2, 15.1.6, 15.2.5  
 Time Limits

2.1.2, 2.2, 2.5, 3.2.2, 3.10, 3.11, 3.12.5, 3.15.1, 4.2,  
 5.2, 5.3, 5.4, 6.2.4, 7.3, 7.4, 8.2, 9.2, 9.3.1, 9.3.3,  
 9.4.1, 9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 12.2, 13.4, 14,  
 15.1.2, 15.1.3, 15.4  
 Time Limits on Claims  
 3.7.4, 10.2.8, 15.1.2, 15.1.3  
 Title to Work  
 9.3.2, 9.3.3  
 UNCOVERING AND CORRECTION OF WORK  
 12  
 Uncovering of Work  
 12.1  
 Unforeseen Conditions, Concealed or Unknown  
 3.7.4, 8.3.1, 10.3  
 Unit Prices  
 7.3.3.2, 9.1.2  
 Use of Documents  
 1.1.1, 1.5, 2.3.6, 3.12.6, 5.3  
 Use of Site  
 3.13, 6.1.1, 6.2.1  
 Values, Schedule of  
 9.2, 9.3.1  
 Waiver of Claims by the Architect  
 13.3.2  
 Waiver of Claims by the Contractor  
 9.10.5, 13.3.2, 15.1.7  
 Waiver of Claims by the Owner  
 9.9.3, 9.10.3, 9.10.4, 12.2.2.1, 13.3.2, 14.2.4, 15.1.7  
 Waiver of Consequential Damages  
 14.2.4, 15.1.7  
 Waiver of Liens  
 9.3, 9.10.2, 9.10.4  
 Waivers of Subrogation  
 6.1.1, 11.3  
 Warranty  
 3.5, 4.2.9, 9.3.3, 9.8.4, 9.9.1, 9.10.2, 9.10.4, 12.2.2,  
 15.1.2  
 Weather Delays  
 8.3, 15.1.6.2  
 Work, Definition of  
 1.1.3  
 Written Consent  
 1.5.2, 3.4.2, 3.7.4, 3.12.8, 3.14.2, 4.1.2, 9.3.2, 9.10.3,  
 13.2, 13.3.2, 15.4.4.2  
 Written Interpretations  
 4.2.11, 4.2.12  
 Written Orders  
 1.1.1, 2.4, 3.9, 7, 8.2.2, 12.1, 12.2, 13.4.2, 14.3.1



## **ARTICLE 1 GENERAL PROVISIONS**

### **§ 1.1 Basic Definitions**

#### **§ 1.1.1 The Contract Documents**

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding or proposal requirements.

#### **§ 1.1.2 The Contract**

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants, or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

#### **§ 1.1.3 The Work**

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

#### **§ 1.1.4 The Project**

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by Separate Contractors.

#### **§ 1.1.5 The Drawings**

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

#### **§ 1.1.6 The Specifications**

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

The Specifications may describe (or the Drawings may show) the general placement required of materials or equipment, but the actual required placement may vary depending on the specific material or equipment used by the Contractor or the existing field conditions. The Contractor shall bear all direct and indirect costs associated with such variances.

Some Specifications may be written in a condensed outline form and omitted words shall be included by inference. If the Specifications identify a task, it shall mean the "Contractor shall furnish, install and complete" the identified task unless otherwise stated.

Reference to standard specifications, manuals or codes shall mean reference to the latest standard specification, manual or code in effect at the time of the execution of the Owner-Contractor Agreement, unless otherwise stated.

When reference is made to a manufacturer, trade association, reference standard or similar source (such as ASTM, ASA, AISC, ACI, etc.) the standards or requirements of such entity shall be incorporated into the Specifications and have the force and effect as though they were set forth expressly. Upon entering into the Owner-Contractor Agreement, the Contractor acknowledges its familiarity with those references, codes, etc. The date of the referenced

standard shall be the latest edition in effect at the time of the execution of the Owner-Contractor Agreement unless otherwise stated.

#### **§ 1.1.7 Instruments of Service**

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

#### **§ 1.1.8 Initial Decision Maker**

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

#### **§ 1.2 Correlation and Intent of the Contract Documents**

**§ 1.2.1** The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results. In the event of inconsistencies within or between parts of the Contract Documents, the Contractor shall (1) provide the better quality of Work or (2) comply with the more stringent requirement; either or both in accordance with the Architect's interpretation. The terms and conditions of the Subparagraph 1.2.1, however shall not relieve the Contractor of any of the obligations set forth elsewhere in this Agreement. All work shall conform to the Contract Documents. No significant change there from shall be made without prior written authorization by the Owner. Where only part of the Work is indicated, similar parts shall be considered repetition. When any detail is shown and the components therefore are fully described, similar details shall be construed to require the same materials and construction. Items required by either the Drawings or the Specifications and not mentioned in the other shall be of like effect as if shown or mentioned in both. Should the Specifications and Drawings fail to particularly describe a product or material shown to be used in any place, the Contractor shall furnish the product that would normally be used in that place.

**§ 1.2.1.1** The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

**§ 1.2.2** Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed nor to limit the scope of work performed by any trade or by any Subcontractor or supplier. Such separations shall not operate to make the Architect an arbiter to establish limits of work between Subcontractors or between Contractor and Subcontractor.

**§ 1.2.3** Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

**§ 1.2.4** Reference to "match existing" in Contract Documents refer to existing finishes, materials, details, and qualities which have been used in adjacent portions of existing facilities. Material designations or details not specifically shown shall either match existing or be similar in finish, material or quality to similar adjacent conditions.

#### **§ 1.3 Capitalization**

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects.



#### **§ 1.4 Interpretation**

In the interest of brevity the Contract Documents frequently omit modifying words such as “all” and “any” and articles such as “the” and “an,” but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

#### **§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service**

**§ 1.5.1** The Architect and the Architect’s consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Owner, Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect’s or Architect’s consultants’ reserved rights.

**§ 1.5.2** The Owner, Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect’s consultants.

#### **§ 1.6 Notice**

**§ 1.6.1** Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

**§ 1.6.2** Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

#### **§ 1.7 Digital Data Use and Transmission**

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

#### **§ 1.8 Building Information Models Use and Reliance**

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party’s sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

### **ARTICLE 2 OWNER**

#### **§ 2.1 General**

**§ 2.1.1** The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner’s approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term “Owner” means the Owner or the Owner’s authorized representative.

**§ 2.1.2** The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic’s lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner’s interest therein.

## **§ 2.2 Evidence of the Owner's Financial Arrangements**

**§ 2.2.1** Prior to commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.

**§ 2.2.2** Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.

## **§ 2.2.3**

Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

## **§ 2.3 Information and Services Required of the Owner**

**§ 2.3.1** Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities as necessary to complete the Project.

**§ 2.3.2** The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

**§ 2.3.3** If the employment of the Architect terminates, the Owner shall employ a successor whose status under the Contract Documents shall be that of the Architect.

**§ 2.3.4** The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

**§ 2.3.5** The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

**§ 2.3.6** Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.



#### **§ 2.4 Owner's Right to Stop the Work**

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3. Such order or stoppage by the Owner shall not constitute grounds for contract termination by the Contractor under Article 14 and shall not be the basis of Time Extensions by the Contractor under Article 8.3.

#### **§ 2.5 Owner's Right to Carry Out the Work**

**§ 2.5.1** If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate for Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

**§ 2.5.2** The rights stated in this Article 2 and elsewhere in the Contract Documents are cumulative and not in limitation of any rights of the Owner or Contractor (1) granted in the Contract Documents; (2) law; or (3) in equity.

**§ 2.5.3** In no event shall the Owner have control over, charge of, or any responsibility for construction means, methods, techniques, sequences, or procedures or for safety precautions and programs in connection with the Work. The owner assumes no responsibility for liability for the safety of the Project site. The Contractor shall be solely responsible for providing a safe place for the performance of the Work; provided that the Owner shall be responsible for, and the Contractor shall upon discovery notify the Owner of, any unsafe condition created by the Owner.

### **ARTICLE 3 CONTRACTOR**

#### **§ 3.1 General**

**§ 3.1.1** The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

**§ 3.1.2** The Contractor shall perform the Work in accordance with the Contract Documents.

**§ 3.1.3** The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

#### **§ 3.2 Review of Contract Documents and Field Conditions by Contractor**

**§ 3.2.1** Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents.

The Contractor shall rely on its own knowledge and its review and interpretation of the Contract Documents and data provided in entering into the Contract and not the representations of the Owner or other persons. The Contractor acknowledges that quantities provided in the Contract Documents are estimates only and Contractor shall not seek additional compensation or adjustment in price based on a variation in actual quantities.

Prior to execution of the Contract, the Contractor and each Subcontractor shall evaluate and satisfy themselves as to the conditions and limitations under which the Work is to be performed, including, without limitation, (i) the

location, condition, layout, and nature of the Project site and surrounding areas, (ii) generally prevailing climatic conditions, (iii) anticipated labor supply and costs, and (iv) availability and cost of materials, tools, and equipment.

The location of existing features shown on plans is intended for general information only. The Contractor, alone, is responsible for accurate determination of the location of all structures, and shall not be entitled to any extra payment for discrepancies between the Work as shown in the Contract Documents and existing conditions.

The locations, depths and data as to underground conditions have been obtained from records, surface indications and data furnished by others. Information furnished is solely for the convenience of the Contractor without any warranty, expressed or implied as to its accuracy or completeness. The Contractor shall verify all existing conditions prior to commencing the Work. The Contractor shall make no claim against the Owner or Architect with respect to the accuracy or completeness of such information if the conditions found after commencement of the Work are different from those as indicated.

The Contractor shall be solely responsible for the conditions which develop during construction and in the event any structure is dislocated, or over strained, or damaged so as to affect its usefulness, the Contractor shall correct or repair any dislocations, over strains or damages caused.

The Contractor is responsible for restoration and/or repair of utilities, private property, buildings, pavement, walkways, roads, etc. damaged by its activities during the performance of its Work.

**§ 3.2.2** Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

The Contractor shall assume full responsibility for accuracy of measurements obtained at the site. No extra compensation will be allowed because of differences between actual measurements and dimensions indicated on the Drawings, nor for Contractor's failure to coordinate work with actual field measurements.

**§ 3.2.3** The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

**§ 3.2.4** If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

**§ 3.2.5** The Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and shall make no changes or relocations without the prior written approval of the Owner. The Contractor shall report to the Architect whenever any reference point is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points by professionally qualified personnel.



### **§ 3.3 Supervision and Construction Procedures**

**§ 3.3.1** The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

**§ 3.3.2** The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

**§ 3.3.3** The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

**§ 3.3.4** The Contractor shall employ a licensed surveyor to locate and stake out the Work and establish necessary reference and bench marks. The contractor shall work from established bench marks and reference points, layout and correctly establish all lines, levels, grades and locations of all parts of their own Work and be responsible for their accuracy and proper correlation with Work and established data.

**§ 3.3.5 Prohibitions:** There shall be no use of tobacco products, alcohol or illegal drugs at the construction site. No weapons are permitted at the construction site. Contractor and its agents shall refrain from the use of profanity or dressing in any way that is disrespectful or harassing to legally protected groups, including but not limited to race, color, sex, age, disability, religion, national orientation or sexual orientation.

### **§ 3.4 Labor and Materials**

**§ 3.4.1** Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

- .1 All materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the instructions of the applicable manufacturer, fabricator, supplier or distributor, except as otherwise provided in the Contract Documents.
- .2 Contractor shall confine construction equipment, the storage of materials and equipment and the operations of all workers to areas permitted by law, ordinances, permits or the Contract Documents, and shall not disturb the premises more than required for the proper performance of the Work and/or permitted by the Owner.
- .3 Contractors and Subcontractors warrant that they have good title to all materials used in performing Work on this Contract.

**§ 3.4.2** Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

After the Contract has been executed, the Owner and Architect will consider requests for the substitution of products in place of those specified only if the Contractor satisfies the procedural requirements set forth in the General Requirements (Division 01) of the Specifications. By making requests for substitutions, the Contractor:

- .1 Represents that it has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified;
- .2 Represents that it will provide the same warranty for the substitution as it would have provided for the product specified;

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- 3 Certifies that the cost data presented is complete and includes all related costs for the substituted product and for Work that must be changed as a result of the substitution, except for the Architect's redesign costs, and waives all claims for additional costs related to the substitution that may subsequently be incurred by the Contractor; and
- 4 Shall coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects.

§ 3.4.2.1 The Owner shall be entitled to reimbursement from the Contractor for amounts paid to the Architect for reviewing the Contractor's proposed substitutions and making agreed upon changes in the Drawings and Specifications resulting from such substitutions. The Owner may seek reimbursement pursuant to the procedures set forth in § 9.5.1.

§ 3.4.2.2 The Contractor shall bear all expenses resulting from substitutions including the cost General Conditions as well as any structural, plumbing, mechanical and electrical trade costs made necessary by the substitution.

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.4.4 The Owner shall have the right, but not the obligation, to require the Contractor to remove and replace, with a person acceptable to Owner, promptly after notice from Owner, any employee of Contractor or Subcontractor who:  
(1) has engaged in conduct on Owner's property that is contrary to the requirements of any applicable law, the Contract Documents, or any rule or directive of Owner relating to conduct on Owner's property; or (2) is incapable of fulfilling its responsibilities in connection with the Project.

### § 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

### § 3.6 Taxes

*(Paragraph Deleted)*

§ 3.6.1 Owner is exempt from payment of federal, state, and local Sales and Compensation Use Taxes on all supplies and materials incorporated into and becoming an integral component part of the structures, buildings, or real property pursuant to this Contract. Such taxes are therefore not to be included in the Contractor's bid or Contract Sum. Owner shall deliver to Contractor the appropriate exemption certificate required to be supplied by the Owner, and Contractor and its Subcontractors and materialmen shall be solely responsible for obtaining and delivering any and all exemption or other certificates and for furnishing a Contractor Exempt Purchase Certificate or other appropriate certificates to all persons, firms, or corporations from whom they purchase supplies, materials, and equipment for the performance of the Work.

### § 3.7 Permits, Fees, Notices and Compliance with Laws

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

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- .1 The Contractor shall promptly deliver copies of such documents to the Owner.
- .2 If in connection with the Project, the Owner has obtained certain permits, licenses or agreements for the Project, the Owner will furnish copies of these documents to the Contractor. It is the Contractor's responsibility to comply with any conditions or limitations placed on the Project by these permits. The Contractor shall fully cooperate with the Owner in meeting the permit requirements and accommodations of regulatory inspections / directives.

**§ 3.7.2** The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work. If the Contractor fails to give such notices as applicable to the performance of the Work, the Contractor shall be liable for and shall indemnify and hold harmless the Owner against any and all resulting fines, penalties, judgments or damages, including reasonable attorney fees, imposed on or incurred by the parties indemnified, as a result of such failure by the Contractor

**§ 3.7.3** If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

**§ 3.7.4 Concealed or Unknown Conditions**

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

**§ 3.7.5** If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

**§ 3.7.6** Upon completion of the Work, the Contractor shall deliver to the Architect original copies of all required final certificates of inspection, the Certificate of Occupancy, the other documents evidencing that inspections required by authorities having jurisdiction over the Work have been performed

**§ 3.8 Allowances**

**§ 3.8.1** The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

**§ 3.8.2** Unless otherwise provided in the Contract Documents,

- .1 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- .2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and

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- .3 whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

**§ 3.8.3** Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

**§ 3.9 Superintendent**

**§ 3.9.1** The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

The Contractor's superintendent shall not be removed from this Project until the Project punch list has been completed and the Project has been accepted by the Owner. Unless approved otherwise by the Owner in advance, the Contractor's superintendent shall be assigned solely to this Project and shall not perform any duties or superintendence on any other Project until completion of this Project.

**§ 3.9.2** The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

**§ 3.9.3** The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

**§ 3.10 Contractor's Construction and Submittal Schedules**

**§ 3.10.1** The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project.

**§ 3.10.1.1** The Construction Schedule shall be a Critical Path Method (CPM) type of schedule, consisting of: (1) a single critical path delineation and other sequencing, and early and late start, float, and completion dates for each activity; and (2) milestones, interrelationships, and restraints for all activities, including Owner-awarded contracts through the date of Project completion. The Construction Schedule must show all activities necessary for Substantial and Final Completion as defined in Section 9.8, Section 9.10, and elsewhere in the Contract Documents.

**§ 3.10.1.2** When the Construction Schedule is complete, the Contractor, after consultation with all Subcontractors and material suppliers, shall confirm in writing to the Architect that the Construction Schedule is reasonable and achievable by the Contractor, subject to any extensions of time as provided for elsewhere in the Contract Documents. The Contractor shall thereafter give prompt specific notice to the Owner and the Architect of any change in the logic of the Construction Schedule or any part thereof, the removal of any restraints, or the reduction of any durations.

**§ 3.10.1.3** Periodic meetings will be held at least monthly or at more frequent times, as required by the Work, to assess the state of the completion of the Project and to update the Construction Schedule as necessary. In advance of each such meeting, Contractor shall provide Owner a written status report identifying whether the Work is on schedule in accordance with the Construction Schedule or whether there are anticipated or potential delays to any critical path elements in the construction of the Work (in which event Contractor shall provide notice and an analysis as reasonably requested by Owner)



**§ 3.10.1.4** The Construction Schedule shall be revised at least monthly or at more frequent times as required by conditions of the Work, and shall provide for expeditious and practicable execution of the Work consistent with the Contract Time. The Architect and Owner shall be provided copies of the Construction Schedule as periodically updated and in electronic format, as maintained by the Contractor.

**§ 3.10.1.5** In the event that any updated Construction Schedule indicates a projected Substantial Completion date that is more than thirty (30) days after the required Substantial Completion date (as the same may be extended by Change Order for Excusable Delay), the Owner shall have the right to direct the Contractor to take corrective measures necessary to expedite the progress of construction, including, without limitation, (1) working additional shifts or overtime, (2) supplying additional manpower, equipment, facilities, (3) rescheduling activities, and (4) other similar measures (hereinafter referred to collectively as "Recovery Measures"). Such Recovery Measures shall continue until the progress of the Work complies with the state of completion required by the Construction Schedule. The Owner's right to require Recovery Measures is solely for the purpose of ensuring the Contractor's compliance with the Construction Schedule.

- .1** The Contractor shall not be entitled to seek and adjustment in the Contract Sum in connection with Recovery Measures required by the Owner, unless they are incurred by Contractor as directed in writing by Owner to mitigate or offset Excusable Delay.
- .2** The Owner may exercise the rights furnished to the Owner under or pursuant to this Subparagraph 3.10.1.5 as frequently as is reasonably necessary to ensure that the Contractor's performance of the Work will comply with any milestone date or completion date set forth in the Construction Schedule.

**§ 3.10.1.6** The Contractor is solely responsible for the timing, sequencing coordination, and supervision of the work in accordance with the approved Construction Schedule. Review or approval of the initial Construction Schedule and subsequent reviews of the Construction Schedule by the Architect and Owner do not operate to imply agreement by the Architect or Owner that the means and methods of planning of the Work utilized by the Contractor are adequate or will accomplish the Work in the time shown on the Construction Schedule. The Contractor shall take all actions necessary to ensure the Work's successful planning and execution within the stipulated Contract Time. Additionally, review or approval of the Construction Schedule by the Owner or its consultants shall not make the Owner or its consultants responsible for Contractor's scheduling obligations or the accuracy of the Construction Schedule prepared by the Contractor.

**§ 3.10.1.7** The Contractor represents to the Owner that the initial Construction Schedule and all subsequent Construction Schedules (including updates and amendments) have been prepared in good faith and are accurate to the best of the Contractor's knowledge.

**§ 3.10.2** The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's review. The Architect's review shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

**§ 3.10.3** The Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers and other persons and organizations performing or furnishing any of the Work under a contract with the Contractor.

**§ 3.10.4** The Owner shall have the reasonable right to direct postponement or rescheduling of any date or time for the performance of any part of the Work that may interfere with the operation of the Owner's premises or any tenants or invitees, thereof. The Contractor shall, upon the Owner's reasonable request, reschedule any portion of the Work affecting operation of the premises during hours when the premises are not in operation. Any postponement, rescheduling, or performance of the Work under this Subparagraph 3.10.5 may be grounds for an extension of the Contract Time, if permitted under Subparagraph 8.3.1, and an equitable adjustment in the Contract Sum if (1) the performance of the Work was properly scheduled by the Contractor in compliance with the requirements of the Contract Documents, and (2) such rescheduling or postponement is required by the Owner.

### **§ 3.11 Documents and Samples at the Site**

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the Architect's reviewed Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

### **§ 3.12 Shop Drawings, Product Data and Samples**

**§ 3.12.1** Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

**§ 3.12.2** Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

**§ 3.12.3** Samples are physical examples that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged. Contractor shall submit samples requiring color or finish selection in a single, coordinated submittal. The Architect will issue no color or finish schedule until all samples and other data necessary for making complete color selections for the project are received.

**§ 3.12.4** Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

**§ 3.12.5** The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Architect, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the submittal schedule reviewed by the Architect. The Architect shall have no responsibility to review any Shop Drawings, Product Data, Samples or similar submittals unless and until the Contractor has submitted and received back from the Architect approved reviewed submittal schedule as required under Section 3.10.2. In addition, it is not the Architect's responsibility to ensure that all required Shop Drawings, Product Data, Samples or similar submittals that are required to be submitted and reviewed under the Contract Documents are submitted by the Contractor. Submissions of Shop Drawings, Product Data, Samples or similar submittals is solely the Contractor's responsibility.

**§ 3.12.6** By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

**§ 3.12.7** The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been reviewed and commented on by the Architect.

**§ 3.12.8** The Work shall be in accordance with reviewed submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's review of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect of such deviation at the time of submittal and (1) the Architect has indicated in writing that there is no exception to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's review thereof.

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**§ 3.12.9** The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such notice, the Architect's action on a resubmission shall not apply to such revisions.

**§ 3.12.10** The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify all performance and design criteria that such services must satisfy. The Contractor shall cause such services or certifications to be provided by a properly licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy, accuracy and completeness of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor all performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review, and take other appropriate action on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Contractor shall not be responsible for the adequacy of the performance and design criteria specified in the Contract Documents.

**§ 3.12.10.1** If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

**§ 3.12.11** The Architect's review of the Contractor's submittals will be limited to examination of an initial submittal and one (1) resubmittal. The Owner is entitled to obtain reimbursement from the Contractor for amounts paid to the Architect for evaluation of additional resubmittals.

### **§ 3.13 Use of Site**

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

- .1** Due to the site constraints, only materials and equipment that are to be used in the Work shall be brought to and stored on the Project site by the Contractor. After materials and equipment are no longer required for the Work, they shall be promptly removed from the Project site. Protection of materials and equipment stored at the Project site from weather, theft, damage, and all other adversity is solely the responsibility of the Contractor. The Contractor shall ensure that the Work, at all times, is performed in a manner that affords reasonable access, both vehicular and pedestrian, to the site of the Work and adjacent areas.
- .2** The Contractor shall not permit any workers to use existing facilities at the Project site, including, without limitation, lavatories, entrances and parking areas other than those designated and approved by the Owner.
- .3** The Contractor shall comply with all rules and regulations promulgated by the Owner in connection with the use and occupancy of the Project site and the Building, as amended from time to time. The Contractor shall immediately notify the Owner in writing if during the performance of the Work, the Contractor finds compliance with any portion of such rules and regulations to be impracticable, setting forth the problems of such compliance and suggesting alternatives through which the same results intended by such portions of the rules and regulations can be achieved. The Owner may, in the Owner's sole discretion, adopt such suggestions, develop new alternatives, or require compliance with the existing requirements of the rules and regulations.

### **§ 3.14 Cutting and Patching**

**§ 3.14.1** The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

**§ 3.14.2** The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a Separate Contractor without written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the Work.

**§ 3.14.3** All cutting and patching work shall be done by the Contractor (or through the appropriate Subcontractor). Patches in finish surfaces shall match the adjacent surfaces in material, finish, detail, and quality. Patches in fire rated construction or construction required to be smoke tight shall be made in conformance with assemblies designed and tested by agencies recognized by governing codes. Any UL rated fire safing materials, flanges, or other materials required by Code, the Contract Documents, or manufacturers installation instructions for devices penetrating the work affected shall be applied and installed by an approved firestop subcontractor or qualified personnel from the applicable trade.

### **§ 3.15 Cleaning Up**

**§ 3.15.1** The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall lawfully remove and dispose of waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project.

**§ 3.15.2** If the Contractor fails to clean up as provided in the Contract Documents, or if not specified in the Contract Documents, then within 48 hours of an Owner request, the Owner may do so and the Owner shall be entitled to reimbursement from the Contractor.

### **§ 3.16 Access to Work**

The Contractor shall provide the Owner and Architect with access to the Work in preparation and progress wherever located.

### **§ 3.17 Royalties, Patents and Copyrights**

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

### **§ 3.18 Indemnification**

**§ 3.18.1** To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

**§ 3.18.2** In claims against any person or entity indemnified under this Section 3.18 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, the

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indemnification obligation under Section 3.18.1 shall not be limited by a limitation on amount or type of damages, compensation, or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts, or other employee benefit acts.

## **ARTICLE 4 ARCHITECT**

### **§ 4.1 General**

**§ 4.1.1** The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

**§ 4.1.2** Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner and Architect. Consent shall not be unreasonably withheld.

### **§ 4.2 Administration of the Contract**

**§ 4.2.1** The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

**§ 4.2.2** The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

**§ 4.2.2.1** The Owner is entitled to reimbursement from the Contractor for amounts paid to the Architect for site visits made necessary by the fault of the Contractor to maintain the Project Schedule or for defects and deficiencies in the Work. The Owner may seek reimbursement pursuant to the procedures set forth in § 9.5.1.

**§ 4.2.3** On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

### **§ 4.2.4 Communications**

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

**§ 4.2.5** Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

**§ 4.2.6** The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work. All costs made

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necessary by such failure, including those of repeated procedures shall be at Contractor's sole expense, including reasonable compensation for Architect's services and expenses.

**§ 4.2.7** The Architect will review the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken with the most recently reviewed submittal schedule or, in the absence of a submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's review of a specific item shall not indicate approval of an assembly of which the item is a component.

**§ 4.2.8** The Architect will prepare Change Orders and Construction Change Directives, and may order minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

**§ 4.2.9** The Architect will conduct site visits to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

**§ 4.2.10** If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

**§ 4.2.11** The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

**§ 4.2.12** Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of interpretations or decisions rendered in good faith.

**§ 4.2.13** The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

**§ 4.2.14** The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

- .1 The Contractor's request for information shall be prepared and submitted in accordance with the General Requirements (Division 01 of the Specifications) on the form included therein or as otherwise approved in advance. The Architect will return requests for information that do not conform to requirements of the Contract Documents.
- .2 The Architect's response to a request for information (RFI), or issuance of a clarification or interpretation shall be considered an interpretation, clarification, supplemental information or an order for a minor change in the Work not involving an adjustment in Contract Sum or extension of Contract Time and not inconsistent with the intent of the Contract Documents, and shall be binding, unless indicated otherwise in the Architect's response to the RFI.



## **ARTICLE 5 SUBCONTRACTORS**

### **§ 5.1 Definitions**

**§ 5.1.1** A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a Separate Contractor or the subcontractors of a Separate Contractor.

**§ 5.1.2** A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

### **§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work**

**§ 5.2.1** Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, but prior to the first Application for Payment, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

The listing required by this Section shall be submitted to the Architect no later than 30 days from the date of the Agreement. This list shall include the names of manufacturers, suppliers, and installers proposed for each of the products, equipment, and materials to be incorporated into the project.

The Contractor shall furnish upon request adequate data on any named entity on the list in order to permit the Architect and the Owner to conduct a proper evaluation. Failure to object to a manufacturer shall not constitute a waiver of any of the requirements of the Contract Documents and all products furnished by the listed manufacturer must conform to such requirements.

**§ 5.2.2** The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

**§ 5.2.3** If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

**§ 5.2.4** The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner or Architect makes reasonable objection to such substitution.

### **§ 5.3 Subcontractual Relations**

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work that the Contractor, by these Contract Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor

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will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

**§ 5.3.1** The division of the Specifications into sections is not intended to control the Contractor in dividing the work among subcontractors nor to limit the scope of work performed by any trade under a given section. The Architect will not undertake to settle any differences between the Contractor and its Subcontractors as to the responsibility for completing all Work in the Specifications. It shall be entirely the Contractor's responsibility to properly coordinate and complete all the Work described in the Specifications whether performed by the Contractor or its Subcontractors.

#### **§ 5.4 Contingent Assignment of Subcontracts**

**§ 5.4.1** Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

- .1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and
- .2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract, provided that the Owner shall not be under any obligation to compensate the Subcontractor with respect to amounts that the Owner has already paid to the Contractor for such Subcontractor's work.

**§ 5.4.2** Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

**§ 5.4.3** Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity.

**§ 5.4.4** Nothing in the Contract Documents shall be deemed to create any contractual relationship between any Subcontractor of any tier and the Owner, or between the General Contractor or Subcontractor of any tier and the Architect.

### **ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS**

#### **§ 6.1 Owner's Right to Perform Construction and to Award Separate Contracts**

**§ 6.1.1** The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

**§ 6.1.2** When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

**§ 6.1.3** The Owner shall provide for coordination of the activities of the Owner's own forces and of each Separate Contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, Separate Contractors, and the Owner until subsequently revised.

**§ 6.1.4** Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces or with Separate Contractors, the Owner or its Separate

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Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.

#### **§ 6.2 Mutual Responsibility**

**§ 6.2.1** The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

**§ 6.2.2** If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

**§ 6.2.3** The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a Separate Contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a Separate Contractor's delays, improperly timed activities, damage to the Work or defective construction.

**§ 6.2.4** The Contractor shall promptly remedy damage that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor as provided in Section 10.2.5.

**§ 6.2.5** The Owner and each Separate Contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

#### **§ 6.3 Owner's Right to Clean Up**

If a dispute arises among the Contractor, Separate Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

### **ARTICLE 7 CHANGES IN THE WORK**

#### **§ 7.1 General**

**§ 7.1.1** Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

**§ 7.1.2** A Change Order shall be based upon agreement among the Owner, Contractor, and Architect. A Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone.

**§ 7.1.3** Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

**§ 7.1.4** Unless otherwise agreed to in writing by the Owner and the Contractor, the combined overhead and profit that shall be included in the total cost (or credit) to the Owner for a Change in the Work shall be based on the following schedule:

- .1 For the Contractor, for Work performed by the Contractor's own forces:
  1. 15% on the first \$25,000 of the change order direct cost of self-performed work,
  2. 10% on the portion of the change order direct cost of self-performed work between \$25,000 and \$50,000 and
  3. 7.5% on the portion of the change order direct cost of self-performed work between \$50,000 and \$200,000 and

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4. 5% on the portion of the change order direct cost of self-performed work greater than \$200,000.
- .2 For the Contractor, for Work performed by the Contractor's Subcontractor five percent (5%) of the amount due the Subcontractor.
- .3 For each Subcontractor involved, for Work performed by that Subcontractor's own forces, fifteen percent (15%) of the cost.
- .4 For each Subcontractor involved, for Work performed by the Subcontractor's Sub-subcontractors, five percent (5%) of the amount due the Sub-subcontractor.
- .5 Cost to which overhead and profit is to be applied shall be determined in accordance with Section 7.3.7 and shall be itemized (including labor costs).

## **§ 7.2 Change Orders**

**§ 7.2.1** A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor, and Architect stating their agreement upon all of the following:

- .1 The change in the Work;
- .2 The amount of the adjustment, if any, in the Contract Sum; and
- .3 The extent of the adjustment, if any, in the Contract Time.

**§ 7.2.2** A Change Order, when issued, shall be full compensation, or credit, for the extra Work performed, omitted, or substituted. It shall show on its face, any adjustment in time for completion of the Project as a result of the Change in the Work. Each Change Order shall include all costs related thereto, including all overhead, miscellaneous expenses, and incidentals.

## **§ 7.3 Construction Change Directives**

**§ 7.3.1** A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

**§ 7.3.2** A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

**§ 7.3.3** If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- .1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- .2 Unit prices stated in the Contract Documents or subsequently agreed upon;
- .3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- .4 As provided in Section 7.3.4.
- .5 **Calculation of overhead and profit shall be consistent with Section 7.1.4.**

**§ 7.3.4** If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in Section 7.1.4. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

- .1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;
- .2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;
- .3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
- .4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and

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**.5 Costs of supervision and field office personnel directly attributable to the change.**

**§ 7.3.5** If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

**§ 7.3.6** Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum and/or Contract Time.

**§ 7.3.7** A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and/or Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

**§ 7.3.8** The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured in accordance with Section 7.1.4.

**§ 7.3.9** Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

**§ 7.3.10** When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

**§ 7.4 Minor Changes in the Work**

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

**ARTICLE 8 TIME**

**§ 8.1 Definitions**

**§ 8.1.1** Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

**§ 8.1.2** The date of commencement of the Work is the date established in the Agreement.

**§ 8.1.3** The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

**§ 8.1.4** The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

**§ 8.2 Progress and Completion**

**§ 8.2.1** Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

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**§ 8.2.2** The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

**§ 8.2.3** The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

### **§ 8.3 Delays and Extensions of Time**

**§ 8.3.1** If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

In the event that the Owner, the Contractor or the Architect is delayed or hindered in or prevented from the performance of any act required by the Contract Documents by reason of a labor dispute, fire, failure of power, unusual delay in deliveries, adverse weather conditions not reasonably anticipatable, unavoidable casualties or other causes of a like nature beyond the Owner's, the Contractor's or the Architect's control, the Contractor (or its Subcontractors) shall not be entitled to any additional compensation.

**§ 8.3.2** Claims relating to time shall be made in accordance with applicable provisions of Article 15; however, The Contractor's Claims, if any, for any increase in Contract Time must be made in accordance with the time requirements of this Section. Claims for an increase in Contract Time must be made in writing to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims must be initiated within seven (7) days after the Contractor has notice of the delay (initial notice).

Thereafter, the Contractor must provide full details and support documentation with regard to the cause of the delay within twenty-one (21) days of the initial notice of the delay. If either the initial notice or the supporting documentation is not submitted to the Initial Decision Maker with a copy to the Architect, if the Architect is not the Initial Decision maker, in writing within the time periods prescribed in this Section, the Claim for an increase in Contract Time shall be waived. If the cause for the delay is a continuing one then only one Claim is necessary. The Contractor's supporting documentation to the Initial Decision Maker and/or Architect shall include an estimate of cost, if any, and of the probable effect of the delay on the progress of the Work and the Project Schedule.

**§ 8.3.3** Unless expressly provided otherwise in the Contract Documents, an extension of the Contract Time, to the extent permitted under Subparagraph 8.3.1 shall be the sole remedy of the contractor for any (1) delay in the commencement, prosecution, or completion of the Work, (2) hindrance or obstruction in the performance of the work, (3) loss of productivity, or (4) other similar claims (collectively referred to in this Subparagraph 8.3.3 as "Delays") whether or not such Delays are foreseeable unless a Delay is caused by acts of the Owner or Architect, or of an employee of either, or of a separate contractor employed by the Owner (an "Owner-Caused Delay"), in which case the Contractor shall also be entitled to an equitable adjustment of the Contract Sum provided that the Contractor provides to the Owner written notice of such Owner-Caused Delay within ten (10) days of the occurrence of the event giving rise to such Owner-Caused Delay or within ten (10) days after the Contractor first recognizes the condition giving rise to such Owner-Caused Delay, whichever is later.

## **ARTICLE 9 PAYMENTS AND COMPLETION**

### **§ 9.1 Contract Sum**

**§ 9.1.1** The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

**§ 9.1.2** If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

*(Paragraph Deleted)*

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## **§ 9.2 Schedule of Values**

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the Architect and supported by such data to substantiate its accuracy as the Architect may require, and unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

**§ 9.2.1 The Contractor and each Subcontractor shall prepare a trade payment breakdown for the work for which it is responsible, such breakdown being submitted on a uniform standardized form reasonably approved by the Architect and Owner (AIA G703). The form shall be divided in detail sufficient to exhibit area, floors, and/or sections of the Work, and/or by convenient units and shall be updated as required by either the Owner or the Architect as necessary to reflect (1) description of Work (listing labor and material separately), (2) total value, (3) percent of the work completed to date, (4) value of the work completed to date, (5) percent of previous amount billed, (6) previous amount billed, (7) current percent completed, and (8) value of Work completed to date. Any trade breakdown that unreasonably fails to include sufficient funds shall be withheld from future Applications for Payment to ensure an adequate reserve (including of normal retainage) to complete the Work.**

## **§ 9.3 Applications for Payment**

**§ 9.3.1** At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under Section 9.2, for completed portions of the Work. The application shall be notarized and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents.

The form Application for Payment, duly notarized, shall be the most recent authorized edition of AIA Document G702, Application and Certificate for Payment, supported by the most recent authorized edition of AIA Document G703, Continuation Sheet.

**§ 9.3.1.1** As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

**§ 9.3.1.2** Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

**§ 9.3.1.3** Each Application for Payment shall be submitted electronically and in four (4) hard copies and shall be accompanied by the following, in all form and substance reasonably satisfactory to the Owner; (1) a current conditional Contractor's waiver of claims and liens, and duly executed an acknowledged sworn statement showing all Subcontractors and material suppliers with whom the Contractor has entered into subcontracts, the amount of each such subcontract, the amount requested for any Subcontractor and material supplier in the requested progress payment, and the amount to be paid to the Contractor from such progress payment together with similar sworn statements from all such subcontractors and material suppliers; (2) duly executed unconditional waivers of claims and liens from all Subcontractors and, when appropriate, from material suppliers and lower tier Subcontractors establishing payment or satisfaction of payment of all amounts requested by the Contractor on behalf of such entities or information and materials required to comply with the requirements Contract Documents or reasonably requested by the Owner or the Architect or required by the Owner's title insurer.

**§ 9.3.1.4** Until Substantial Completion, the Owner shall pay the Contractor ninety percent (90%) of the amount due the Contractor.

**§ 9.3.2** Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site. Such payment by the Owner for materials, equipment, fixtures and supplies stored on or off the Site shall not relieve the Contractor of its responsibility to provide reasonable protection of said materials, equipment, fixtures and supplies until their incorporation into the Work.

**§ 9.3.3** The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work.

**§ 9.3.3.1** The Contractor further expressly undertakes to defend the Owner, against any actions, lawsuits, or proceedings brought against the Owner as a result of liens related to the Work unless the reason for the lien is the nonpayment by the Owner to the Contractor in accordance with the Contract Documents (referred to as "liens" in this Subparagraph). The Contractor hereby agrees to indemnify and hold the Owner harmless against any such liens or claims of liens and agrees to pay any final judgment or lien if the reason for the judgment or lien is the nonpayment by the Owner to Contractor in accordance with the Contract Documents.

**§ 9.3.3.2** The Owner shall release any payments withheld due to a lien or claim of lien if the Contractor obtains security acceptable to the Owner or a lien discharge bond that is (1) issued by a surety acceptable to the Owner; (2) in form and substance satisfactory to the Owner, and (3) in an amount required by law to release such lien claim. By posting a lien discharge bond or other acceptable security, however, the Contractor shall not be relieved of any responsibilities or obligations under Subparagraph 9.3.3.1 including without limitation, the duty to defend and indemnify the Owner. The cost of any premiums incurred in connection with such bonds and security shall be the responsibility of the Contractor and shall not be part of, or cause any adjustment to, the Contract Sum.

#### **§ 9.4 Certificates for Payment**

**§ 9.4.1** The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

**§ 9.4.2** The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.



## **§ 9.5 Decisions to Withhold Certification**

**§ 9.5.1** The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- .1 defective Work not remedied;
- .2 third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- .3 failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a Separate Contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay;
- .7 repeated failure to carry out the Work in accordance with the Contract Documents; or
- .8 any other reasonable grounds for objection or withholding as provided in the agreement or as permitted by law.

**§ 9.5.2** When the above reasons for withholding certification are removed, certification will be made for amounts previously withheld. The Owner shall not be deemed in default by reason of withholding payment while any conditions described in 9.5.1 remain.

**§ 9.5.3** If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its option, issue joint checks to the Contractor and to any Subcontractor for material and/or equipment suppliers to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Architect will reflect such payment on the next Certificate for Payment.

## **§ 9.6 Progress Payments**

**§ 9.6.1** After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

**§ 9.6.2** The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

**§ 9.6.2.1** The Contractor shall indemnify and hold the Owner harmless from laborers, mechanics and materialmen liens upon the Owner's properties or the premises upon which the work is located, arising out of the work performed or materials furnished by the Contractor or any of its Subcontractors or any material suppliers under the Contract.

**§ 9.6.3** The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

**§ 9.6.4** The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

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**§ 9.6.5** The Contractor's payments to material and equipment suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4. The Owner shall have no obligation to pay or reimburse a Contractor for payments to material and equipment suppliers until materials and supplies have been delivered on site or to an offsite storage facility which is bonded and secured.

**§ 9.6.6** A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

**§ 9.6.7** Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

**§ 9.6.8** Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

#### **§ 9.7 Failure of Payment**

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately, and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up.

#### **§ 9.8 Substantial Completion**

**§ 9.8.1** Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use, and shall require that: (1) the Work is operational and usable for the purposes intended; and (2) all required governmental permits, approvals and temporary or permanent certificates of occupancy have been properly and validly issued. Substantial completion shall not be withheld due to Owner's failure to occupy or use based on any reason that is not the responsibility of the Contractor under the Contract Documents or is caused by circumstances beyond Contractor's control

**§ 9.8.2** When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

**§ 9.8.3** Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

- .1 The Architect will perform no more than two (2) inspections to determine whether the Work or a designated portion thereof has attained Substantial Completion in accordance with the Contract Documents. The

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Owner is entitled to reimbursement from the Contractor for amounts paid to the Architect for any additional inspections pursuant to Section 9.5.1.

**§ 9.8.4** When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion. The Certificate of Substantial Completion will not be issued until after the Architect and Owner have determined that: (1) the Work and all systems are operational and otherwise complete and ready for unobstructed, lawful use and occupancy by the Owner; (2) the governmental agency that issued the building permit has issued a certificate of occupancy; (3) all testing (including but not limited to TAB, Envelope, Commissioning, etc.) are completed and required corrections revealed by these tests are completed; (4) the Project has been accepted by each regulatory body having jurisdiction, and (5) the only items of Work remaining to be completed are of a minor nature such as touch-up, adjustments, testing, corrections, and omissions to be remedied, as may appear on the final list made during inspection by the Architect and Owner.

**§ 9.8.5** The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

**§ 9.9 Partial Occupancy or Use**

**§ 9.9.1** The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

**§ 9.9.2** Immediately prior to such partial occupancy or use, the Owner, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

**§ 9.9.3** Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

**§ 9.10 Final Completion and Final Payment**

**§ 9.10.1** Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

**§ 9.10.1.1** The Architect will perform no more than two (2) inspections to determine whether the Work or a designated portion thereof has attained Final Completion in accordance with the Contract Documents. The Owner is



entitled to reimbursement from the Contractor for amounts paid to the Architect for any additional inspections. The Owner may seek reimbursement pursuant to Section 9.5.1.

**§ 9.10.1.2** The final payment of retained amount due the Contractor on account of the Contract shall not become due until the Contractor has furnished to the Owner, through the Architect, completion documents as enumerated below, or as otherwise required in the Contract Documents.

- .1 One (1) hard copy and one electronic Record Set of Drawings showing actual construction of all portions of the Work and incorporating all changes and amendments thereto, as redlined against the 100% Construction Drawings.
- .2 **Guarantees and Warranties required by specific Sections of the Specifications.**
- .3 **Release and Waiver of Claims, conditioned upon Final Payment, by the General Contractor, Subcontractors, Sub-subcontractors and materials suppliers.**
- .4 **All mechanical and electrical installation, operating and maintenance manuals called for under the Specifications.**
- .5 **All test reports and certifications required under the mechanical and electrical specifications.**
- .6 **All forms required to be completed by the Contractor by regulatory governmental agencies with two copies delivered to the Architect.**
- .7 **Shop Drawing submittals in accordance with Article 3.**
- .8 **A copy of the unconditional Occupancy Permit or Certificate of Compliance issued by the local Building Inspection Department have Jurisdiction, unless such is not issued for any reason that is not the responsibility of the Contractor under the Contract Documents or is caused by circumstances beyond Contractor's control.**
- .9 **Manufacturer's current detailed installation instructions for fire dampers, ceiling radiation dampers, smoke dampers, and duct smoke detectors as applicable to the Project**
- .10 **One (1) copy of the equipment operational and maintenance manuals.**

**§ 9.10.2** Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner, other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

**§ 9.10.3** If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

**§ 9.10.4** The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- .1 liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents;
- .3 terms of special warranties required by the Contract Documents; or
- .4 audits performed by the Owner, if permitted by the Contract Documents, after final payment.

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**§ 9.10.5** Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

## **ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY**

### **§ 10.1 Safety Precautions and Programs**

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract.

### **§ 10.2 Safety of Persons and Property**

**§ 10.2.1** The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

- .1 employees on the Work and other persons who may be affected thereby;
- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and
- .3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

**§ 10.2.2** The Contractor shall comply with, and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss.

**§ 10.2.2.1** In the event that review, inspection or other action by regulatory agencies or other parties results in the imposition of fines, fees, or other costs due to the failure of the Contractor to comply with said applicable laws, ordinance, rules, regulations and lawful orders, the Contractor shall hold harmless the Owner, owner's Consultants, the Architect, and Owner's separate contractors, if any, from all consequences arising from the Contractor's non-compliance.

**§ 10.2.3** The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards.

**§ 10.2.4** When use or storage of explosives or other hazardous materials or equipment, or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

**§ 10.2.5** The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

**§ 10.2.6** The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

**§ 10.2.7** The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

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#### **§ 10.2.8 Injury or Damage to Person or Property**

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

#### **§ 10.3 Hazardous Materials and Substances**

**§ 10.3.1** The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect of the condition.

**§ 10.3.2** Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor.

**§ 10.3.3** To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that such claim, damage, loss, or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

**§ 10.3.4** The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

**§ 10.3.5** The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

**§ 10.3.6** If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

#### **§ 10.4 Emergencies**

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

## ARTICLE 11 INSURANCE AND BONDS

### § 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase from and maintain in a company or companies lawfully authorized to do business in the jurisdiction in which the Project is located such insurance as will protect the Contractor from claims set forth below (and such insurance shall be from a company that is A rated or better by A.M Best Company) which may arise out of or result from the Contractor's operations and completed operations under the Contract and for which the Contractor may be legally liable, whether such operations be by the Contractor or by a Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

- .1 Claims under workers' compensation, disability benefit and other similar employee benefit acts that are applicable to the Work to be performed.
- .2 Claims for damages because of bodily injury, occupational sickness or disease, or death of the Contractor's employees;
- .3 Claims for damages because of bodily injury, sickness or disease, or death of any person other than the Contractor's employees;
- .4 Claims for damages insured by usual personal injury liability coverage;
- .5 Claims for damages, other than to the Work itself, because of injury to or destruction of tangible property, including loss of use resulting therefrom;
- .6 Claims for damages because of bodily injury, death or a person or property damage arising out of ownership, maintenance or use of a motor vehicle.
- .7 Claims for bodily injury or property damage arising out of completed operations; and
- .8 Claims involving contractual liability insurance applicable to the Contractor's obligations under Section 3.18.

§ 11.1.2 The insurance required by Section 11.1.1 (or other corresponding Exhibit setting forth the specific insurance requirements) shall be written for not less than limits of liability specified by the Owner or required by law, whichever coverage is greater. Coverages, whether written on an occurrence or claims-made basis, shall be maintained without interruption from the date of commencement of the Work until the date of final payment and termination of any coverage required to be maintained after final payment, and, with respect to the Contractor's completed operations coverage, until the expiration of the period for correction of Work or for such other period for maintenance of completed operations coverage as specified in the Contract Documents.

§ 11.1.3 Certificates of insurance acceptable to the Owner shall be filed with the Owner prior to commencement of the Work and thereafter upon renewal or replacement of each required policy of insurance. These certificates and the insurance policies required by this Section 11.1 shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days prior written notice has been given to the Owner. An additional certificate evidencing continuation of liability coverage, including coverage for completed operations, shall be submitted with the final Application for Payment as required by Section 9.10.2 and thereafter upon renewal or replacement of such coverage on account of revised limits or claims paid under the General Aggregate, or both, shall be furnished by the Contractor with reasonable promptness.

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within not less than twenty (20) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.1.5 The Contractor shall cause the commercial liability coverage required by the Contract Documents to include (1) the Owner, the Architect and the Architect's consultants as additional insureds for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's operations; and (2) the Owner as an additional insured for claims caused in whole or in part by the Contractor's negligent acts or omissions during the Contractor's completed operations.

See Section 00 7316 for insurance requirements.



## **§ 11.2 Owner's Insurance**

**§ 11.2.1** The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

**§ 11.2.2 Failure to Purchase Required Property Insurance.** If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

**§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance.** Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

## **§ 11.3 Waivers of Subrogation**

**§ 11.3.1** The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

**§ 11.3.2** If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

*(Paragraphs Deleted)*

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### **§11.5 Adjustment and Settlement of Insured Loss**

**§ 11.5.1** A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

**§ 11.5.2** Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

## **ARTICLE 12 UNCOVERING AND CORRECTION OF WORK**

### **§ 12.1 Uncovering of Work**

**§ 12.1.1** If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

**§ 12.1.2** If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

### **§ 12.2 Correction of Work**

#### **§ 12.2.1 Before Substantial Completion**

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

#### **§ 12.2.2 After Substantial Completion**

**§ 12.2.2.1** In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

**§ 12.2.2.2** The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.



**§ 12.2.2.3** The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

**§ 12.2.3** The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

**§ 12.2.4** The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

**§ 12.2.5** Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

**§ 12.3 Acceptance of Nonconforming Work**

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

**ARTICLE 13 MISCELLANEOUS PROVISIONS**

**§ 13.1 Governing Law**

The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

**§ 13.1.1** In all operations under the Contract, the Contractor agrees that it will comply with provisions of all State and Federal Laws (including OSHA) and all local ordinances which may affect such operations.

**§ 13.2 Successors and Assigns**

**§ 13.2.1** The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

**§ 13.2.2** The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.

**§ 13.3 Rights and Remedies**

**§ 13.3.1** Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

**§ 13.3.2** No action or failure to act by the Owner, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

**§ 13.4 Tests and Inspections**

**§ 13.4.1** Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect

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timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.4.5 If the Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

*(Paragraphs Deleted)*

## ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

### § 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

- .1 Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- .2 An act of government, such as a declaration of national emergency, that requires all Work to be stopped;

*(Paragraphs Deleted)*

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed and costs incurred by reason of such termination.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.



## **§ 14.2 Termination by the Owner for Cause**

### **§ 14.2.1 The Owner may terminate the Contract if the Contractor**

- .1** repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- .2** fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- .3** repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- .4** otherwise is guilty of substantial breach of a provision of the Contract Documents.
- .5** fails to implement measures that will bring the work into conformity with the approved Project Schedule.

**§ 14.2.2** When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- .1** Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- .2** Accept assignment of subcontracts pursuant to Section 5.4; and
- .3** Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

**§ 14.2.3** When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

**§ 14.2.4** If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

## **§ 14.3 Suspension by the Owner for Convenience**

**§ 14.3.1** The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine.

**§ 14.3.2** The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

- .1** that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or
- .2** that an equitable adjustment is made or denied under another provision of the Contract.

## **§ 14.4 Termination by the Owner for Convenience**

**§ 14.4.1** The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

**§ 14.4.2** Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- .1** cease operations as directed by the Owner in the notice;
- .2** take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- .3** except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

**§ 14.4.3** In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of

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Subcontracts; and the termination fee, if any, set forth in the Agreement.

**§ 14.4.4** The Contractor shall include in each of its subcontracts a clause, similar in effect to the provisions in Paragraph 14.4, allowing the Contractor to terminate the subcontract for its sole convenience, subject only to the payment obligations set forth in Paragraph 14.4.3.

## **ARTICLE 15 CLAIMS AND DISPUTES**

### **§ 15.1 Claims**

#### **§ 15.1.1 Definition**

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

#### **§ 15.1.2 Time Limits on Claims**

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

#### **§ 15.1.3 Notice of Claims**

**§ 15.1.3.1** Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

**§ 15.1.3.2** Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

#### **§ 15.1.4 Continuing Contract Performance**

**§ 15.1.4.1** Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

**§ 15.1.4.2** The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

#### **§ 15.1.5 Claims for Additional Cost**

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

#### **§ 15.1.6 Claims for Additional Time**

**§ 15.1.6.1** If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary. The Contractor shall accompany the Claim with a written analysis with a proposed revision to the Schedule illustrating the claimed influence of the basis for delay on the critical path of the Work and the applicable deadlines that may be impacted. Contractor will exercise reasonable efforts to mitigate the potential impact of any delay but shall be compensated for any costs associated therewith.

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**§ 15.1.6.2** If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction. The time for performance of this Contract, as set forth in the Construction Schedule, shall include an allowance for delays due to reasonably anticipated adverse weather for the area where the Work is located. For the purpose of establishing that abnormal adverse weather conditions have caused a delay, and determining the extent of delay attributed to such weather conditions, the Contractor shall furnish with its claim, National Oceanic and Atmospheric Administration (NOAA) National Weather Service records of climatic conditions during the same time interval for the previous five (5) years for the locality of the Work; the Contractor's daily job site logs/daily construction reports showing weather, job activities, and the effect of weather on the progress of the Work; and an impact schedule showing the effects of the weather event on the critical path of the Contractor's Construction Schedule. Time extensions for weather delays and related impact do not entitle the Contractor to extended overhead recovery or to any other monetary compensation associated with that claim unless approved in writing by the Owner.

**§ 15.1.6.3** The Contractor shall not be entitled to a separate increase in the Contract Time for each one of the number of causes of delay which have concurrent or interrelated effects on the progress of the Work.

**§ 15.1.7 Waiver of Claims for Consequential Damages**

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

- .1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and
- .2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

**§ 15.2 Initial Decision**

**§ 15.2.1** Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

**§ 15.2.2** The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

**§ 15.2.3** In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

**§ 15.2.4** If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a

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response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

**§ 15.2.5** The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

**§ 15.2.6** Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

**§ 15.2.6.1** Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days after receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

**§ 15.2.7** In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

**§ 15.2.8** If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

### **§ 15.3 Mediation**

**§ 15.3.1** Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution.

**§ 15.3.2** The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

**§ 15.3.3** Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

**§ 15.3.4** The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

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**SECTION 007250  
INSURANCE REQUIREMENTS – CONTRACTOR****PART 1**

**1.01 NOTWITHSTANDING ANY TERMS, CONDITIONS OR PROVISIONS, IN ANY OTHER WRITING BETWEEN THE PARTIES, THE CONTRACTOR HEREBY AGREES TO EFFECTUATE THE NAMING OF THE SUFFERN CENTRAL SCHOOL DISTRICT (DISTRICT / OWNER), AND CPL (ARCHITECT/ENGINEER) AS AN ADDITIONAL INSURED ON THE CONTRACTOR'S INSURANCE POLICIES, EXCEPT FOR WORKERS' COMPENSATION AND N.Y. STATE DISABILITY INSURANCE.**

**1.02 THE POLICY NAMING ADDITIONAL INSURED(S) SHALL:**

- A. Be an insurance policy from an A.M. Best A- rated or better insurer, licensed to conduct business in New York State.
- B. State that the organization's coverage shall be primary and non-contributory coverage for the District, its Board, employees and volunteers, and Architect.
- C. Additional insured status shall be provided by standard or other endorsements that extend coverage to the District and Architect for on-going operations (CG 20 38) and products and completed operations (CG 20 37). The decision to accept an endorsement rest solely with the District, and its consultants. A completed copy of the endorsements must be attached to the Certificate of Insurance.
- D. All insurance policies maintained by the Contractor shall include a waiver of any and all rights of subrogation of the Contractor or its insurers against the Owner and Architect, along with all other Additional Insureds / Indemnified Parties and their agents, officers, directors and employees for recovery of damages. Contractor further waives its rights of subrogation against the Owner or any Additional Insureds or Indemnified Party for any damage or loss to the Contractor's scope of work, tools, equipment, materials or any other loss within the scope of any insurance maintained by the Owner.

**1.03 CERTIFICATE OF INSURANCE**

- A. The certificate of insurance must describe the services provided by the contractor (e.g., roofing, carpentry or plumbing) that are covered by the liability policies.
- B. The contractor shall provide a copy of the declaration page of the liability and umbrella/excess policies with a list of endorsements and forms. If requested, the contractor shall provide a copy of the policy endorsements and forms.
- C. A fully completed New York Construction Certificate of Liability Insurance Addendum (ACORD 855 2014/15) must be included with the certificates of insurance. For any "Yes" answers on Items G through L on this Form– additional details must be provided in writing.

**1.04 THE CONTRACTOR AGREES TO INDEMNIFY THE DISTRICT FOR APPLICABLE DEDUCTIBLES AND SELF-INSURED RETENTIONS.**

**1.05 MINIMUM REQUIRED INSURANCE:**

- A. Commercial General Liability Insurance
  - 1. \$1,000,000 per Occurrence/ \$2,000,000 Aggregate
  - 2. \$2,000,000 Products and Completed Operations
  - 3. \$1,000,000 Personal and Advertising Injury
  - 4. \$100,000 Fire Damage
  - 5. \$10,000 Medical Expense
  - 6. The general aggregate shall apply on a per-project basis.

**1.06 OWNERS CONTRACTORS PROTECTIVE (OCP) INSURANCE**

- A. For projects less than or equal to \$1,000,000 and work on 1 story (10 feet) only; \$1 million per occurrence, \$2 million aggregate with the District as the Named Insured.
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- B. For projects greater than \$1,000,000 and work over 1 story (10 feet); \$2 million per occurrence, \$4 million aggregate with the District as the Named Insured.
  - C. The District will be the Named Insured on OCP Policies. There will be no Additional Insureds on any OCP Policies.
  - D. Automobile Liability
    - 1. \$1,000,000 combined single limit for owned, hired, borrowed and non-owned motor vehicles.
  - E. Workers' Compensation and NYS Disability Insurance
    - 1. Statutory Workers' Compensation (C-105.2 or U-26.3); and NYS Disability Insurance (DB-120.1) for all employees. Proof of coverage must be on the approved specific form, as required by the New York State Workers' Compensation Board. ACORD certificates are not acceptable. A person seeking an exemption must file a CE-200 Form with the state. The form can be completed and submitted directly to the WC Board online.
  - F. Builder's Risk
    - 1. Must be purchased by the contractor to include interest of the Owner and Contractor jointly in a form satisfactory to the Owner. The limit must reflect the total completed value – all material and labor costs and provide coverage for fire, lightning, explosion, extended coverage, vandalism, malicious mischief, windstorm, hail and/or flood.
  - G. Umbrella/Excess Insurance
    - 1. \$5 million each Occurrence and Aggregate for general construction and no work at elevation greater than 1 story or 10 feet, or project values less than or equal to \$1,000,000.
    - 2. \$10 million each Occurrence and Aggregate for high risk construction, work at elevation greater than 1 story or 10 feet, or project values greater than \$1,000,000.
    - 3. Umbrella/Excess coverage shall be on a follow-form basis.
- 1.07 CONTRACTOR ACKNOWLEDGES THAT FAILURE TO OBTAIN SUCH INSURANCE ON BEHALF OF THE DISTRICT CONSTITUTES A MATERIAL BREACH OF CONTRACT AND SUBJECTS IT TO LIABILITY FOR DAMAGES, INDEMNIFICATION AND ALL OTHER LEGAL REMEDIES AVAILABLE TO THE DISTRICT. THE CONTRACTOR IS TO PROVIDE THE DISTRICT WITH A CERTIFICATE OF INSURANCE, EVIDENCING THE ABOVE REQUIREMENTS HAVE BEEN MET, PRIOR TO THE COMMENCEMENT OF WORK.**
- 1.08 SUB-CONTRACTORS ARE SUBJECT TO THE SAME TERMS AND CONDITIONS AS STATED ABOVE AND SUBMIT SAME TO THE DISTRICT FOR APPROVAL PRIOR TO START OF ANY WORK.**
- 1.09 IN THE EVENT THE CONTRACTOR FAILS TO OBTAIN THE REQUIRED CERTIFICATES OF INSURANCE FROM THE SUBCONTRACTOR AND A CLAIM IS MADE OR SUFFERED, THE CONTRACTOR SHALL INDEMNIFY, DEFEND, AND HOLD HARMLESS THE DISTRICT, ITS BOARD, EMPLOYEES AND VOLUNTEERS, AND THE ARCHITECT/ENGINEER, FROM ANY AND ALL CLAIMS FOR WHICH THE REQUIRED INSURANCE WOULD HAVE PROVIDED COVERAGE. THIS INDEMNITY OBLIGATION IS IN ADDITION TO ANY OTHER INDEMNITY OBLIGATION PROVIDED IN THE CONTRACT.**
- 1.10 ADDITIONAL REQUIREMENTS ASBESTOS, LEAD ABATEMENT AND/OR HAZARDOUS MATERIALS**
- A. Asbestos/Lead Abatement Insurance
    - 1. \$2,000,000 per occurrence/\$2,000,000 aggregate, including products and completed operations. Such insurance shall include coverage for the Contractor's operations including, but not limited to, removal, replacement, enclosure, encapsulation and/or disposal of asbestos, or any other hazardous material, along with any related pollution events, including coverage for third-party liability claims for bodily injury, property damage and clean-up costs. If a retroactive date is used, it shall pre-date the inception of the
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2. If the Contractor is using motor vehicles for transporting hazardous materials, the Contractor shall maintain pollution liability broadened coverage (ISO endorsement CA 9948), as well as proof of MCS 90. Coverage shall fulfill all requirements of these specifications and shall extend for a period of three (3) years following acceptance by the District of the Certificate of Completion.

#### **1.11 TESTING COMPANY ERRORS AND OMISSION INSURANCE**

- A. \$1,000,000 per occurrence/\$2,000,000 aggregate for the testing and other professional acts of the Contractor performed under the Contract with the District.

**END OF SECTION 007250**

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**SECTION 007343  
PREVAILING WAGE RATES**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Wage rates shall apply as shown in the Prevailing Wage Schedule prepared by the New York State Department of Labor for this project (the Prevailing Wage Case Number (PRC#) assigned to this project is **2022003432**). The Schedule can be viewed at the following web site:  
**<https://apps.labor.ny.gov/wpp/publicViewProject.do?method=showIt&id=1529915>**.
- B. The Contractor shall be responsible for completing one copy of Notice of Contract Award (Form PW-16). Upon completion of the form, the Contractor shall submit the form to the Architect for record keeping and forwarding to the New York State Department of Labor.

**PART 2 PRODUCTS (NOT APPLICABLE)**

**PART 3 EXECUTION (NOT APPLICABLE)**

**END OF SECTION 007343**

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**SECTION 011000  
SUMMARY**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Section includes:
  - 1. Project information.
  - 2. Work covered by Contract Documents.
  - 3. Multiple work packages.
  - 4. Access to site.
  - 5. Work restrictions.
  - 6. Coordination with occupants.
  - 7. Phased construction.
  - 8. Work under separate contracts.
  - 9. Work by Owner.
  - 10. Owner-furnished products.
  - 11. Miscellaneous provisions.
  - 12. Specification and drawing conventions.

**1.02 PROJECT INFORMATION**

- A. Project Identification: Heating System Conversion.
- B. Project Location: RP Connor Elementary School, 13 Cypress Road, Suffern, NY 10901.
- C. Owner: Suffern Central School District, 45 Mountain Avenue, Hillburn, New York 10931.
  - 1. Owner's Representative: John Palma.
- D. Architect: CPL, 50 Front Street, Newburgh, NY 12550.
- E. Submittal Web Site: The Architect requires the use of Newforma Info Exchange for delivery and return of submittals, shop drawings and requests for information. There are no exceptions to this requirement.

**1.03 DEFINITIONS**

- A. Work Package: A group of specifications, drawings, and schedules prepared by the design team to describe a portion of the Project Work for pricing, permitting, and construction.

**1.04 WORK COVERED BY CONTRACT DOCUMENTS**

- A. The Work of the Project is defined by the Contract Documents and consists of the following:
  - 1. Work consists of HVAC and plumbing improvements as described in the Contract Documents.
- B. Type of Contract:
  - 1. Project will be constructed under coordinated, concurrent multiple contracts. See Division 01 Section "Multiple Contract Summary" for a description of work included under each of the multiple contracts and for the responsibilities of the Project coordinator.

**1.05 PHASED CONSTRUCTION**

- A. The Work shall be conducted in 2 phases, with each phase substantially complete as indicated:
  - 1. Phase 1: Work of this phase shall commence within 10 days after the Notice to Proceed and be substantially complete and ready for phase 2 summer 2024 construction.
    - a. Steam boiler B-2 shall remain operational and continue to serve the steam H&V equipment.
    - b. The (2) steam-to-hot water heat exchangers will be removed once the new boilers can effectively replace the two steam to hot water heat exchangers.
    - c. Demolish boiler B-1. Valve off connections to the steam supply header and boiler feed piping.



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- d. Install some of the new heating hot water high-efficiency condensing boilers per the construction documents.
  - e. The boiler system will be provided with the manufacturer controller (controls boiler firing rate and sequencing).
  - f. Install new heating hot water pumps per the construction documents.
    - 1) The pumps will be controlled by the Honeywell BMS.
  - g. Install new heating hot water piping to the downstream connections of the two heat exchangers in the existing pipe tunnels per the construction documents.
  - h. Construction can continue during the fall and winter months of 2023, with a switch-over for connection to the existing hot water systems occurring over a school break. The steam boiler B-1 demolition and the new boiler installation can occur without affecting the building heating. The pumps and piping can also be installed independently of the steam heating system operation.
- 2. Phase 2: The remaining Work shall be substantially complete and ready for occupancy at time of Substantial Completion for the Work.
    - a. Replace all existing steam H&V equipment (UVs, AHUs, etc.) with new hot water equipment per the construction documents.
    - b. Provide new HHWS/R piping from the crawl space mains to the new equipment.
    - c. Integrate all new H&V equipment with the Honeywell BMS.
    - d. Demolish boiler B-2 and all associated steam equipment (condensate receivers, boiler feed system, steam/condensate piping, traps, etc.).
  - 3. Refer to Division 00 Section "Preliminary Schedules" for additional information regarding phased construction.
- B. Before commencing Work of each phase, submit an updated copy of the Contractor's Construction Schedule showing the sequence, commencement and completion dates, (and move-out and -in dates of Owner's personnel) for all phases of the Work.

#### 1.06 ACCESS TO SITE

- A. General: **Contractors shall have full use** of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.
- B. Use of Site: Limit use of Project site to **work in areas** indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
  - 1. Driveways, Walkways and Entrances: Keep driveways (parking garage,) (loading areas,) and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
    - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
    - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

#### 1.07 WORK RESTRICTIONS

- A. On-Site Work Hours: Limit work in the existing building to normal business working hours of 7:00 a.m. to 3:30 p.m, Monday through Friday, except as otherwise indicated.
    - 1. School Vacations and Holidays: Work may occur at any times, as approved.
    - 2. Weekend Hours: Work may occur at any times, as approved.
    - 3. Hours for Utility Shutdowns: Only on weekends, holidays and school vacations as approved.
    - 4. Hours for Noisy Activity: For core drilling, powder-activated fasteners, and other disruptive activities, 3:30 p.m. to 11:00 p.m, or as otherwise approved.
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5. Special Events: The Owner will provide dates and times of special events that will restrict construction operations.
- B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
  1. Notify **Owner** not less than two days in advance of proposed utility interruptions.
  2. Obtain **Owner's** written permission before proceeding with utility interruptions.
- C. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
  1. Notify **Owner** not less than two days in advance of proposed disruptive operations.
  2. Obtain **Owner's** written permission before proceeding with disruptive operations.
- D. Nonsmoking Building: Smoking is not permitted within the building or **grounds**.

#### 1.08 COORDINATION WITH OCCUPANTS

- A. **Full Owner Occupancy:** Owner will occupy site and building(s) during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.
  1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
  2. Notify the Owner not less than 72 hours in advance of activities that will affect Owner's operations.
- B. **Owner Limited Occupancy of Completed Areas of Construction:** Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.
  1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner acceptance of the completed Work.
  2. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy.
  3. Before limited Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of Work.
  4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.

#### 1.09 WORK UNDER SEPARATE CONTRACTS

- A. General: Cooperate fully with separate contractors so work on those contracts may be carried out smoothly, without interfering with or delaying work under this Contract or other contracts. Coordinate the Work of this Contract with work performed under separate contracts.

#### 1.10 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
  1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
  2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

3. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
4. Drawing Coordination: Requirements for materials and products identified on the Drawings are described in detail in the Specifications. One or more of the following are used on the Drawings to identify materials and products:
  - B. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
    1. Abbreviations: Materials and products are identified by abbreviations (published as part of the U.S. National CAD Standard) (and) scheduled on Drawings.
    2. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

**PART 2 PRODUCTS (NOT APPLICABLE)**

**PART 3 EXECUTION (NOT APPLICABLE)**

**END OF SECTION 011000**

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**SECTION 011200  
MULTIPLE CONTRACT SUMMARY****PART 1 GENERAL****1.01 SUMMARY**

- A. This Section includes a summary of each contract, including responsibilities for coordination and temporary facilities and controls.
- B. Specific requirements of each contract are also indicated in individual Specification Sections and on Drawings.
- C. Related Sections include the following:
  - 1. Division 01 Section "Summary" for the Work covered by the Contract Documents, restrictions on use of the premises, [phasing,] Owner-occupancy requirements, and work restrictions.
  - 2. Division 01 Section "Project Management and Coordination" for general coordination requirements.
  - 3. Division 01 Section "Temporary Facilities and Controls" for specific requirements for temporary facilities and controls.

**1.02 DEFINITIONS**

- A. Permanent Enclosure: As determined by Architect, permanent or temporary roofing is complete, insulated, and weathertight; exterior walls are insulated and weathertight; and all openings are closed with permanent construction or substantial temporary closures.

**1.03 PROJECT COORDINATOR CONSTRUCTION MANAGER**

- A. Project Coordinator shall be responsible for coordination between the **Mechanical Contract and Electrical Contract**.
  - 1. **Mechanical Contractor** shall act as Project Coordinator.
- B. **Project Coordinator:** Full-time **Project Coordinator** shall be experienced in administration and supervision of building construction, including mechanical and electrical work.
  - 1. Coordination activities of **Project Coordinator**: include but are not necessarily limited to the following:
    - a. Schedule and run all construction meetings and produce meeting minute record.
    - b. Provide overall coordination of the Work.
    - c. Coordinate shared access to workspaces.
    - d. Coordinate product selections for compatibility.
    - e. Provide overall coordination of temporary facilities and controls.
    - f. Coordinate, schedule, and approve interruptions of permanent and temporary utilities, including those necessary to make connections for temporary services.
    - g. Coordinate construction and operations of the Work with work performed by each contract.
    - h. Prepare Coordination Drawings to coordinate work by more than one contract.
    - i. Coordinate sequencing and scheduling of the Work. Include the following:
      - 1) Initial Coordination Meeting: At earliest possible date, arrange and conduct a meeting with separate contractors for sequencing and coordinating the Work; negotiate reasonable adjustments to schedules.
      - 2) Prepare a combined Contractor's Construction Schedule for entire Project. Base schedule on Preliminary Construction Schedule. Secure time commitments for performing critical construction activities from separate contractors. Show activities of each contract on a separate sheet. Prepare a simplified summary sheet indicating combined construction activities of contracts.
      - 3) Distribute copies of schedules to Architect, Owner, and separate contractors.

MULTIPLE CONTRACT  
SUMMARY

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- j. Provide photographic documentation.
  - k. Provide quality-assurance and quality-control services specified in Division 01 Section "Quality Requirements."
  - l. Coordinate sequence of activities to accommodate tests and inspections, and coordinate schedule of tests and inspections.
  - m. Provide information necessary to adjust, move, or relocate existing utility structures affected by construction.
  - n. Locate existing permanent benchmarks, control points, and similar reference points, and establish permanent benchmarks on Project site.
  - o. Provide field surveys of in-progress construction and site work[ and final property survey.
  - p. Provide progress cleaning of common areas and coordinate progress cleaning of areas or pieces of equipment where more than one contractor has worked.
  - q. Coordinate cutting and patching.
  - r. Coordinate protection of the Work.
  - s. Coordinate firestopping.
  - t. Coordinate mechanical and electrical activities:
    - 1) Schedule and sequence mechanical and electrical activities.
    - 2) Coordinate sharing access to workspaces by mechanical and electrical contractors.
    - 3) Coordinate integration of mechanical and electrical work into limited spaces.
    - 4) Coordinate protection of mechanical and electrical contractors' work.
    - 5) Coordinate cutting and patching for mechanical and electrical work.
    - 6) Coordinate tests and inspections for mechanical and electrical work.
    - 7) Coordinate mechanical and electrical temporary services and facilities.
  - u. Coordinate completion of interrelated punch list items.
  - v. Coordinate preparation of Project Record Documents if information from more than one contractor is to be integrated with information from other contractors to form one combined record.
  - w. Collect Record Specification Sections from other contractors, collate Sections into numeric order, and submit complete set.
  - x. Coordinate preparation of operation and maintenance manuals if information from more than one contractor is to be integrated with information from other contractors to form one combined record.
- C. Responsibilities of **Project Coordinator** for temporary facilities and controls include, but are not limited to, the following:
- 1. Insert temporary facilities and controls.

**1.04 GENERAL REQUIREMENTS OF CONTRACTS**

- A. Extent of Contract: Unless the Agreement contains a more specific description of the Work, names and terminology on Drawings and in Specification Sections determine which contract includes a specific element of Project.
    - 1. Unless otherwise indicated, the Work described in this Section for each contract shall be complete systems and assemblies, including products, components, accessories, and installation required by the Contract Documents.
    - 2. Local custom and trade-union jurisdictional settlements do not control the scope of the Work of each contract. When a potential jurisdictional dispute or similar interruption of work is first identified or threatened, affected contractors shall negotiate a reasonable settlement to avoid or minimize interruption and delays.
    - 3. All contractors are responsible for the removal and reinstallation of ceiling where work must be installed above a ceiling not scheduled for removal.
    - 4. Trenches for the Work of each contract shall be provided by **each contract for its own Work.**
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MULTIPLE CONTRACT  
SUMMARY

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5. Cutting and Patching: **Provided by each contract for its own Work.**
  6. Through-penetration firestopping for the Work of each contract shall be provided by **each contract for its own Work.**
  7. Roof-mounted equipment curbs for the work of each contract shall be the work of **each contract for its own work.**
  8. Within **[five]** working days after preliminary horizontal bar-chart-type construction schedule submittal has been received from Project Coordinator, submit a matching preliminary horizontal bar-chart schedule showing construction operations sequenced and coordinated with overall construction.
  9. Project closeout requirements.
  10. Each Contractor shall review the facility asbestos report to become familiar with any materials that may contain asbestos. If the contractor encounters materials that have not been tested for asbestos he shall cease work and contact the **Project Coordinator**. The Contractor will be held responsible for clean-up costs if they continue to remove materials that have not been tested for asbestos.
- B. Substitutions: Each contractor shall cooperate with other contractors involved to coordinate approved substitutions with remainder of the Work.
1. **Project Coordinator** shall coordinate substitutions.
- C. Temporary Facilities and Controls: In addition to specific responsibilities for temporary facilities and controls indicated in this Section and in Division 01 Section "Temporary Facilities and Controls," each contractor is responsible for the following:
1. Installation, operation, maintenance, and removal of each temporary facility usually considered as its own normal construction activity, and costs and use charges associated with each facility.
  2. Plug-in electric power cords and extension cords, supplementary plug-in task lighting, and special lighting necessary exclusively for its own activities.
  3. Its own field office, complete with necessary furniture, utilities, and telephone service.
  4. Its own storage and fabrication sheds.
  5. Its own dust protection to control dust where dust partition are not scheduled or shown on the drawings but are necessary to protect the building from dust contamination.
  6. Temporary enclosures for its own construction activities.
  7. Staging and scaffolding for its own construction activities.
  8. General hoisting facilities for its own construction activities, up to 2 tons.
  9. Waste disposal facilities, including collection and legal disposal of its own hazardous, dangerous, unsanitary, or other harmful waste materials.
  10. Progress cleaning of its own areas on a daily basis.
  11. Secure lockup of its own tools, materials, and equipment.
  12. Construction aids and miscellaneous services and facilities necessary exclusively for its own construction activities.
  13. Temporary heat to protect to install and protect the work is place where scheduled temporary heat is not in place or not called for in the contract documents.
  14. Provide temporary electric generators where scheduled permanent power or temporary power is not in place.
- D. Temporary Heating, Cooling, and Ventilation: **The Mechanical Contract** is responsible for temporary heating, cooling, and ventilation, including utility-use charges, temporary meters, and temporary connections.
- E. Temporary Heating, Cooling, and Ventilation: **The Mechanical Contract** is responsible for temporary heating, cooling, and ventilation before permanent enclosure of building is complete. **The Mechanical Contract** is responsible for temporary heating, cooling, and ventilation after permanent enclosure of building is complete.
- F. Temporary ventilation: Each Contractor to control fumes from construction operations including interior painting and "off gassing" of new finish materials.
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**1.05 MECHANICAL CONTRACT**

- A. Work of the HVAC Contract includes, but is not limited to, the following:
  - 1. Site steam distribution.
  - 2. Site hydronic distribution.
  - 3. Energy supply, including gas and hot-water supply systems.
  - 4. HVAC systems and equipment.
  - 5. HVAC instrumentation and controls.
  - 6. HVAC testing, adjusting, and balancing.
  - 7. Building automation system.
  - 8. Mechanical connections to equipment furnished by the HVAC Contract
  - 9. Asbestos Abatement
- B. Work in the Mechanical Contract includes, but is not limited to, the following:
  - 1. Division 00 "Procurement and Contracting Requirements" as it pertains to Work of this Contract.
  - 2. Division 01 "General Requirements" as it pertains to Work of this Contract.
  - 3. Section 024119 "Selective Structure Demolition" for shutoff of utilities or removal of equipment and fixtures where indicated.
  - 4. Section 078413 "Penetration Firestopping."
  - 5. Section 083113 "Access Doors and Frames" for furnishing of access doors where required for installation by others.
  - 6. Section 099123 "Interior Painting" for painting of pipes and ducts for identification where indicated.
  - 7. Division 23 "Heating Ventilating and Air Conditioning" except for the following Sections:
    - a. Section 231123 "Facility Natural-Gas Piping."
  - 8. Division 33 "Utilities" Sections as follows:
    - a. Section 330550 "Common Work Results for Utilities."
    - b. Section 336113 "Underground Hydronic Energy Distribution."
    - c. Section 336313 "Underground Steam and Condensate Distribution Piping."
- C. Temporary facilities and controls in the Mechanical Contract include, but are not limited to, the following:
  - 1. Insert temporary facilities and controls.
- D. Work in the Mechanical Construction Contract includes, but is not limited to, the work included in each of the following Drawings.
  - 1. All Prefix "T" Drawings
  - 2. All Prefix "G" Drawings
  - 3. All Prefix "H" Drawings
  - 4. All Prefix "AA" Drawings

**1.06 ELECTRICAL CONTRACT**

- A. Work of the Electrical Contract includes, but is not limited to, the following:
    - 1. Site electrical distribution.
    - 2. Site lighting.
    - 3. Site communications and security.
    - 4. Electrical service and distribution.
    - 5. Exterior and interior lighting[ and light pole bases].
    - 6. Communication and security.
    - 7. Special electrical systems, including the following:
      - a. Uninterruptible power supply systems.
      - b. Packaged engine generator systems.
      - c. Battery power systems.
      - d. Lightning protection systems.
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MULTIPLE CONTRACT  
SUMMARY

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- e. Power generation systems.
  - 8. Electrical connections to equipment furnished by the HVAC Contract.
  - B. Work in the Electrical Contract includes, but is not limited to, the following:
    - 1. Division 00 "Procurement and Contracting Requirements" as it pertains to Work of this Contract.
    - 2. Division 01 "General Requirements" as it pertains to Work of this Contract.
    - 3. Section 024119 "Selective Structure Demolition" for shutoff of utilities or removal of equipment and fixtures where indicated.
    - 4. Division 3 "Concrete." as it pertains to Work of this Contract
    - 5. Division 26 "Electrical."
    - 6. Division 27 "Communications."
    - 7. Division 28 "Electronic Safety and Security."
    - 8. Division 33 "Utilities" Sections as follows:
      - a. Section 330550 "Common Work Results for Utilities."
      - b. Section 337149.13 "Overhead Medium-Voltage Wiring."
      - c. Section 337753 "Medium-Voltage Utility Reclosers."
  - C. Temporary facilities and controls in the Electrical Contract include, but are not limited to, the following:
    - 1. Electric power service and distribution.
    - 2. Lighting, including site lighting.
    - 3. Electrical connections to existing systems and temporary facilities and controls furnished by the Mechanical Contract.
    - 4. Insert temporary facilities and controls.
  - D. Work in the Electrical Construction Contract includes, but is not limited to, the work included in each of the following Drawings.
    - 1. **All Prefix "T" Drawings**
    - 2. **All Prefix "G" Drawings**
    - 3. **All Prefix "E" Drawings**

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION (NOT USED)**

**END OF SECTION 011200**

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**SECTION 012100  
ALLOWANCES**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Section includes administrative and procedural requirements governing allowances.
  - 1. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when direction will be provided to the Contractor. If necessary, additional requirements will be issued by Change Order.
- B. Types of allowances include the following:
  - 1. Contingency allowances.

**1.02 SELECTION AND PURCHASE**

- A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.
- B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
- C. Purchase products and systems selected by Architect from the designated supplier.

**1.03 ACTION SUBMITTALS**

- A. Submit proposals for purchase of products or systems included in allowances, in the form specified for Change Orders.

**1.04 INFORMATIONAL SUBMITTALS**

- A. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of each allowance.
- B. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance.
- C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

**1.05 COORDINATION**

- A. Coordinate allowance items with other portions of the Work.

**1.06 CONTINGENCY ALLOWANCES**

- A. Use the contingency allowance only as directed by Architect for Owner's purposes.
- B. Contractor's overhead and profit for work ordered by Owner under the contingency allowance is included in the Contract Sum and is not part of the Allowance.
- C. At Project closeout, credit unused amounts remaining in the contingency allowance to Owner by Change Order.

**1.07 ALLOWANCE DISBURSEMENT "REQUEST FOR PROPOSALS"**

- A. Submit proposals for changes in the scope in the form of the "Request for Proposal" as described in Division 01, Section "CONTRACT MODIFICATION PROCEDURES".
- B. Once all parties have agreed to the terms and methods of the change, a Change Order will be issued.

**1.08 UNUSED MATERIALS**

- A. Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
  - 1. If requested by Architect, prepare unused material for storage by Owner when it is not economically practical to return the material for credit. If directed by Architect, deliver unused material to Owner's storage space. Otherwise, disposal of unused material is



Contractor's responsibility.

**PART 2 PRODUCTS (NOT APPLICABLE)**

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Examine products covered by an allowance promptly on delivery for damage or defects. Return damaged or defective products to manufacturer for replacement.

**3.02 PREPARATION**

- A. Coordinate materials and their installation for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

**3.03 MECHANICAL CONSTRUCTION SCHEDULE OF ALLOWANCES**

- A. MC-1: Contingency Allowance: Include in the Base Bid an Allowance of **5% of the Base Bid** for use according to the Owners instructions. Unused allowance will be credited back to the Owner at the completion of the project.
  - 1. Contractor overhead and profit is provided in the Base Bid.

**3.04 ELECTRICAL CONSTRUCTION SCHEDULE OF ALLOWANCES**

- A. EC-1: Contingency Allowance: Include in the Base Bid an Allowance of 5% of the Base Bid for use according to the Owners instructions.
  - 1. Contractor overhead and profit is provided in the Base Bid.

**END OF SECTION 012100**

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**SECTION 012500  
SUBSTITUTION PROCEDURES**

**PART 1 GENERAL**

**1.01 GENERAL**

- A. Should the Contractor desire to substitute other articles, materials, apparatus, products or processes than those specified or approved as equal, the Contractor shall apply to the Architect in writing for approval of such substitution. It should be noted that the bid shall not be based on a substituted article, material, apparatus, product or process. With the application shall be furnished such information as required by the Architect to demonstrate that the article, material, apparatus, product or process he wishes to use is the equivalent of that specified in quality, finish, design, efficiency and durability and has been elsewhere demonstrated to be equally serviceable for the purpose for which it is intended. The Contractor shall set forth the reasons for desiring to make the substitution and shall further state what difference, if any, will be made in the construction schedule and the contract price for such substitution should it be accepted; it being the intent hereunder that any savings shall accrue to the benefit of the Owner.
- B. The Architect shall reject any such desired substitution as not being specifically named in the contract, or if he shall determine that the adjustment in price in favor of the Owner is insufficient, the Contractor shall immediately proceed to furnish the designated article, material, apparatus, product or process.
- C. Request for substitutes shall conform to the requirements of this Article.
- D. Requests for substitutions shall, include full information concerning differences in cost, and any savings in cost resulting from such substitutions shall be passed on to the Owner.
- E. Requests for utilization of substitutes will be reviewed during the course of the project. The impact on the project and the timeliness of submission will be of key consideration.
- F. The approval of utilization of a substitute is subject to the sole and final discretion of the Architect.

**1.02 SUMMARY**

- A. Section includes administrative and procedural requirements for substitutions.

**1.03 DEFINITIONS**

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
  - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
  - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.
- B. Substitute Items (Or Equal): If in Architect/Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item it will be considered a proposed substitute item.

**1.04 ACTION SUBMITTALS**

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
  - 1. Substitution Request Form: Use **form provided in Project Manual**.
  - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
    - a. Statement indicating why specified product or fabrication, or installation cannot be provided, if applicable.

- b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
  - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
  - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
  - e. Samples, where applicable or requested.
  - f. Certificates and qualification data, where applicable or requested.
  - g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
  - h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
  - i. Research reports evidencing compliance with building code in effect for Project.
  - j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
  - k. Cost information, including a proposal of change, if any, in the Contract Sum.
  - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
  - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
  - n. See additional requirements in Article 2.3 DETAILED SUBSTITUTION PROCEDURES
3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within **five** days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within **10** days of receipt of request, or **five** days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
  - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

## 1.05 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage qualified testing agency to perform compatibility tests recommended by manufacturers.

## PART 2 PRODUCTS

### 2.01 SUBSTITUTION PROCEDURES (GENERAL)

- A. Conditions: After the "Notice of Award" and prior to the Contractor entering into a Formal Contract with the Owner, the Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

1. Requested substitution is consistent with the Contract Documents and will produce indicated results.
  2. Substitution results in substantial cost savings to the Owner or substantial performance improvements.
  3. Substitution request is fully documented and properly submitted.
  4. Requested substitution will not adversely affect Contractor's construction schedule.
  5. Requested substitution has received necessary approvals of authorities having jurisdiction.
  6. Requested substitution is compatible with other portions of the Work.
  7. Requested substitution has been coordinated with other portions of the Work.
  8. Requested substitution provides specified warranty.
  9. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
  10. The substitution is submitted in compliance with Article 2.3 DETAILED SUBSTITUTION PROCEDURES
- B. If the Contractor does not present "Substitutions" in the time frame noted above any future requests to substitute products will not be considered, unless the substitution is for cause.
- C. Coordination: Modify or adjust affected work as necessary to integrate work of the approved substitutions.

## 2.02 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately upon discovery of need for change, but not later than **20** days prior to time required for preparation and review of related submittals.
1. Architect will consider Contractor's request for substitution when the following conditions are present.
    - a. The specified product is not available
    - b. The specified product cannot be delivered in the time frame required under the Project Schedule.
  2. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
    - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
    - b. Requested substitution provides sustainable design characteristics that specified product provided.
    - c. Substitution request is fully documented and properly submitted.
    - d. Requested substitution will not adversely affect Contractor's construction schedule.
    - e. Requested substitution has received necessary approvals of authorities having jurisdiction.
    - f. Requested substitution is compatible with other portions of the Work.
    - g. Requested substitution has been coordinated with other portions of the Work.
    - h. Requested substitution provides specified warranty.
    - i. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Architect will consider requests for substitution if received **within 10 days after the Notice of Award** and based on the following
1. The proposed product substitution will result in a significant cost savings to the Owner.
  2. The proposed product has substantial performance improvements.
  3. The proposed product can be provided much earlier in the schedule enhancing the project completion date.

4. The proposed product warranty is superior to the specified item.

### **2.03 DETAILED SUBSTITUTION REVIEW PROCEDURES**

- A. The Architect in addition to the requirements listed above will require compliance with the following requirements and procedures.
  1. Requests for approval of substitutions will be received and considered from Prime Contractors only and not from manufacturers, suppliers, Subcontractors, or other third parties.
  2. If the materials and equipment submitted are offered as substitutions to the Contract Documents or approved equal, the Contractor shall advise the Owner and the Architect of the requested substitutions and comply with the requirements hereinafter specified in this Article.
  3. Where the acceptability of substitution is conditioned upon a record of and the proposed substitution does not fulfill this requirement, the Architect, at the Architect's sole discretion, may accept the substitution if the Contractor provides a bond or cash deposit which guarantees replacement at no cost to the Owner for any failure occurring within a specified time. The substitution item must meet all other technical requirements contained in the Specification.
  4. The Contractor shall furnish such information as required by the Architect to demonstrate that the equal article, material, apparatus, product or process is the equivalent of that specified in quality, finish, design, efficiency and durability and has been elsewhere demonstrated to be equally serviceable for the purpose for which it is intended and/or that it offers substantial benefits to the Owner in saving of time and/or cost. The Contractor shall set forth the reasons for desiring to make this substitution.
  5. Contractor shall submit:
    - a. For each proposed request for approved substitute sufficient details, complete descriptive literature and performance data together with samples of the materials, where feasible, to enable the Architect to determine if the proposed request for approval should be granted, including manufacturer's brand or trade names, model numbers, description of specification of item, performance data, test reports, samples, history of service, and other data as applicable.
    - b. Certified tests, where applicable, by an independent laboratory attesting to the performance of the substitute.
    - c. A list of installations where the proposed substitute equipment or materials is performing under similar conditions as specified.
    - d. A list of installations where the proposed substitute equipment or materials is performing under similar conditions as specified.
  6. Where the approval of a substitute requires revision or redesign of any part of Work, including that of other Contracts, all such revision and redesign, and all new drawings and details required therefore, shall be provided by the Contractor at its own cost and expense, and shall be subject to the approval of the Architect.
  7. In the event that the Architect is required to provide additional services, then the Architect's charges for such additional services shall be paid by the Contractor to the Owner.
  8. Any modifications in the Work required under other contracts to accommodate the changed design will be incorporated in the appropriate contracts and any resulting increases in contract prices will be charged to the Contractor by the Owner who initiated the changed design.
  9. In all cases, the Architect shall be the judge as to whether a proposed substitute is to be approved. The Contractor shall be bound by the Architect's decision. No substitute items shall be used in the Work without written approval of the Architect.
  10. In making request for approval of substitute, Contractor represents that:
    - a. Contractor has investigated proposed substitute and determined that it is equal to or superior in all respects to the product, manufacturer or method specified or offers other specified advantages to the Owner.



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- b. Contractor will provide the same or better warranties or bonds for proposed substitute as for product, manufacturer or method specified.
  - c. Contractor waives all claims for additional costs or extension of time related to proposed substitute that subsequently may become apparent.
  - d. Contractor shall have and make no claim for an extension of time or for damages by reason of the time taken by the Architect in considering a substitute proposed by the Contractor or by reason of failure of the Architect to approve a substitute proposed by the Contractor. Any delays arising out of consideration, approval, or utilization of a substitute shall be the sole responsibility of the Contractor requesting the substitute and it shall arrange its operations to make up the time lost.
- 11. Proposed substitute will not be accepted if:
    - a. Acceptance will require substantial revision of Contract Documents.
    - b. Acceptance will substantially change design concepts or Technical Specifications.
    - c. Acceptance will delay completion of the Work, or the Work of other Contractors.
    - d. If the Substitute item is not accompanied by formal request for approval of substitute from Contractor.
  - 12. The Architect reserves the right to disapprove, for aesthetic reasons, any material or equipment on the basis of design or color considerations alone, without prejudice to the quality of the material or equipment, if the manufacturer cannot meet the required colors or design.
  - 13. All requests for approval of substitutes of materials or other changes from the contract requirements shall be accompanied by an itemized list of all other items affected by such substitution or change. The Architect shall have the right, if such is not done, to rescind any approvals for substitutions and to order such Work removed and replaced with Work conforming to the specified requirements of the contract, all at the Contractor's expense, or to assess all additional costs resulting from the substitution to the Contractor.
  - 14. Approval of a substitute will not relieve Contractor from the requirement to submit Shop Drawings or any of the provisions of the Contract Documents.
  - 15. In the event that the Architect is required to provide additional services as a result of a request for approval of a substitute results in changes by the Contractor in dimension, weight, power requirements, etc., of the equipment and accessories furnished, or as a result of Contractor's errors, omissions or failure to conform to the requirements of the Contract Documents or if the Architect is required to examine and evaluate any changes proposed by the Contractor solely for the convenience of the Contractor, or for evaluation of deviations from Contract Documents, then the Architect's charges in connection with such additional services shall be paid by the Contractor.
  - 16. Structural design shown on the Drawings is based upon the configuration of and maximum loading for major items of equipment as indicated on the Drawings and as specified. If the substituted equipment furnished differs from said features, the Contractor shall pay to the Owner all costs of redesign and for any construction changes required to accommodate the equipment furnished, including the Architect's charges in connection therewith.
- B. The Contractor shall respond to required submittals with complete information and with a degree of accuracy to achieve approvals within two (2) submissions. All costs to the Architect involved with subsequent submissions of Shop Drawings, Samples or other items requiring approval, will be paid by the Contractor to the Owner, by deducting such costs from payments due for Work completed. In the event an approved item is requested by the Contractor to be changed or substituted for, all costs involved in the reviewing and approval process will likewise be back charged to the Contractor unless determined by the Architect that the need for such substitution and/or deviation from Contract Documents is beyond the control of the Contractor.

**PART 3 EXECUTION (NOT APPLICABLE)**

**END OF SECTION 012500**

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**SECTION 012600**  
**CONTRACT MODIFICATION PROCEDURES****PART 1 GENERAL****1.01 SUMMARY**

- A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

**1.02 NO COST CHANGES IN THE WORK**

- A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on **the Information Bulletin bound in the Project Forms Section of Project Manual.**

**1.03 PROPOSAL REQUESTS**

- A. Owner-Initiated Proposal Requests: **[Architect]** will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
  - 1. Proposal Requests issued by **Architect** are not instructions either to stop work in progress or to execute the proposed change.
  - 2. Within time specified in Proposal Request, or **10** days when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
    - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    - c. Include costs of labor and supervision directly attributable to the change.
    - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship.
- B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to **Architect**.
  - 1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
  - 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
  - 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
  - 4. Include costs of labor and supervision directly attributable to the change.
  - 5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times.
  - 6. Comply with requirements in Division 01 Section "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.

**1.04 ALLOWANCES**

- A. Allowance Adjustment: To adjust allowance amounts, base each Change Order proposal on the difference between purchase amount and the allowance, multiplied by final measurement of work-in-place. If applicable, include reasonable allowances for cutting losses, tolerances, mixing wastes, normal product imperfections, and similar margins.
    - 1. Include installation costs in purchase amount only where indicated as part of the allowance.
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2. If requested, prepare explanation and documentation to substantiate distribution of overhead costs and other margins claimed.
  3. Submit substantiation of a change in scope of work, if any, claimed in Change Orders related to unit-cost allowances.
  4. Owner reserves the right to establish the quantity of work-in-place by independent quantity survey, measure, or count.
- B. Submit claims for increased costs because of a change in scope or nature of the allowance described in the Contract Documents, whether for the Purchase Order amount or Contractor's handling, labor, installation, overhead, and profit. Submit claims within 5 days of receipt of the Change Order or Construction Change Directive authorizing work to proceed. Owner will reject claims submitted later than 5 days after such authorization.
1. Do not include Contractor's or subcontractor's indirect expense in the Change Order cost amount unless it is clearly shown that the nature or extent of work has changed from what could have been foreseen from information in the Contract Documents.
  2. No change to Contractor's indirect expense is permitted for selection of higher- or lower-priced materials or systems of the same scope and nature as originally indicated.

#### 1.05 ADMINISTRATIVE CHANGE ORDERS

- A. Adjustment from Allowances: Refer to Division 01 Section "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.
- B. Adjustments from Unit Prices: Refer to Division 01 Section "Unit Prices" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit price work.

#### 1.06 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Proposal Request, **Architect** will issue a Change Order for signatures of Owner and Contractor on **AIA Document G701-Change Order**.

#### 1.07 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: **Architect** may issue a Construction Change Directive on **the Information Bulletin bound in the Project Forms Section of Project Manual**.
1. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
    - a. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
  2. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
    - a. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

#### PART 2 PRODUCTS (NOT APPLICABLE)

#### PART 3 EXECUTION (NOT APPLICABLE)

END OF SECTION 012600

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**SECTION 012900  
PAYMENT PROCEDURES**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

**1.02 SCHEDULE OF VALUES**

- A. Schedule of Values: Furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.
- B. Coordination: Correlate line items in the schedule of values with other required administrative forms and schedules, including the following:
1. Application for Payment forms with continuation sheets. (AIA G702 and G703)
  2. Submittal schedule.
  3. Submit the schedule of values to Architect at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
- C. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the schedule of values.
1. Identification: Include the following Project identification on the schedule of values:
    - a. Project name and location.
    - b. Name of Architect.
    - c. Architect's project number.
    - d. Contractor's name and address.
    - e. Date of submittal.
  2. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:
    - a. Related Specification Section or Division.
    - b. Description of the Work.
    - c. Change Orders (numbers) that affect value.
    - d. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
      - 1) Labor.
      - 2) Materials.
      - 3) Equipment.
  3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports.
  4. **Each school building shall be separately itemized and detailed.**
  5. The following line items must be included on the continuation sheet.
    - a. Project Bonds and Insurances
    - b. Mobilization
    - c. Shop Drawings
    - d. Project Meetings
    - e. Temporary Heat (where applicable)
    - f. Progress Cleaning
    - g. Lawn and Tree Watering (where applicable to establish new lawns and trees)
    - h. Punch List
    - i. Final Cleaning
    - j. Close Out documents and Warranties
  6. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
  7. Submit draft of AIA Document G703 Continuation Sheets.
  8. **Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit**
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**cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.**

9. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
  - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.
10. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

### **1.03 APPLICATIONS FOR PAYMENT**

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
    1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
  - B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.
    1. Submit draft copy of Application for Payment **five** days prior to due date for review by Architect. Work to be projected out to the end of the pay period.
  - C. Application for Payment Forms: Use **AIA Document G702 and AIA Document G703** as form for Applications for Payment.
  - D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Incomplete applications will be returned without action.
    1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
    2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
    3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
    4. The OWNER shall retain five percent (5%) of the amount due on each Application for both the work completed and materials stored, unless stated otherwise in Owner Contractor Agreement. The OWNER reserves the right to retain a greater percentage in the event the CONTRACTOR fails to make satisfactory progress or in the event there is other specific cause for greater withholding.
  - E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
    1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
    2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
  - F. **Provide copies of payroll records (including subcontractors) that are signed and notarized, documenting compliance with prevailing wage requirements.**
  - G. Transmittal: **Submit three** signed and notarized original copies of each Application for Payment to **Architect** by a method ensuring receipt. Include waivers of lien and similar attachments.
  - H. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
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1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
  2. When an application shows completion of an item, submit conditional final or full waivers.
  3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
  4. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.
- I. Initial Application for Payment: Administrative actions and submittals that must precede submittal of first Application for Payment include the following:
1. List of Substitutions
  2. Contractor or Notice to Proceed.
  3. Performance and Payment bonds.
  4. Liability, Auto, and Umbrella Insurance.
  5. Worker Compensation certificates.
  6. Proposed schedule of values for approval.
- J. Initial Application for Payment: Administrative actions and submittals that must coincide with submittal of first Application for Payment include the following:
1. Approved Schedule of values.
  2. List of subcontractors.
  3. Contractors Safety Program.
  4. Contractor's construction schedule (preliminary if not final).
  5. Products list (preliminary if not final).
  6. Submittal schedule (preliminary if not final).
    - a. First Payment WILL NOT be processed without a Submittal Schedule.
  7. Emergency Contacts List.
  8. Certified Payroll.
  9. Schedule of unit prices.
  10. List of Contractor's staff assignments.
  11. List of Contractor's principal consultants.
  12. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
  13. Minutes or report of preconstruction conference.
- K. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Administrative actions and submittals that shall precede or coincide with this application include:
    - a. Occupancy permits and similar approvals
    - b. List of incomplete Work, recognized as exceptions to Architect's Certificate of Substantial Completion
    - c. Record Drawings and Specifications
    - d. Operations and Maintenance Manuals
    - e. Maintenance Instructions and Training
    - f. Start-up performance reports
    - g. Test/adjust/balance records
    - h. Warranties (guarantees) and maintenance agreements
    - i. Final cleaning
    - j. Change-over information related to Owner's occupancy, use, operation and maintenance
    - k. Application for reduction of retainage and consent of surety
    - l. Advice on shifting insurance coverages
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2. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
  3. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- L. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Ensure that incomplete Work is not accepted and will be completed without undue delay.
  2. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
  3. Evidence of completion of Project closeout requirements.
  4. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
  5. Updated final statement, accounting for final changes to the Contract Sum.
  6. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
  7. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
  8. AIA Document G707, "Consent of Surety to Final Payment."
  9. Evidence that all claims have been settled.
  10. Final liquidated damages settlement statement.
  11. Removal of temporary facilities and services.
  12. Removal of surplus materials, rubbish, and similar elements.

**PART 2 PRODUCTS (NOT APPLICABLE)**

**PART 3 EXECUTION (NOT APPLICABLE)**

**END OF SECTION 012900**

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**SECTION 013000  
ADMINISTRATIVE REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. General administrative requirements.
- B. Electronic document submittal service.
- C. Preconstruction meeting.
- D. Site mobilization meeting.
- E. Progress meetings.
- F. Construction progress schedule.
- G. Contractor's daily reports.
- H. Progress photographs.
- I. Coordination drawings.
- J. Submittals for review, information, and project closeout.
- K. Number of copies of submittals.
- L. Requests for Interpretation (RFI) procedures.
- M. Submittal procedures.

**1.02 REFERENCE STANDARDS**

- A. AIA G716 - Request for Information 2004.

**1.03 GENERAL ADMINISTRATIVE REQUIREMENTS**

- A. Comply with requirements of Section 017000 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.
- B. Make the following types of submittals to Architect/Engineer:
  - 1. Requests for Interpretation (RFI).
  - 2. Requests for substitution.
  - 3. Shop drawings, product data, and samples.
  - 4. Test and inspection reports.
  - 5. Design data.
  - 6. Manufacturer's instructions and field reports.
  - 7. Applications for payment and change order requests.
  - 8. Progress schedules.
  - 9. Coordination drawings.
  - 10. Correction Punch List and Final Correction Punch List for Substantial Completion.
  - 11. Closeout submittals.

**1.04 PROJECT COORDINATOR**

- A. Project Coordinator: Mechanical Contractor\_\_\_\_\_.
  - B. Cooperate with the Project Coordinator in allocation of mobilization areas of site; for field offices and sheds, for \_\_\_\_\_ access, traffic, and parking facilities.
  - C. During construction, coordinate use of site and facilities through the Project Coordinator.
  - D. Comply with Project Coordinator's procedures for intra-project communications; submittals, reports and records, schedules, coordination drawings, and recommendations; and resolution of ambiguities and conflicts.
  - E. Comply with instructions of the Project Coordinator for use of temporary utilities and construction facilities. Responsibility for providing temporary utilities and construction facilities is identified in Section 011000 - DO NOT USE BSD SUMMARY.
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- F. Coordinate field engineering and layout work under instructions of the Project Coordinator.
- G. Make the following types of submittals to Architect/Engineer through the Project Coordinator:
  - 1. Requests for Interpretation.
  - 2. Requests for substitution.
  - 3. Progress schedules.
  - 4. Coordination drawings.
  - 5. Correction Punch List and Final Correction Punch List for Substantial Completion.
  - 6. Closeout submittals.

## **PART 2 PRODUCTS - NOT USED**

## **PART 3 EXECUTION**

### **3.01 ELECTRONIC DOCUMENT SUBMITTAL SERVICE**

- A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF, MS Word, or MS Excel) format, as appropriate to the document, and transmitted via an Internet-based submittal service that receives, logs and stores documents, provides electronic stamping and signatures, and notifies addressees via email.
  - 1. Besides submittals for review, information, and closeout, this procedure applies to Requests for Interpretation (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, Contractor's correction punchlist, and any other document any participant wishes to make part of the project record.
  - 2. Contractor and Architect/Engineer are required to use this service.
  - 3. It is Contractor's responsibility to submit documents in allowable format.
  - 4. Subcontractors, suppliers, and Architect/Engineer's consultants will be permitted to use the service at no extra charge.
  - 5. Users of the service need an email address, internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, [www.adobe.com](http://www.adobe.com), or Bluebeam PDF Revu, [www.bluebeam.com](http://www.bluebeam.com)), unless such software capability is provided by the service provider.
  - 6. Paper document transmittals will not be reviewed; emailed electronic documents will not be reviewed.
  - 7. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.
- B. Submittal Service: The selected service is:
- C. Training: One, one-hour, web-based training session will be arranged for all participants, with representatives of Architect/Engineer and Contractor participating; further training is the responsibility of the user of the service.
- D. Project Closeout: Architect/Engineer will determine when to terminate the service for the project and is responsible for obtaining archive copies of files for Owner.

### **3.02 PRECONSTRUCTION MEETING**

- A. Schedule meeting after Notice of Award.
- B. Attendance Required:
  - 1. Owner.
  - 2. Architect/Engineer.
  - 3. Contractor.
- C. Agenda:
  - 1. Execution of Owner-Contractor Agreement.
  - 2. Submission of executed bonds and insurance certificates.
  - 3. Distribution of Contract Documents.

4. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
  5. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
  6. Scheduling.
- D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect/Engineer, Owner, participants, and those affected by decisions made.

### **3.03 SITE MOBILIZATION MEETING**

- A. Project Coordinator will schedule meeting at the Project site prior to Contractor occupancy.
- B. Attendance Required:
1. Contractor.
  2. Owner.
  3. Architect/Engineer.
  4. Contractor's superintendent.
  5. Major subcontractors.
- C. Agenda:
1. Use of premises by Owner and Contractor.
  2. Owner's requirements.
  3. Construction facilities and controls provided by Owner.
  4. Temporary utilities provided by Owner.
  5. Survey and building layout.
  6. Security and housekeeping procedures.
  7. Schedules.
  8. Application for payment procedures.
  9. Procedures for testing.
  10. Procedures for maintaining record documents.
  11. Requirements for start-up of equipment.
  12. Inspection and acceptance of equipment put into service during construction period.
- D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect/Engineer, Owner, participants, and those affected by decisions made.

### **3.04 PROGRESS MEETINGS**

- A. Schedule and administer meetings throughout progress of the work at maximum bi-monthly intervals.
- B. Project Coordinator will make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- C. Attendance Required:
1. Contractor.
  2. Owner.
  3. Architect/Engineer.
  4. Contractor's superintendent.
  5. Major subcontractors.
- D. Agenda:
1. Review minutes of previous meetings.
  2. Review of work progress.
  3. Field observations, problems, and decisions.
  4. Identification of problems that impede, or will impede, planned progress.
  5. Review of submittals schedule and status of submittals.
  6. Maintenance of progress schedule.
  7. Corrective measures to regain projected schedules.
  8. Planned progress during succeeding work period.

9. Maintenance of quality and work standards.
  10. Effect of proposed changes on progress schedule and coordination.
  11. Other business relating to work.
- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect/Engineer, Owner, participants, and those affected by decisions made.

### **3.05 CONSTRUCTION PROGRESS SCHEDULE**

- A. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- B. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
  1. Include written certification that major contractors have reviewed and accepted proposed schedule.
- C. Within 10 days after joint review, submit complete schedule.
- D. Submit updated schedule with each Application for Payment.

### **3.06 PROGRESS PHOTOGRAPHS**

- A. Maintain one set of all photographs at project site for reference; same copies as submitted, identified as such.
- B. Photography Type: Digital; electronic files.
- C. Digital Photographs: 24 bit color, minimum resolution of 1024 by 768, in JPG format; provide files unaltered by photo editing software.
  1. Delivery Medium: Via email.
  2. File Naming: Include project identification, date and time of view, and view identification.
  3. PDF File: Assemble all photos into printable pages in PDF format, with 2 to 3 photos per page, each photo labeled with file name; one PDF file per submittal.

### **3.07 COORDINATION DRAWINGS**

- A. Provide information required by Project Coordinator for preparation of coordination drawings.

### **3.08 REQUESTS FOR INTERPRETATION (RFI)**

- A. Definition: A request seeking one of the following:
  1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in Contract Documents.
  2. A resolution to an issue which has arisen due to field conditions and affects design intent.
- B. Whenever possible, request clarifications at the next appropriate project progress meeting, with response entered into meeting minutes, rendering unnecessary the issuance of a formal RFI.
- C. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
  1. Prepare a separate RFI for each specific item.
    - a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
    - b. Do not forward requests which solely require internal coordination between subcontractors.
  2. Prepare using software provided by the Electronic Document Submittal Service.
- D. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
  1. Include in each request Contractor's signature attesting to good faith effort to determine from Contract Documents information requiring interpretation.



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- E. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
    - 1. Official Project name and number, and any additional required identifiers established in Contract Documents.
    - 2. Owner's, Architect/Engineer's, and Contractor's names.
    - 3. Discrete and consecutive RFI number, and descriptive subject/title.
    - 4. Issue date, and requested reply date.
    - 5. Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).
    - 6. Annotations: Field dimensions and/or description of conditions which have engendered the request.
    - 7. Contractor's suggested resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example; routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.
  - F. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.
  - G. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project.
    - 1. Indicate current status of every RFI. Update log promptly and on a regular basis.
    - 2. Note dates of when each request is made, and when a response is received.
    - 3. Highlight items requiring priority or expedited response.
    - 4. Highlight items for which a timely response has not been received to date.
    - 5. Identify and include improper or frivolous RFIs.
  - H. Review Time: Architect/Engineer will respond and return RFIs to Contractor within seven calendar days of receipt. For the purpose of establishing the start of the mandated response period, RFIs received after 12:00 noon will be considered as having been received on the following regular working day.
    - 1. Response period may be shortened or lengthened for specific items, subject to mutual agreement, and recorded in a timely manner in progress meeting minutes.
  - I. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.
    - 1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.

### **3.09 SUBMITTAL SCHEDULE**

- A. Submit to Architect/Engineer for review a schedule for submittals in tabular format.
  - 1. Coordinate with Contractor's construction schedule and schedule of values.
  - 2. Format schedule to allow tracking of status of submittals throughout duration of construction.
  - 3. Arrange information to include scheduled date for initial submittal, specification number and title, submittal category (for review or for information), description of item of work covered, and role and name of subcontractor.
  - 4. Account for time required for preparation, review, manufacturing, fabrication and delivery when establishing submittal delivery and review deadline dates.

### **3.10 SUBMITTALS FOR REVIEW**

- A. When the following are specified in individual sections, submit them for review:
  - 1. Product data.

2. Shop drawings.
  3. Samples for selection.
  4. Samples for verification.
- B. Submit to Architect/Engineer for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.
- C. Samples will be reviewed for aesthetic, color, or finish selection.
- D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 017800 - Closeout Submittals.

### **3.11 SUBMITTALS FOR INFORMATION**

- A. When the following are specified in individual sections, submit them for information:
1. Design data.
  2. Certificates.
  3. Test reports.
  4. Inspection reports.
  5. Manufacturer's instructions.
  6. Manufacturer's field reports.
  7. Other types indicated.
- B. Submit for Architect/Engineer's knowledge as contract administrator or for Owner.

### **3.12 SUBMITTALS FOR PROJECT CLOSEOUT**

- A. Submit Correction Punch List for Substantial Completion.
- B. Submit Final Correction Punch List for Substantial Completion.
- C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 017800 - Closeout Submittals:
1. Project record documents.
  2. Operation and maintenance data.
  3. Warranties.
  4. Bonds.
  5. Other types as indicated.
- D. Submit for Owner's benefit during and after project completion.

### **3.13 NUMBER OF COPIES OF SUBMITTALS**

- A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.
- B. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect/Engineer.
1. After review, produce duplicates.
  2. Retained samples will not be returned to Contractor unless specifically so stated.

### **3.14 SUBMITTAL PROCEDURES**

- A. General Requirements:
1. Use a separate transmittal for each item.
  2. Submit separate packages of submittals for review and submittals for information, when included in the same specification section.
  3. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
  4. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.

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5. Deliver each submittal on date noted in submittal schedule, unless an earlier date has been agreed to by all affected parties, and is of the benefit to the project.
    - a. Upload submittals in electronic form to Electronic Document Submittal Service website.
  6. Schedule submittals to expedite the Project, and coordinate submission of related items.
    - a. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.
    - b. For sequential reviews involving Architect/Engineer's consultants, Owner, or another affected party, allow an additional 7 days.
    - c. For sequential reviews involving approval from authorities having jurisdiction (AHJ), in addition to Architect/Engineer's approval, allow an additional 30 days.
  7. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
- B. Product Data Procedures:
1. Submit only information required by individual specification sections.
  2. Collect required information into a single submittal.
  3. Do not submit (Material) Safety Data Sheets for materials or products.
- C. Shop Drawing Procedures:
1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
  2. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.

### **3.15 SUBMITTAL REVIEW**

- A. Submittals for Review: Architect/Engineer will review each submittal, and approve, or take other appropriate action.
- B. Submittals for Information: Architect/Engineer will acknowledge receipt and review. See below for actions to be taken.
- C. Architect/Engineer's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.
- D. Architect/Engineer's and consultants' actions on items submitted for review:
1. Authorizing purchasing, fabrication, delivery, and installation:
    - a. "Approved", or language with same legal meaning.
    - b. "Approved as Noted, Resubmission not required", or language with same legal meaning.
      - 1) At Contractor's option, submit corrected item, with review notations acknowledged and incorporated.
    - c. "Approved as Noted, Resubmit for Record", or language with same legal meaning.
  2. Not Authorizing fabrication, delivery, and installation:
- E. Architect/Engineer's and consultants' actions on items submitted for information:
1. Items for which no action was taken:
    - a. "Received" - to notify the Contractor that the submittal has been received for record only.
  2. Items for which action was taken:
    - a. "Reviewed" - no further action is required from Contractor.

**END OF SECTION 013000**

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**SECTION 013100**  
**PROJECT MANAGEMENT AND COORDINATION****PART 1 GENERAL****1.01 SUMMARY**

- A. Section includes administrative provisions for coordinating construction operations including, but not limited to, the following:
  - 1. General project coordination procedures.
  - 2. Administrative and supervisory personnel.
  - 3. Coordination drawings.
  - 4. Requests for Information (RFIs).
  - 5. Project meetings.
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.

**1.02 DEFINITIONS**

- A. RFI: Request from Owner, Architect, or Contractor seeking information from each other during construction.

**1.03 INFORMATIONAL SUBMITTALS**

- A. Use the Architect's Newforma Info Exchange when up loading Submittals.
- B. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Use form provided in specification Section 006000 of the Project Manual. Include the following information in tabular form:
  - 1. Name, address, and telephone number of entity performing subcontract or supplying products.
  - 2. Number and title of related Specification Section(s) covered by subcontract.
  - 3. Drawing number and detail references, as appropriate, covered by subcontract.
- C. Key Personnel Names: Within 5 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
  - 1. Each Contractor to furnish a 24hr. emergency contact person and cellular phone number.
  - 2. Post copies of listing in project meeting room, or field office, and by each field telephone. Keep list current.

**1.04 COORDINATION**

- A. Coordination: Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its operations with operations included in different Sections that depend on each other for proper installation, connection, and operation.
    - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
    - 2. Coordinate installation of different components with other contractors to ensure maximum performance and accessibility for required maintenance, service, and repair.
    - 3. Make adequate provisions to accommodate items scheduled for later installation.
  - B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
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1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
  - C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
    1. Preparation of Contractor's construction schedule.
    2. Preparation of the schedule of values.
    3. Installation and removal of temporary facilities and controls.
    4. Delivery and processing of submittals.
    5. Progress meetings.
    6. Preinstallation conferences.
    7. Project closeout activities.
    8. Startup and adjustment of systems.
    9. Project closeout activities.
  - D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

#### 1.05 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings in accordance with requirements in individual Sections, where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
    1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
      - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
      - b. Coordinate the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
      - c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
      - d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
      - e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
      - f. Indicate required installation sequences.
      - g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
  - B. Coordination Drawing Organization: Organize coordination drawings as follows:
    1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire protection, fire alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work. Provide required information for work sequence to interface with the installation work.
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2. Plenum Space: Indicate sub framing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.
  3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire protection, fire alarm, and electrical equipment.
  4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
  5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
  6. Mechanical and Plumbing Work: Show the following:
    - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
    - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
    - c. Fire-rated enclosures around ductwork.
  7. Electrical Work: Show the following:
    - a. Runs of vertical and horizontal conduit 1-1/4 inch diameter and larger.
    - b. Light fixture, exit light, emergency battery pack, smoke detector, and other fire alarm locations.
    - c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
    - d. Location of pull boxes and junction boxes, dimensioned from column center lines.
  8. Fire Protection System: Show the following:
    - a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
  9. Review areas for required access and indicate the need for access doors for access to shutoffs electrical boxes Etc.
  10. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are the Contractor's responsibility. If the Architect determines that the coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, the Architect will so inform the Contractor, who shall make changes as directed and resubmit.
    - a. Failure to provide the required coordination drawings as required by this specification section may result in withholding a portion of the Contractor payment requests until such coordination drawings are received.
  11. Coordination Drawing Prints: Prepare and submit coordination drawing prints in accordance with requirements of Division 01 Section "Submittal Procedures."
- C. Architect provides PDF Files: For Projects where Project Building Information Modeling Protocol **(BIM) is NOT executed.**
1. Architect will **not** furnish Contractor with digital drawings for the preparation of coordination drawings.
  2. The Architect will provide digital PDF's of Contract Drawings for the purpose of producing coordination drawings.
    - a. Contract documents are graphic representations of approximate locations of materials. Therefore, information contained within these files should not be assumed to be accurate and users of the Files accept full responsibility for verifying the accuracy and completeness of the Files with field conditions and the contract documents.
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**1.06 REQUESTS FOR INFORMATION (RFI)**

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
  - 1. Do not submit an RFI if information is readily available in the Contract Documents.
    - a. Architect will return with no response RFI's where information is available to the contractor as indicated on the Contract Documents.
  - 2. Architect will return RFI's submitted to Architect by other entities controlled by Contractor with no response.
  - 3. Coordinate and submit RFI's in a prompt manner so as to avoid delays.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
  - 1. Project name.
  - 2. Project number.
  - 3. Date.
  - 4. Name of Contractor.
  - 5. Name of Architect.
  - 6. RFI number, numbered sequentially.
  - 7. RFI subject.
  - 8. Specification Section number and title and related paragraphs, as appropriate.
  - 9. Drawing number and detail references, as appropriate.
  - 10. Field dimensions and conditions, as appropriate.
  - 11. Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
  - 12. Contractor's signature.
  - 13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
    - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI's sent without the required content information will not be considered a formal RFI.
- D. RFI Forms: Form provided in specification Section 006000 of the Project Manual, or Software-generated form with substantially the same content as indicated above, acceptable to Architect.
- E. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFI's received by Architect after 1:00 p.m. will be considered as received the following working day.
  - 1. The following RFI's will be refused without action:
    - a. Requests for approval of submittals.
    - b. Requests for approval of substitutions.
    - c. Requests for information already indicated in the Contract Documents.
    - d. Requests for adjustments in the Contract Time or the Contract Sum.
    - e. Requests for interpretation of Architect's actions on submittals.
    - f. Incomplete RFI's or inaccurately prepared RFI's.
  - 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
  - 3. Architect's action on RFI's that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section "Contract Modification Procedures."
    - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 5 days of receipt of the RFI response.

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**1.07 ARCHITECT'S WEB SITE**

- A. The contractor will use Newforma Info Exchange for Submittals, Shop Drawings and RFI's. Project Web site shall include the following functions:
1. Project directory.
  2. Project correspondence.
  3. Meeting minutes.
  4. Contract modifications forms and logs.
  5. RFI forms and logs.
  6. Task and issue management.
  7. Photo documentation.
  8. Schedule and calendar management.
  9. Submittals forms and logs.
  10. Payment application forms.
  11. Drawing and specification document hosting, viewing, and updating.
  12. Online document collaboration.
  13. Reminder and tracking functions.
  14. Archiving functions.

**1.08 PROJECT MEETINGS**

- A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times. All Prime Contractors are required to attend Project Meetings.
  2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
  3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner, and Architect, within three days of the meeting.
- B. Preconstruction Conference: Architect will schedule and conduct a preconstruction conference before starting construction, at a time convenient to all parties, but no later than 15 days after execution of the Agreement.
1. Conduct the conference to review responsibilities and personnel assignments.
  2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractors and their superintendents; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to decide matters relating to the Work.
  3. Agenda: Discuss items of significance that could affect progress, including the following:
    - a. Tentative construction schedule.
    - b. Phasing.
    - c. Critical work sequencing and long-lead items.
    - d. Designation of key personnel and their duties.
    - e. Procedures for project communications.
    - f. Procedures for processing field decisions and Change Orders.
    - g. Procedures for RFIs.
    - h. Testing and inspecting requirements.
    - i. Procedures for processing Applications for Payment.
    - j. Distribution of the Contract Documents.
    - k. Submittal procedures using Newforma Info Exchange.
    - l. Preparation and updating of record documents.
    - m. Use of the premises.
    - n. Work restrictions.
    - o. Working hours.
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- p. Owner's occupancy requirements and restrictions.
  - q. Responsibility for temporary facilities and controls.
  - r. Procedures for moisture and mold control.
  - s. Procedures for disruptions and shutdowns.
  - t. Construction waste management and recycling.
  - u. Parking availability.
  - v. Office, work, and storage areas.
  - w. Equipment deliveries and priorities.
  - x. First aid.
  - y. Security.
  - z. Progress cleaning.
4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
- 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect and Owner of scheduled meeting dates.
  - 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
    - a. Contract Documents.
    - b. Options.
    - c. Related RFIs.
    - d. Related Change Orders.
    - e. Purchases.
    - f. Deliveries.
    - g. Submittals.
    - h. Review of mockups.
    - i. Possible conflicts.
    - j. Compatibility problems.
    - k. Time schedules.
    - l. Weather limitations.
    - m. Manufacturer's written recommendations.
    - n. Warranty requirements.
    - o. Compatibility of materials.
    - p. Acceptability of substrates.
    - q. Temporary facilities and controls.
    - r. Space and access limitations.
    - s. Regulations of authorities having jurisdiction.
    - t. Testing and inspecting requirements.
    - u. Installation procedures.
    - v. Coordination with other work.
    - w. Required performance results.
    - x. Protection of adjacent work.
    - y. Protection of construction and personnel.
  - 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
  - 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
  - 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the
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Work and reconvene the conference at earliest feasible date.

- D. Progress Meetings: Architect will conduct progress meetings at weekly intervals.
1. Coordinate dates of meetings with preparation of payment requests.
  2. Required Attendees: In addition to representatives of Owner and Architect, each Prime contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to decide matters relating to the Work.
  3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
      - 1) Review schedule for next period.
    - b. Review present and future needs of each entity present, including the following:
      - 1) Interface requirements
      - 2) Sequence of operations.
      - 3) Status of submittals.
      - 4) Deliveries.
      - 5) Off-site fabrication.
      - 6) Access.
      - 7) Site utilization.
      - 8) Temporary facilities and controls.
      - 9) Progress cleaning.
      - 10) Status of correction of deficient items.
      - 11) Field observations.
      - 12) Status of RFIs.
      - 13) Status of proposal requests.
      - 14) Pending changes.
      - 15) Status of Change Orders.
  4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
    - a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.
- E. Coordination Meetings: Conduct Project coordination meetings at weekly intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
1. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work.
  2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    - a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of
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- schedule, or behind schedule, in relation to combined Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
- b. Schedule Updating: Revise combined Contractor's construction schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
  - c. Review present and future needs of each contractor present, including the following:
    - 1) Interface requirements.
    - 2) Sequence of operations.
    - 3) Status of submittals.
    - 4) Deliveries.
    - 5) Off-site fabrication.
    - 6) Access.
    - 7) Site utilization.
    - 8) Temporary facilities and controls.
    - 9) Work hours.
    - 10) Hazards and risks.
    - 11) Progress cleaning.
    - 12) Quality and work standards.
    - 13) Change Orders.
  - 3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.
- F. Project Closeout Meeting: Architect will schedule and conduct a Project closeout meeting, at a time convenient to Owner and Contractor, but no later than 30 days prior to the scheduled date of Substantial Completion.
- 1. Conduct the conference to review requirements and responsibilities related to Project closeout.
  - 2. Required Attendees: Authorized representatives of Owner, Owner's Commissioning Authority (if applicable), Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
  - 3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
    - a. Preparation and completion of Contractor's punch list.
    - b. Responsibility for removing temporary facilities and controls.
    - c. Owner's partial occupancy requirements.
    - d. Coordination of separate contracts for owner related work prior to occupancy.
    - e. Installation of Owner's furniture, fixtures, and equipment.
    - f. [Requirements for preparing, completing and submitting sustainable design documentation.]
    - g. Requirements for preparing operations and maintenance data.
    - h. Requirements for the Submittal of written warranties.
    - i. Requirements for demonstration and training.
    - j. Requirements for submission of record documents, record specifications and record submittals.
    - k. Responsibility and schedule for final cleaning
    - l. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
  - 4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
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**PART 2 PRODUCTS (NOT APPLICABLE)**

**PART 3 EXECUTION (NOT APPLICABLE)**

**END OF SECTION 013100**

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**SECTION 013200  
CONSTRUCTION PROGRESS DOCUMENTATION****PART 1 GENERAL****1.01 SUMMARY**

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
  - 1. Start-up construction schedule.
  - 2. Contractor's construction schedule.
  - 3. Daily construction reports.
  - 4. Field condition reports.
  - 5. Special reports.

**1.02 INFORMATIONAL SUBMITTALS**

- A. Format for Submittals: Submit required submittals in the following format[s]:
  - 1. PDF electronic file.
- B. Start-up construction schedule.
- C. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
- D. Daily Construction Reports: Submit at **weekly** intervals.
- E. Field Condition Reports: Submit at time of discovery of differing conditions.
- F. Special Reports: Submit at time of unusual event.

**1.03 QUALITY ASSURANCE**

- A. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's construction schedule, including, but not limited to, the following:
  - 1. Review software limitations and content and format for reports.
  - 2. Verify availability of qualified personnel needed to develop and update schedule.
  - 3. Discuss phasing, work stages, area separations, interim milestones, and partial Owner occupancy.
  - 4. Review delivery dates for Owner-furnished products.
  - 5. Review schedule for work of Owner's separate contracts.
  - 6. Review time required for review of submittals and resubmittals.
  - 7. Review requirements for tests and inspections by independent testing and inspecting agencies.
  - 8. Review time required for completion and startup procedures.
  - 9. Review and finalize list of construction activities to be included in schedule.
  - 10. Review submittal requirements and procedures.
  - 11. Review procedures for updating schedule.

**1.04 COORDINATION**

- A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.
  - 1. Secure time commitments for performing critical elements of the Work from entities involved.
  - 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

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**PART 2 PRODUCTS****2.01 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL**

- A. Time Frame: Extend schedule from date established for commencement of the Work to date of Substantial Completion.
  - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B. Activities: Treat each story or separate area as a separate numbered activity for each principal element of the Work. Comply with the following:
  - 1. Activity Duration: Define activities and days
  - 2. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
  - 3. Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
  - 4. Startup and Testing Time: Include not less than 15 days for startup and testing.
  - 5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
  - 6. Punch List and Final Completion: Include not more than 30 days for punch list and final completion.
- C. Schedule Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule and show how the sequence of the Work is affected.
  - 1. Phasing: Arrange list of activities on schedule by phase.
  - 2. Work under More Than One Contract: Include a separate activity for each contract.
  - 3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
  - 4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
  - 5. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
  - 6. Work Restrictions: Show the effect of the following items on the schedule:
    - a. Coordination with existing construction.
    - b. Limitations of continued occupancies.
    - c. Uninterruptible services.
    - d. Partial occupancy before Substantial Completion.
    - e. Use of premises restrictions.
    - f. Provisions for future construction.
    - g. Seasonal variations.
    - h. Environmental control.
  - 7. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
    - a. Submittals.
    - b. Purchases.
    - c. Mockups.
    - d. Sample testing.
    - e. Deliveries.
    - f. Installation.

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- g. Tests and inspections.
    - h. Adjusting.
    - i. Startup and placement into final use and operation.
  - 8. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
    - a. Structural completion.
    - b. Permanent space enclosure.
    - c. Completion of mechanical installation.
    - d. Completion of electrical installation.
    - e. Substantial Completion.
  - D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion, and any defined interim milestones.
  - E. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
    - 1. Unresolved issues.
    - 2. Unanswered RFIs.
    - 3. Rejected or unreturned submittals.
    - 4. Notations on returned submittals.
  - F. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.
  - G. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

## 2.02 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
    - 1. List of Prime contractors at Project site.
    - 2. List of subcontractors at Project site.
    - 3. Approximate count of personnel at Project site.
    - 4. Equipment at Project site.
    - 5. Material deliveries.
    - 6. High and low temperatures and general weather conditions, including presence of rain or snow.
    - 7. Accidents.
    - 8. Meetings and significant decisions.
    - 9. Unusual events (refer to special reports).
    - 10. Stoppages, delays, shortages, and losses.
    - 11. Meter readings and similar recordings.
    - 12. Emergency procedures.
    - 13. Orders and requests of authorities having jurisdiction.
    - 14. Change Orders received and implemented.
    - 15. Construction Change Directives received and implemented.
    - 16. Services connected and disconnected.
    - 17. Equipment or system tests and startups.
    - 18. Partial completions and occupancies.
    - 19. Substantial Completions authorized.
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- B. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

### **2.03 SPECIAL REPORTS**

- A. General: Submit special reports directly to Owner within **one** day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.
- B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

## **PART 3 EXECUTION**

### **3.01 CONTRACTOR'S CONSTRUCTION SCHEDULE**

- A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
  2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
  3. As the Work progresses, indicate final completion percentage for each activity.
- B. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
1. Post copies in Project meeting rooms and temporary field offices.
  2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

**END OF SECTION 013200**



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**SECTION 013300  
SUBMITTAL PROCEDURES**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. This specification describes the procedures for submission of submittals and shop drawings using Newforma Info Exchange.
  - 1. The Contractor will be required to use the Newforma Info Exchange for the transfer of Submittals, Shop Drawings and RFI's. There will be **no exceptions** to this requirement. The contractor will be given a login and password free of charge. For more information follow the procedure below.
    - a. Information and instructions for use are available for review by the contractor by contacting CPL. The Contractor is to provide an email address for the file to be sent. A PDF file will be emailed to the requesting contractor.

**1.02 DEFINITIONS**

- A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."
- B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."
- C. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

**1.03 DELEGATED-DESIGN SERVICES**

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
  - 1. If criteria indicated are insufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF file of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
  - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

**1.04 SUBMITTAL GENERAL ADMINISTRATIVE REQUIREMENTS**

- A. The Contractor shall prepare a Submittal Log containing the information required to be submitted under the Submittal article from each respective Specification Section. With each item listed the Contractor shall provide anticipated dates for submission to the Architect. The Architect will review and accept or request that corrections be made for subsequent acceptance. This acceptance will constitute an approval for the submittal, shop drawings and sample submissions to commence. **No Submittals or Shop Drawings will be reviewed by the Architect until an approved Submittal Schedule is in place.**
- B. The contractor shall prepare expected submittals in Newforma that correspond to all submittals listed on the submittal schedule at the time of submission of the submittal log. These expected submittals are to follow the naming conventions laid out in section "1.5 Submittal Schedule" and

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“1.6 Submittal Identification”

- C. The Contractor is responsible for all costs for creating electronic files for the submittal process. The Architect will not provide this service.
    - 1. The Submittal Cover Sheet located in Specification Section 006000 Project Forms shall be used for all Submittals.
      - a. An electronic form of the submittal cover is available from the Architect.
    - 2. The Submittal Cover sheet when scanned to a .PDF shall be the first page viewed in the individual file.
      - a. Each product submitted within a specification section shall have a Submittal Cover sheet attached. Combined submittals with one cover page will not be accepted
      - b. Each Submittal Cover sheet shall be filled in completely. **Files that are sent with the Submittal Cover Sheet missing or not filled in correctly will not be reviewed.** The Architect will send a notice that the submittal is missing information. If the Contractor fails to correct or provide the proper submittal within 15 days, notice will be provided, and the submittal will be REJECTED.
    - 3. The Contractor(s) will be provided with a link to upload files to the Newforma Info Exchange. The site address and a “log in” will be provided to the Contractor(s) free of charge.
    - 4. A read only Record Submittal Log and RFI Log will be available from the Newforma Info Exchange for the Contractors reference in checking the status of the submittals and shop drawings.
  - D. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
    - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
    - 2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
    - 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
    - 4. Coordinate transmittals of different types of submittals from related section for parts of the work so processing will not be delayed because of need to review submittals concurrently for coordination.
      - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until all related submittals are received. Delays associated with the above are the not the Architects responsibility and rests solely with the Contractor.
  - E. Architect's Digital Data Files: For Projects where Project Building Information Modeling Protocol is NOT executed. Provide digital PDF's only.
    - 1. Architect will not furnish Contractor with digital drawings for the preparation of shop drawings.
    - 2. The Architect will provide digital PDF's of Contract Drawings for the purpose of producing project record drawings.
      - a. Contract documents are graphic representations of approximate locations of materials. Therefore, information contained within these files should not be assumed to be accurate and users of the Files accept full responsibility for verifying the accuracy and completeness of the Files with field conditions and the contract documents.
    - 3. [Document Transfer Agreement - For Projects where Architect's work files are not a deliverable: The Contractor shall execute an Electronic Document Transfer Agreement for all electronic transfers of files, other than PDFs. The contractor must provide acknowledgement, accept the information regarding drawings, ownership and Limitations of Liability. Agreement is found with Project Forms.
      - a. The following plot files will by furnished for each appropriate discipline:
        - 1) Floor plans.
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- 2) Reflected ceiling plans.

### 1.05 SUBMITTAL SCHEDULE

- A. Submittal Schedule: Submit, as an action submittal, a list of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.
1. Submit a preliminary if not final Submittal Schedule for approval a minimum of 15 days after award of contract. Failure to submit a submittal schedule within the required time frame will result in the refusal by the Architect to review any submittals. Delays associated with failure to receive the Submittal Schedule are the not the Architects responsibly and rest solely with the Contractor.
- B. The information is required to be submitted under the Submittal article from each respective Specification Section. With each item listed the Contractor shall provide anticipated dates for submission to the Architect. The Architect will review and accept or request that corrections be made for subsequent acceptance. This acceptance will constitute a review for the submittal, shop drawings and sample submissions may commence. No Submittals or Shop Drawings will be reviewed by the Architect until an approved Submittal Schedule is in place.
1. The Submittal Schedule shall be coordinated with the overall Project Schedule to ensure that submittals are submitted and reviewed so as not to delay the Project Schedule.
  2. The Architect will not be responsible for ensuring that all required Shop Drawings, Product Data, Samples or similar submittals that are required to be submitted and reviewed under the Contract Documents are submitted by the Contractor. Submissions of Shop Drawings, Product Data, Samples or similar submittals are the Contractor's sole responsibility. Delays associated with the contractor's failure to provide the required submittals are the Contractors responsibility.
  3. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
  4. Initial Submittal Schedule: Submit concurrently with startup construction schedule. Include submittals required during the first 30 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
  5. Final Submittal Schedule: Submit concurrently with the first complete submittal of Contractor's construction schedule.
    - a. Submit revised submittal schedule as required to reflect changes in current status and timing for submittals.
  6. Format: Arrange the following information in a tabular format:
    - a. Scheduled date for first submittal.
    - b. Specification Section number and title.
    - c. Submittal Category: Action; informational.
    - d. Name of subcontractor.
    - e. Description of the Work covered.
    - f. Scheduled date for Architect's [ and Construction Manager's] final release or approval.
    - g. Scheduled dates for purchasing.
    - h. Scheduled date of fabrication.
    - i. Scheduled dates for installation.

### 1.06 SUBMITTAL IDENTIFICATION

- A. Submittal Cover Sheet: Attach one cover sheet for each product, shop drawing or sample. DO NOT combine submittals together with one cover sheet for multiple items. They will not be reviewed.
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- B. Submittal Information: Include the following information in each submittal. Use the submittal cover form found in specification section 006000 Project Forms. An electronic form can be sent to the contractor upon request
1. Contractor, Address, Phone/fax and or Email
  2. Contractors Submittal Number.
  3. Architects Project Number.
  4. Project Name (if not filled in by the Architect)
  5. Type of submittal being sent (select box)
  6. Product Identification including the following: Provide one submittal cover sheet for each product within a specification section
    - a. Specification Section Number
    - b. Contract Drawing Number
    - c. Product Name
    - d. Specification Reference: Part/Paragraph
    - e. Detail Reference
    - f. Manufacturer
  7. Contractors Approval: The contractor must acknowledge that they have reviewed the submittal for conformance with the Contract Documents and must sign and date the approval.
  8. Deviation from the Contract Documents: Where the submittal may not meet all of the requirements of the specified item. The contractor must indicate how the submitted item differs from the specified item.
  9. Contractor Comments: Any additional comments by the contractor should be indicated in this space. (Provide an attachment sheet for any other information required that will not fit on the cover sheet.)
- C. Deviations and Additional Information: On each individual submittal, clearly indicate deviations from requirements in the Contract Documents, including minor variations and limitations; include relevant additional information, revisions, line by line comparison and other information requested by Architect [ and Construction Manager]. Indicate by highlighting on each submittal or noting on attached separate sheet. Identify options requiring selection by Architect.
- D. File Naming (for uploading): Each submittal or shop drawing file uploaded to the project on the Newforma Info Exchange, shall have in the file name, the specification section number followed by the submittal number, the submittal abbreviation and the specification section name. For re-submissions an R1 would be added following submittal number. The file name must include the following information:

Example:

|              |               |                |                    |
|--------------|---------------|----------------|--------------------|
| 081416       | 001           | PD             | Flush Wood Doors   |
| Spec Section | Submittal No. | Submittal Abbr | Specification Name |

File to Read: 081416-001 PD - Flush Wood Doors

Re-submission to Read:081416-001-R1-Flush Wood Doors

Submittal Abbr. required to be used in the file name on submittals are as follows:

CD - Coordination Drawings  
CERT - Certification(s)  
CLC - Calculations  
DD - Design Data  
EJ - Engineer's Judgement  
LEED - LEED or PD/LEED

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O&M - Operations and Maintenance Manuals  
PD - Product Data  
PHOTO - Photo  
QD - Qualification Data  
RPT - Report  
SAMP - Sample  
SCH - Schedule  
SEL - Make A Selection  
SD - Shop Drawing(s)  
STDY - Study  
TR - Test Results  
WAR - Warranty

- E. When uploading submittals or RFI's to the Newforma Info Exchange, complete the online transmittal. The information required is derived from the contractor's submittal cover sheet or RFI. Instructions using the Newforma Info Exchange are available from CPL. These instructions can be emailed to the contractor.

#### **1.07 SUBMITTAL DATA AND TESTING REQUIREMENTS**

- A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment. Each product within a specification section shall have a separate submittal cover.
1. If information must be specially prepared for submittal because standard published data are unsuitable for use, submit as Shop Drawings, not as Product Data.
  2. Mark each copy of each submittal to show which products and options are applicable. Send full submittals for each product. Partial submittals will not be reviewed until all required submittal information is received. The architect will not be responsible for project delays due to the contractor's failure to submit the required submittal information in a complete package.
  3. Include the following information, as applicable:
    - a. Manufacturer's catalog cuts.
    - b. Manufacturer's product specifications.
    - c. Standard color charts.
    - d. Statement of compliance with specified referenced standards.
    - e. Testing by recognized testing agency.
    - f. Application of testing agency labels and seals.
    - g. Notation of coordination requirements.
    - h. Availability and delivery time information.
  4. For equipment, include the following in addition to the above, as applicable:
    - a. Wiring diagrams that show factory-installed wiring.
    - b. Printed performance curves.
    - c. Operational range diagrams.
    - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
  5. Submit Product Data before Shop Drawings, and before or concurrently with Samples.
- B. Shop Drawings: Prepare project-specific information for each shop drawing. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data [ unless submittal based on Architect's digital data drawing files is otherwise permitted].
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1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
    - a. Identification of products.
    - b. Schedules.
    - c. Compliance with specified standards.
    - d. Notation of coordination requirements.
    - e. Notation of dimensions established by field measurement.
    - f. Relationship and attachment to adjoining construction clearly indicated.
    - g. Description any conflicts with other trades.
    - h. Seal and signature of professional engineer if specified.
  2. BIM Incorporation: When Project uses BIM through the Construction Stage and Contractor is required to prepare Shop Drawings for incorporation into the BIM. Revise as required to reflect Project scope agreements. [Develop and Incorporate] [Construction Manager will incorporate Contractor's] shop drawings and data files into BIM established for Project.
    - a. Prepare design drawings and data files in the following format - Refer to these executed AIA Documents – required for BIM incorporation;
      - 1) AIA Document G201 – 2013 Project Digital Data Protocol Form
      - 2) AIA Document G202 – 2013 Project Building Information Modeling Protocol Form
      - 3) AIA Document E203–2013, Building Information Modeling and Digital Data Exhibit
    - b. Refer to Section 013100 "Project Management and Coordination" for requirements for coordination drawings.]]
- C. Samples: Submit Samples for review of type, color, pattern, and texture for a check of these characteristics with other materials.
1. Transmit Samples that contain multiple, related components, such as accessories together in one submittal package. If samples are delivered with product data, only the samples will be reviewed. The Product Data must be uploaded to the Newforma Info Exchange. A duplicate submittal cover sheet is to be uploaded to the Newforma Info exchange as a record of sample delivery.
    - a. The Product Data is to be loaded concurrent with the delivery of samples. Samples may be delivered/given to the Architect. In the remarks column of the transmittal place "given to the Architect"
  2. Identification: Permanently attach label on unexposed side of Samples that includes the following:
    - a. Project name and submittal number.
    - b. Generic description of Sample.
    - c. Product name and name of manufacturer.
    - d. Sample source.
    - e. Number and title of applicable Specification Section.
    - f. Specification paragraph number and generic name of each item.
    - g. In addition to all hard copy and physical samples submitted, duplicate digital submittal is to be produced for review, record and tracking purposes through Newforma Info Exchange. Include same information as above as well as a high resolution, color, digital image of all samples with labeled information clearly visible for each physical sample.
  3. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
    - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
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4. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units, showing the full range of colors, textures, and patterns available.
    - a. Number of Samples: Submit [one] or Insert number full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect [, through Construction Manager,] will return submittal with options selected.
  5. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
    - a. Number of Samples: Submit [three] or Insert number sets of Samples. Architect [ and Construction Manager] will retain [two] or Insert number Sample sets; remainder will be returned. [ Mark up and retain one returned Sample set as a project record Sample.]
      - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
      - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least [three] or Insert number sets of paired units that show approximate limits of variations.
- D. Information requirements for each submittal: Where submittal is requiring Schedules, Product Data, Qualification Data, Design Data, Certificates and Tests use the following protocol.
1. Schedules: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
  2. Product Data. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
    - a. Manufacturer and product name, and model number if applicable.
    - b. Number and name of room or space.
    - c. Location within room or space.
  3. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
  4. Design Data: Prepare and submit written and graphic information indicating compliance with indicated performance and design criteria in individual Specification Sections. Include list of assumptions and summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Number each page of submittal.
  5. Certificates:
    - a. Certificates and Certifications Submittals: Submit a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity. Provide a notarized signature where indicated.
    - b. Insert definition of Contractor certificates here if required by individual Specification Sections. See the Evaluations.
    - c. Installer Certificates: Submit written statements on manufacturer's letterhead, certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
    - d. Manufacturer Certificates: Submit written statements on manufacturer's letterhead, certifying that manufacturer complies with requirements in the Contract Documents.
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- Include evidence of manufacturing experience where required.
        - e. Material Certificates: Submit written statements on manufacturer's letterhead, certifying that material complies with requirements in the Contract Documents.
        - f. Product Certificates: Submit written statements on manufacturer's letterhead, certifying that product complies with requirements in the Contract Documents.
        - g. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of AWS B2.1/B2.1M on AWS forms. Include names of firms and personnel certified.
        - h. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
        - i. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
        - j. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
        - k. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
  - 6. Test and Research Reports:
    - a. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for substrate preparation and primers required.
    - b. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
    - c. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
    - d. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
    - e. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
    - f. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
      - 1) Name of evaluation organization.
      - 2) Date of evaluation.
      - 3) Time period when report is in effect.
      - 4) Product and manufacturers' names.
      - 5) Description of product.
      - 6) Test procedures and results.
      - 7) Limitations of use.
  - E. Submit the following submittals: Within 15 days of contract award.
    - 1. Submittal Schedule including dates of anticipated review and approval.
      - a. No submittals will be reviewed without an approved Submittal Schedule in place.
    - 2. Subcontractor List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
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- a. Name, address, telephone number and email address of entities performing subcontract or supplying products.
    - b. Number and title of related Specification Section(s) covered by subcontract.
  - 3. Contractor's Construction Schedule: Comply with requirements specified in Section 013200 "Construction Progress Documentation."
  - 4. Schedule of Values: Comply with requirements specified in Section 012900 "Payment Procedures."
  - F. Submit with in the first 30 days after Contract Award
    - 1. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 014329 "Special Inspections."
    - 2. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
    - 3. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
  - G. Submit Field Test Reports during construction within 15 days of the testing date and as follows:
    - 1. Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
  - H. Submit a minimum 30 days prior to Project Closeout:
    - 1. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017700 "Closeout Procedures."
    - 2. Maintenance Data: Comply with requirements specified in Division 01 Section 017823 "Operation and Maintenance Data."

#### **1.08 SUBMITTAL PROCESSING**

- A. Processing Time: Allow time for submittal review, including time for re-submittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including re-submittals.
  - B. The architect will not be responsible for project delays due to the contractor's failure to submit the required submittal information in time to allow for review based on the stipulated review time and to meet the project schedule.
  - C. Initial Review: Allow 10 Calendar days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
  - D. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
  - E. Re-submittal Review: Allow 10 Calendar days for review of each re-submittal.
  - F. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 Calendar days for initial review of each submittal.
  - G. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 15 Calendar days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.
  - H. Where submittal are required to be approved that are part of an assembly or for items such as finishes where color selections are required. The submittal will be retained until all of the information related to these systems and color selections is provided and accepted.
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- I. Products with multiple submittals may be held until all necessary information has been submitted for architect to make a complete review. Submittals dependent on coordinating information from related or dependent products; or products with critical interface with other products may be held until all information is submitted for architect to make a complete review and coordinate all required information. (example door frames will not be reviewed without door hardware)
- J. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
  - 1. Note date and content of previous submittal.
  - 2. Note date and content of revision in label or title block, and clearly indicate extent of revision.
  - 3. Resubmit submittals until they are marked with reviewed notation from Architect's [ and Construction Manager's] action stamp.
- K. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

#### **1.09 SUBMITTAL PROCEDURES**

- A. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
  - B. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
  - C. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
  - D. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
  - E. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
  - F. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
  - G. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
  - H. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
  - I. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
    - 1. Name of evaluation organization.
    - 2. Date of evaluation.
    - 3. Time period when report is in effect.
    - 4. Product and manufacturers' names.
    - 5. Description of product.
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- 6. Test procedures and results.
- 7. Limitations of use.
- J. Schedule of Tests and Inspections: Comply with requirements specified in Division 01 Section "Quality Requirements."
- K. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- L. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- M. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- N. Maintenance Data: Comply with requirements specified in Division 01 Section "Operation and Maintenance Data."
- O. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

#### **1.10 CONTRACTOR'S REVIEW**

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Contractors Approval: Provide Contractor's approval signature and date on the Submittal Cover sheet certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

#### **1.11 ARCHITECT'S ACTION**

- A. Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will respond to each submittal indicating one of the following actions required:
  - 1. No Exceptions Taken: Architect takes no exception to the submittal. This part of the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents; final acceptance will depend upon that compliance.
  - 2. Furnish as Corrected: No exceptions taken except what is identified by the Architect. The part of the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend on that compliance. Furnish any additional related information as requested.
  - 3. Revise and Re-Submit: Revise the submittal based on the Architects comments and resubmit the submittal. Do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the notations; resubmit without delay. Repeat if necessary to obtain a different action mark.
    - a. Do not permit submittals marked "Revise and Resubmit" to be used at the Project Site, or elsewhere where Work is in progress.
  - 4. Rejected: The submittal is rejected. See Architects comments on why submittal was rejected.
    - a. Submittal has not been reviewed by the Contractor and so noted.

- b. Submittal has been prepared without due regard for information called for or logically implied by the Contract Documents.
  - c. Information is not sufficiently complete or accurate to verify that work represented is in accordance with the Contract Documents.
  - d. Do not permit submittals marked "Rejected" to be used at the Project Site, or elsewhere where Work is in progress.
- 5. No Action Taken: The submittal is not required and will not be reviewed.
- B. Submittals by Newforma Info Exchange: Architect [ and Construction Manager] will indicate, on Newforma Info Exchange, the appropriate action.
- C. Informational Submittals: Architect will review each submittal and will not return it or will return it if it does not comply with requirements. The Architects action will be noted in the Newforma Info Exchange.
- D. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect. The Architects action will be noted in the Newforma Info Exchange and noted as a partial review until a full submittal can be received.
- E. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for re-submittal without review.
- F. Submittals not required by the Contract Documents will not be reviewed and will receive no action.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION (NOT USED)**

**END OF SECTION 013300**



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**SECTION 014000  
QUALITY REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
  - 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
  - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
  - 3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, Commissioning Authority, or authorities having jurisdiction are not limited by provisions of this Section.

**1.02 DEFINITIONS**

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
  - B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect or Construction Manager.
  - C. Mockups: Full size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
    - 1. Integrated Exterior Mockups: Mockups of the exterior envelope erected separately from the building but on Project site, consisting of multiple products, assemblies, and subassemblies.
    - 2. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes, doors, windows, millwork, casework, specialties, furnishings and equipment, and lighting.
  - D. Preconstruction Testing: Tests and inspections performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
  - E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
  - F. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.
  - G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
  - H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
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- I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
  - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade or trades.
- J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

### **1.03 DELEGATED-DESIGN SERVICES**

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
  - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Statement: Submit a statement signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.
  - 1. The design professional shall be licensed to perform professional design services in the jurisdiction of the project location.

### **1.04 CONFLICTING REQUIREMENTS**

- A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

### **1.05 ACTION SUBMITTALS**

- A. Shop Drawings: For integrated exterior mockups, provide plans, sections, and elevations, indicating materials and size of mockup construction.
  - 1. Indicate manufacturer and model number of individual components.
  - 2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

### **1.06 INFORMATIONAL SUBMITTALS**

- A. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems.
  - 1. Seismic-force resisting system, designated seismic system, or component listed in the designated seismic system quality assurance plan prepared by the Architect.
  - 2. Main wind-force resisting system or a wind-resisting component listed in the wind-force-resisting system quality assurance plan prepared by the Architect.
- B. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

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- C. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
1. Specification Section number and title.
  2. Entity responsible for performing tests and inspections.
  3. Description of test and inspection.
  4. Identification of applicable standards.
  5. Identification of test and inspection methods.
  6. Number of tests and inspections required.
  7. Time schedule or time span for tests and inspections.
  8. Requirements for obtaining samples.
  9. Unique characteristics of each quality-control service.

#### **1.07 REPORTS AND DOCUMENTS**

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
1. Date of issue.
  2. Project title and number.
  3. Name, address, and telephone number of testing agency.
  4. Dates and locations of samples and tests or inspections.
  5. Names of individuals making tests and inspections.
  6. Description of the Work and test and inspection method.
  7. Identification of product and Specification Section.
  8. Complete test or inspection data.
  9. Test and inspection results and an interpretation of test results.
  10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
  11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
  12. Name and signature of laboratory inspector.
  13. Recommendations on retesting and re-inspecting.
- B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, and telephone number of technical representative making report.
  2. Statement on condition of substrates and their acceptability for installation of product.
  3. Statement that products at Project site comply with requirements.
  4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
  5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
  6. Statement whether conditions, products, and installation will affect warranty.
  7. Other required items indicated in individual Specification Sections.
- C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, and telephone number of factory-authorized service representative making report.
  2. Statement that equipment complies with requirements.
  3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
  4. Statement whether conditions, products, and installation will affect warranty.
  5. Other required items indicated in individual Specification Sections.
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- D. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

#### 1.08 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm with **5** years experience in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm with **5** years experience in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual with **5** years experience in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.
- F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
  2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
1. Contractor responsibilities include the following:
    - a. Provide test specimens representative of proposed products and construction.
    - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
    - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.

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- d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
  - e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
  - f. When testing is complete, remove test specimens, assemblies, mockups; do not reuse products on Project.
2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
- 1. Build mockups in location indicated or, if not indicated, as directed by Architect.
  - 2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
  - 3. Employ supervisory personnel who will oversee mockup construction. Employ workers who will be employed to perform same tasks during the construction at Project.
  - 4. Demonstrate the proposed range of aesthetic effects and workmanship.
  - 5. Obtain Architect's approval of mockups before starting corresponding Work, fabrication, or construction.
    - a. Allow seven days for initial review and each re-review of each mockup.
  - 6. Promptly correct unsatisfactory conditions noted by Architect's preliminary review, to the satisfaction of the Architect, before completion of final mockup.
  - 7. Approval of mockups by the Architect does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
  - 8. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
  - 9. Demolish and remove mockups when directed unless otherwise indicated.

#### **1.09 QUALITY CONTROL**

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
- 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
  - 2. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
- 1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
  - 2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
  - 3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
  - 4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
  - 5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
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6. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
  - C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."
  - D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
  - E. Retesting/Re-inspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and re-inspecting, for construction that replaced Work that failed to comply with the Contract Documents.
  - F. Testing Agency Responsibilities: Cooperate with Architect, Commissioning Authority, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
    1. Notify Architect, Commissioning Authority, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
    2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
    3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
    4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
    5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
    6. Do not perform any duties of Contractor.
  - G. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
    1. Access to the Work.
    2. Incidental labor and facilities necessary to facilitate tests and inspections.
    3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
    4. Facilities for storage and field curing of test samples.
    5. Preliminary design mix proposed for use for material mixes that require control by testing agency.
    6. Security and protection for samples and for testing and inspecting equipment at Project site.
  - H. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
    1. Schedule times for tests, inspections, obtaining samples, and similar activities.

#### **1.10 QUALITY-CONTROL PLAN**

- A. Contractor's Quality-Control Plan, The Contractor shall submit quality-control plan within 10 days of Notice of Award, and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities and to coordinate Owner's quality-assurance and quality-control activities. Coordinate with Contractor's Construction Schedule.
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- B. Quality-Control Personnel Qualifications: Engage qualified personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
- C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.
- D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:
  - 1. Contractor-performed tests and inspections, including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections. Distinguish source quality-control tests and inspections from field quality-control tests and inspections.
  - 2. Special inspections required by authorities having jurisdiction and indicated on the Statement of Special Inspections.
  - 3. Owner-performed tests and inspections indicated in the Contract Document, including tests and inspections indicated to be performed by Commissioning Authority.
- E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring the Work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- F. Monitoring and Documentation: Maintain testing and inspection reports, including log of approved and rejected results. Include Work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming Work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

#### 1.11 SPECIAL TESTS AND INSPECTIONS

- A. Special Tests and Inspections: **Owner will engage** a qualified **testing agency / special inspector** to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:
  - 1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.
  - 2. Notifying Architect, Commissioning Authority, and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
  - 3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect, Owner, and Commissioning Authority, with copy to Contractor and to authorities having jurisdiction.
  - 4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
  - 5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
  - 6. Retesting and re-inspecting corrected work.

#### PART 2 PRODUCTS (NOT APPLICABLE)

#### PART 3 EXECUTION

##### 3.01 TEST AND INSPECTION LOG

- A. Prepare a record of tests and inspections. Include the following:
  - 1. Date test or inspection was conducted.
  - 2. Description of the Work tested or inspected.
  - 3. Date test or inspection results were transmitted to Architect.
  - 4. Identification of testing agency or special inspector conducting test or inspection.



- B. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for Architect's and Owner's reference during normal working hours.

### **3.02 REPAIR AND PROTECTION**

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
  - 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Division 01 Section "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

**END OF SECTION 014000**

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**SECTION 014119**  
**REGULATORY REQUIREMENTS - NYS EDUCATION DEPARTMENT****PART 1 GENERAL****1.01 SUMMARY**

- A. Section includes:
  - 1. "Uniform Safety Standards for School Construction and Maintenance Projects" for maintaining a Certificate of Occupancy during construction.

**1.02 REFERENCES**

- A. Section 155.5 of the Regulations of the New York State Commissioner of Education "Uniform Safety Standards for School Construction and Maintenance Projects".

**PART 2 PRODUCTS (NOT APPLICABLE)****PART 3 EXECUTION****3.01 GENERAL REQUIREMENT**

- A. The occupied portion of any school building shall always comply with the minimum requirements necessary to maintain a certificate of occupancy.

**3.02 HAZARDOUS BUILDING MATERIALS**

- A. Surfaces that will be disturbed during renovation or demolition have been tested for lead and asbestos. Results of the testing are available, upon request, from the Owner.

**3.03 GENERAL SAFETY AND SECURITY STANDARDS FOR CONSTRUCTION**

- A. General safety and security standards for construction projects include the following:
  - 1. All construction materials shall be stored in a safe and secure manner.
  - 2. Fences around construction supplies or debris shall be maintained.
  - 3. Gates shall always be locked unless a worker is in attendance to prevent unauthorized entry.
  - 4. During exterior renovation work, overhead protection shall be provided for any sidewalks or areas immediately beneath the work site or such areas shall be fenced off and provided with warning signs to prevent entry.
  - 5. Workers shall be required to wear photo-identification badges at all times for identification and security purposes while working at occupied sites.

**3.04 SEPARATION OF CONSTRUCTION AREAS FROM OCCUPIED AREAS**

- A. Construction areas which are under the control of a contractor and therefore not occupied by district staff or students shall be separated from occupied areas. Provisions shall be made to prevent the passage of dust and contaminants into occupied parts of the building. Periodic inspection and repairs of the containment barriers must be made to prevent exposure to dust or contaminants. Gypsum board must be used in exit ways or other areas that require fire rated separation. Heavy duty plastic sheeting may be used only for a vapor, fine dust or air infiltration barrier, and shall not be used to separate occupied spaces from construction areas.
  - 1. A specific stairwell and/or elevator should be assigned for construction worker use during work hours. In general, workers may not use corridors, stairs or elevators designated for students or school staff.
  - 2. Large amounts of debris must be removed by using enclosed chutes or a similar sealed system. There shall be no movement of debris through halls of occupied spaces of the building. No material shall be dropped or thrown outside the walls of the building.
  - 3. All occupied parts of the building affected by renovation activity shall be cleaned at the close of each workday. School buildings occupied during a construction project shall maintain required health, safety and educational capabilities at all times that classes are in session."

**3.05 MAINTAINING EXITING DURING CONSTRUCTION**

- A. The Contractor will prepare a plan detailing how exiting required by the applicable building code will be maintained during construction. The plan shall indicate temporary construction required to isolate construction equipment, materials, people, dust, fumes, odors, and noise during the construction period. Temporary construction details shall meet code-required fire ratings for separation and corridor enclosure. At a minimum, required exits, temporary stairs, ramps, exit signs, and door hardware shall be provided at all times.

**3.06 MAINTAINING VENTILATION DURING CONSTRUCTION**

- A. The Contractor will prepare a plan detailing how adequate ventilation will be maintained during construction. The plan shall indicate ductwork that must be rerouted, disconnected, or capped in order to prevent contaminants from the construction area from entering the occupied areas of the building. The plan shall also indicate how required ventilation to occupied spaces affected by the construction will be maintained during the project.

**3.07 NOISE ABATEMENT DURING CONSTRUCTION**

- A. Construction and maintenance operations shall not produce noise in excess of 60 dba in occupied spaces or shall be scheduled for times when the building or affected building spaces are not occupied or acoustical abatement measures shall be taken
- B. Noise level measurements (dba) shall be taken with a type 2 sound level meter in the occupied space in a location closest to the source of noise.
- C. Each prime contractor shall have a type 2 sound level meter available on the project site at all times for use by the architect/engineer for the entire duration of the construction project.

**3.08 CONTROL OF CHEMICAL FUMES, GASES AND OTHER CONTAMINANTS DURING CONSTRUCTION**

- A. The contractor shall be responsible for the control of chemical fumes, gases, and other contaminants produced by, including but not limited to, welding, gasoline or diesel engines, roofing, paving, or painting, to ensure they do not enter occupied portions of the building or air intakes.
  - 1. Contractors shall provide a plan indicating how and where welding, gasoline engine, roofing, paving, painting or other fumes will be exhausted from the work site. Contractors shall provide all temporary means to assure that fresh air intakes do not draw in such fumes.
  - 2. If any portion of the work will generate toxic gases that cannot be contained in an isolated area, the work shall be done when school classes and programs are not in session. The contractor shall include costs associated with this requirement in his bid. The building shall be properly ventilated and, the material shall be given proper time, as recommended by the manufacturer, to cure "off-gas" before re-occupancy.
  - 3. The contractor shall maintain all manufacturers' Material Safety Data Sheets (MSDS) at the site for all products used in the project. Copies of the MSDS sheets shall be given to the Architect and to the School District. MSDS sheets shall be provided to anyone who requests them.

**3.09 CONTROL OF OFF-GASSING DURING CONSTRUCTION**

- A. The contractor shall be responsible to ensure that activities and materials which result in "off-gassing" of volatile organic compounds such as glues, paints, furniture, carpeting, wall covering, drapery, etc. are scheduled, cured or ventilated in accordance with manufacturers recommendations before a space can be occupied.
  - 1. Contractor shall provide, in their schedules for work of the construction, proper time for "off-gassing" or volatile organic compounds introduced during construction before occupancy is allowed. Specific attention is warranted for activities including glues, adhesives, paint, furniture, carpeting, wall coverings, and drapery. Manufacturers shall be

REGULATORY REQUIREMENTS  
- NYS EDUCATION  
DEPARTMENT

contacted to obtain information regarding appropriate temperatures and times needed to cure or ventilate the product during use and before safe occupancy of the space can be assured. The contractor shall include the above-mentioned information and shall clearly highlight the information, as part of the shop drawing submittal.

2. Building materials or furnishings which "off-gas" chemical fumes, gases, or other contaminants shall be aired out in a well ventilated heated warehouse before it is brought to the project for installation or, the manufacturer's recommended "off-gassing" periods must be scheduled between installation and use of the space.
3. The contractor shall maintain all manufacturers' Material Safety Data Sheets (MSDS) at the site for all products used in the project. Copies of the MSDS sheets shall be given to the Architect and to the School District. MSDS sheets shall be provided to anyone who requests them.

### 3.10 ASBESTOS-CONTAINING BUILDING MATERIALS

- A. Large and small asbestos abatement projects as defined by 12NYCRR56 shall not be performed while the building is occupied. The term "building", as referenced in this section, means a wing or major section of a building that can be completely isolated from the rest of the building with sealed noncombustible construction. The isolated portion of the building must contain exits that do not pass through the occupied portion and ventilation systems must be physically separated and sealed at the isolation barrier.
- B. Exterior work such as roofing, flashing, siding, or soffit work may be performed on occupied buildings provided proper variances are in place as required, and complete isolation of ventilation systems and at windows is provided. Care must be taken to schedule work so that classes are not disrupted by noise or visual distraction.
- C. For clearance sampling, the air sampling technician shall provide aggressive air sampling per Rule 56 and as follows: First direct the exhaust of a leaf blower, against all walls, ceilings, floors, ledges, and other surfaces in the work area. Continue agitation for at least five minutes per every 1,000 sf of floor space. Following this aggressive agitation, the air-sampling technician shall use at least one 20-inch fan per 10,000 cubic feet of work area space for continuous agitation. The fan shall be operated on low speed and pointed toward the ceiling. Sampling pumps shall be started after the fans are started and stopped before the fans are stopped.
  1. Samples shall be logged on a permanently bound logbook at the laboratory. No whiteout will be used to make corrections.
  2. All lab counts, data and analysis shall be recorded on a lab summary sheet for each sample.
  3. Per the requirements of the New York State Education Department all Final Air Clearance Samples shall be (TEM) Transmission Electron Microscopy methodology.

### 3.11 LEAD-CONTAINING BUILDING MATERIALS

- A. Surfaces that will be disturbed by reconstruction have been tested for the present of lead based paint materials. This information is provided in order that proper measures are taken, to train and protect workers per OSHA regulations. Refer to Division 0 Existing Hazardous Material Information for testing results.
- B. Projects which disturb surfaces that contain lead shall have in the specifications a plan prepared by a certified Lead Risk Assessor or Supervisor which details provisions for occupant protection, worksite preparation, work methods, cleaning and clearance testing which are in general accordance with the HUD Guidelines.

**END OF SECTION 014119**

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**SECTION 014120  
WORK RESTRICTIONS**

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

**1.02 USE OF PREMISES**

- A. Use of Site: Limit use of premises to work in areas indicated. Do not disturb portions of site beyond areas in which the Work is indicated.
  - 1. Owner Occupancy: Allow for Owner occupancy of the entire site and building. The Owner's educational programs shall continue throughout the duration of construction. No work shall be done while school is in session.
  - 2. Driveways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
    - a. Schedule deliveries to minimize use of driveways and entrances.
    - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- B. Use of Existing Building: Maintain existing building in a weathertight condition throughout construction period. Repair damage caused by construction operations. Protect building and its occupants during construction period.

**1.03 OCCUPANCY REQUIREMENTS**

- A. Full Owner Occupancy: Owner will occupy site and existing buildings during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations.
- B. Partial Owner Occupancy: Owner reserves the right to occupy and to place and install equipment in completed areas of all buildings, before Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and partial occupancy shall not constitute acceptance of the total Work.
  - 1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied before Owner occupancy.
  - 2. Obtain a Certificate of Occupancy from authorities having jurisdiction before Owner occupancy.
  - 3. Before partial Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will provide, operate, and maintain mechanical and electrical systems serving occupied portions of building.
  - 4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of building.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION (NOT USED)**

**END OF SECTION 014120**

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**SECTION 014200  
REFERENCES**

**PART 1 GENERAL**

**1.01 KEY DEFINITIONS**

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

**1.02 DEFINITIONS**

- A. Air Handling Unit: A blower or fan used for the purpose of distributing supply air to a room, space or area.
  - B. Approved Agency: An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been approved according to the requirements established in this Section and as required by the Code Official having jurisdiction over this project.
  - C. Architect: Other terms including "Architect/Engineer" and "Engineer" have the same meaning as "Architect".
  - D. Company Field Adviser: An employee of the Company which lists and markets the primary components of the system under the name who is certified in writing by the Company to be technically qualified in design, installation, and servicing of the required products or an employee of an organization certified by the foregoing Company to be technically qualified in design, installation, and servicing of the required products. Personnel involved solely in sales do not qualify.
  - E. Concealed Location: A location that cannot be accessed without damaging permanent parts of the building structure or finish surface. Spaces above, below or behind readily removable panels or doors shall not be considered as concealed.
  - F. Concealed Piping: Piping that is located in a concealed location. (See "concealed location".)
  - G. Connect: A term contraction and unless otherwise specifically noted is to mean "The labor and materials necessary to join or attach equipment, materials or systems to perform the functions intended".
  - H. Drain: Any pipe that carries wastewater or water-borne wastes in a building drainage system.
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- I. Drainage Fittings: Type of fitting or fittings utilized in the drainage system. Drainage fittings are similar to cast-iron fittings, except that instead of having a bell and spigot, drainage fittings are recessed and tapped to eliminate ridges on the inside of the installed pipe.
  - J. Drainage System: Piping within a public or private premise that conveys sewage, rainwater or other liquid wastes to a point of disposal. A drainage system does not include the mains of a public sewer system or a private or public sewage treatment or disposal plant.
    - 1. Building Gravity: A drainage system that drains by gravity into the building sewer.
    - 2. Sanitary: A drainage system that carries sewage and excludes storm, surface and ground water.
    - 3. Storm: A drainage system that carries rainwater, surface water, condensate, cooling water or similar liquid wastes.
  - K. Duct: A tube or conduit utilized for conveying air. The air passages of self-contained systems are not to be construed as air ducts.
  - L. Duct System: A continuous passageway for the transmission of air that, in addition to ducts, includes duct fittings, dampers, plenums, fans and accessory air-handling equipment and appliances.
  - M. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
  - N. Headroom: Minimum clearance between the floor and the underside of the point of lowest installed mechanical construction above. In case of stairways and walkways, the minimum clearance between the step or surface of the walkway and the lowest installed mechanical construction above the stairway or the walkway.
  - O. Include: When used in any form other than "inclusive", is non-limiting and is not intended to mean "all-inclusive."
  - P. Indicated: Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
  - Q. Inspection Certificate: Identification applied on a product by an approved agency containing the name of the manufacturer, the function and performance characteristics, and the name and identification of an approved agency that indicates that the product or material has been inspected and evaluated by an approved agency.
  - R. Installer: An installer is the Contractor or another entity engaged by the Contractor, either as an employee, subcontractor, or contractor of lower tier, to perform a particular construction activity, including installation, erection, application, or similar operations. Installers are required to be experienced in the operations they are engaged to perform.
    - 1. Trades: Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to tradespersons of the corresponding generic name.
    - 2. Assigning Specialists: Certain Sections of the Specifications require that specific construction activities shall be performed by specialists who are recognized experts in those operations. The specialists must be engaged for those activities, and their assignments are requirements over which the Contractor has no option. However, the ultimate responsibility for fulfilling contract requirements remains with the Contractor.
    - 3. This requirement shall not be interpreted to conflict with enforcing building codes and similar regulations governing the Work. It is also not intended to interfere with local trade-union jurisdictional settlements and similar conventions.
  - S. Label: An identification applied on a product by the manufacturer that contains the name of the manufacturer, the function and performance characteristics of the product or material, and the
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name and identification of an approved agency and that indicates that the representative sample of the product or material has been tested and evaluated by an approved agency.

- T. Location:
1. Damp Location: Partially protected locations under canopies, marquees, roofed open porches and like locations, and interior locations subject to moderate degrees of moisture, such as some basements, some barns and some cold-storage warehouses.
  2. Dry Location: A location not normally subject to dampness or wetness. A location classified as dry may be temporarily subject to dampness or wetness, as in the case of a building under construction.
  3. Wet Location: Installations underground or in concrete slabs or masonry in direct contact with the earth and locations subject to saturation with water or other liquids, such as vehicle-washing areas, and locations exposed to weather and unprotected.
- U. Manufacturer's Designation: Identification applied on a product by the manufacturer indicating that a product or material complies with a specified standard or set of rules (see also "Inspection Certificate," "Label" and "Mark").
- V. Mark: An identification applied on a product by the manufacturer indicating the name of the manufacturer and the function of a product or material (see also "Inspection Certificate," "Label" and "Manufacturer's Designation").
- W. Mechanical: Other terms including "HVAC", "Plumbing", "Sprinkler", "Laboratory Equipment", "Food Service Equipment", "Laundry Equipment", and "Refrigeration" have the same meaning as "Mechanical".
- X. Owner: Suffern Central School District
- Y. Piping: This term includes pipe, tube and appurtenant fittings, flanges, valves, traps, hangers and supports.
- Z. Piping, Concealed: Piping built into construction and not accessible without removal of construction Work such as masonry, plaster or other finish material, and piping installed in floors, furred spaces, suspended ceilings, non-walk-in tunnels, conduits, and behind removable panels and cabinet doors.
- AA. Piping, Distribution: Domestic water supply piping, starting with a connection to service piping, and continuing throughout the building to point of connection to equipment and fixture supply piping.
- BB. Piping, Exposed: Piping directly accessible by normal accesses without removal of any construction Work or material.
- CC. Piping, Service: Underground domestic water supply piping with a connection to a water main or supply as noted, and continuing to and into a building and terminating with the exposed fitting inside the building.
- DD. Piping, Tunnel: Piping installed in walk-in or non-walk-in tunnels or conduits up to first shut-off valve inside building.
- EE. Plumbing System: Includes the water supply and distribution pipes; plumbing fixtures and traps; water-treating or water-using equipment; soil, waste and vent pipes; and sanitary and storm sewers and building drains, in addition to their respective connections, devices and appurtenances within a structure or premises.
- FF. Product: As used includes materials, systems and equipment.
- GG. Registered Design Professional: An individual who is a registered architect (RA) in accordance with Article 147 of the New York State Education Law or a licensed professional engineer (PE) in accordance with Article 145 of the New York State Education Law.
- HH. Space, Finished: A space which has a finishing material applied to walls or ceilings, such as paint, plaster, ceramic tile, enamel glazing, face brick, vinyl wall covering, etc. to provide a finished appearance or which will have such finishes applied under a related Contract.
- II. Space, Unfinished: A space which does not meet the definition of a finished space.

- JJ. Special Inspection: Inspection as herein required of the materials, installation, fabrication, erection, or placement of components and connections requiring special expertise to ensure compliance with approved construction documents and referenced standards.
- KK. Steam-Heating Boiler: A boiler operated at pressures not exceeding 15 psi for steam.
- LL. Supplier: Any person or organization who supplies materials or equipment for the work, including that fabricated to a special design.
- MM. Utility: Any gas, steam, water, sanitary sewer, storm sewer, electrical or other such service.
- NN. Water Supply System: The water service pipe, water distribution pipes, and the necessary connecting pipes, fittings, control valves and all appurtenances in or adjacent to the structure or premises.
1. Chilled: Water-cooled by refrigeration.
  2. Cold: Water with at temperature between 33 degrees F and 80 degrees F and which is neither cooled nor heated mechanically.
  3. Domestic: Water for use in buildings, except water used in connection with space heating and space cooling.
  4. High Temperature: Water with a supply water temperature above 350 degrees.
  5. Hot: Water at a temperature greater than or equal to 110°F.

### 1.03 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- C. Conflicting Requirements: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.
1. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.
- D. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

### 1.04 ABBREVIATIONS AND ACRONYMS

A.

|        |                                                                        |
|--------|------------------------------------------------------------------------|
| AA     | Aluminum Association, Inc. (The)                                       |
| AABC   | Associated Air Balance Council                                         |
| AAALAC | Association for Assessment and Accreditation of Laboratory Animal Care |
| AAMA   | American Architectural Manufacturers Association                       |
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|        |                                                                           |
|--------|---------------------------------------------------------------------------|
| AASHTO | American Association of State Highway and Transportation Officials        |
| ACI    | ACI International (American Concrete Institute)                           |
| ACPA   | American Concrete Pipe Association                                        |
| AF&PA  | American Forest & Paper Association                                       |
| AGA    | American Gas Association                                                  |
| AGC    | Associated General Contractors of America (The)                           |
| AHA    | American Hardboard Association (part of CPA)                              |
| AI     | Asphalt Institute                                                         |
| AIA    | American Institute of Architects (The)                                    |
| AISC   | American Institute of Steel Construction                                  |
| AISI   | American Iron and Steel Institute                                         |
| ALSC   | American Lumber Standard Committee, Incorporated                          |
| AMCA   | Air Movement and Control Association International, Inc.                  |
| ANSI   | American National Standards Institute                                     |
| AOSA   | Association of Official Seed Analysts, Inc.                               |
| APA    | Architectural Precast Association                                         |
| APA    | APA - The Engineered Wood Association                                     |
| ARI    | Air-Conditioning & Refrigeration Institute                                |
| ASCE   | American Society of Civil Engineers                                       |
| ASHRAE | American Society of Heating, Refrigerating and Air-Conditioning Engineers |
| ASME   | ASME International                                                        |
| ASSE   | American Society of Sanitary Engineering                                  |
| ASTM   | ASTM International                                                        |
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|-------|-----------------------------------------------------------|
| AWCMA | American Window Covering Manufacturers Association (WCSC) |
| AWI   | Architectural Woodwork Institute                          |
| AWPA  | American Wood-Preservers' Association                     |
| AWS   | American Welding Society                                  |
| AWWA  | American Water Works Association                          |
| BHMA  | Builders Hardware Manufacturers Association               |
| BIA   | Brick Industry Association (The)                          |
| CBM   | Certified Ballast Manufacturers                           |
| CCC   | Carpet Cushion Council                                    |
| CDA   | Copper Development Association                            |
| CISCA | Ceilings & Interior Systems Construction Association      |
| CISPI | Cast Iron Soil Pipe Institute                             |
| CLFMI | Chain Link Fence Manufacturers Institute                  |
| CPA   | Composite Panel Association                               |
| CRI   | Carpet & Rug Institute (The)                              |
| CRSI  | Concrete Reinforcing Steel Institute                      |
| CSI   | Cast Stone Institute                                      |
| CSI   | Construction Specifications Institute (The)               |
| CTI   | Cooling Technology Institute                              |
| DHI   | Door and Hardware Institute                               |
| EIA   | Electronic Industries Alliance                            |
| EIMA  | EIFS Industry Members Association                         |
| EJCDC | Engineers Joint Contract Documents Committee              |
|       |                                                           |

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|--------------|---------------------------------------------------------------|
| EJMA         | Expansion Joint Manufacturers Association, Inc.               |
| ESD          | ESD Association                                               |
| FM Approvals | Factory Mutual Approvals                                      |
| FSA          | Fluid Sealing Association                                     |
| GA           | Gypsum Association                                            |
| GANA         | Glass Association of North America                            |
| GSI          | Geosynthetic Institute                                        |
| HI           | Hydraulic Institute                                           |
| HI           | Hydronics Institute                                           |
| HMMA         | Hollow Metal Manufacturers Association                        |
| HPVA         | Hardwood Plywood & Veneer Association                         |
| ICEA         | Insulated Cable Engineers Association, Inc                    |
| ICRI         | International Concrete Repair Institute, Inc.                 |
| IEC          | International Electrotechnical Commission                     |
| IEEE         | Institute of Electrical and Electronics Engineers, Inc. (The) |
| IESNA        | Illuminating Engineering Society of North America             |
| IENT         | Institute of Environmental Sciences and Technology            |
| IGCC         | Insulating Glass Certification Council                        |
| IGMA         | Insulating Glass Manufacturers Alliance                       |
| ILI          | Indiana Limestone Institute of America, Inc.                  |
| IPCEA        | Insulated Power Cable Engineer Associates                     |
| ISO          | International Organization for Standardization                |
| ISSFA        | International Solid Surface Fabricators Association           |
|              |                                                               |

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|-------|-------------------------------------------------------------------------------|
| ITU   | International Telecommunication Union                                         |
| KCMA  | Kitchen Cabinet Manufacturers Association                                     |
| LEED  | Leadership in Energy and Environmental Design                                 |
|       |                                                                               |
|       |                                                                               |
| MBMA  | Metal Building Manufacturers Association                                      |
| MFMA  | Maple Flooring Manufacturers Association, Inc.                                |
| MFMA  | Metal Framing Manufacturers Association, Inc.                                 |
| MIA   | Marble Institute of America                                                   |
| MPI   | Master Painters Institute                                                     |
| MSS   | Manufacturers Standardization Society of The Valve and Fittings Industry Inc. |
| NAAMM | National Association of Architectural Metal Manufacturers                     |
| NACE  | NACE International                                                            |
| NADCA | National Air Duct Cleaners Association                                        |
| NAIMA | North American Insulation Manufacturers Association                           |
| NCMA  | National Concrete Masonry Association                                         |
| NCPI  | National Clay Pipe Institute                                                  |
| NCTA  | National Cable & Telecommunications Association                               |
| NEBB  | National Environmental Balancing Bureau                                       |
| NECA  | National Electrical Contractors Association                                   |
| NeLMA | Northeastern Lumber Manufacturers' Association                                |
| NEMA  | National Electrical Manufacturers Association                                 |
| NETA  | National Electrical Testing Association                                       |
| NFHS  | National Federation of State High School Associations                         |
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|-------|------------------------------------------------------------------|
| NFPA  | National Fire Protection Association                             |
| NFRC  | National Fenestration Rating Council                             |
| NGA   | National Glass Association                                       |
| NHLA  | National Hardwood Lumber Association                             |
| NLGA  | National Lumber Grades Authority                                 |
| NOFMA | NOFMA: The Wood Flooring Manufacturers Association               |
| NRCA  | National Roofing Contractors Association                         |
| NRMCA | National Ready Mixed Concrete Association                        |
| NSF   | NSF International (National Sanitation Foundation International) |
| NSSGA | National Stone, Sand & Gravel Association                        |
| NTMA  | National Terrazzo & Mosaic Association, Inc. (The)               |
| NWWDA | National Wood Window and Door Association (WDMA)                 |
| PCI   | Precast/Prestressed Concrete Institute                           |
| PDCA  | Painting & Decorating Contractors of America                     |
| PDI   | Plumbing & Drainage Institute                                    |
| PGI   | PVC Geomembrane Institute                                        |
| PTI   | Post-Tensioning Institute                                        |
| RCSC  | Research Council on Structural Connections                       |
| RFCI  | Resilient Floor Covering Institute                               |
| SAE   | SAE International                                                |
| SDI   | Steel Deck Institute                                             |
| SDI   | Steel Door Institute                                             |
| SEFA  | Scientific Equipment and Furniture Association                   |
|       |                                                                  |

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|----------|----------------------------------------------------------------------|
| SEI/ASCE | Structural Engineering Institute/American Society of Civil Engineers |
| SGCC     | Safety Glazing Certification Council                                 |
| SIA      | Security Industry Association                                        |
| SIGMA    | Sealed Insulating Glass Manufacturers Association                    |
| SJI      | Steel Joist Institute                                                |
| SMA      | Screen Manufacturers Association                                     |
| SMACNA   | Sheet Metal and Air Conditioning Contractors' National Association   |
| SPIB     | Southern Pine Inspection Bureau (The)                                |
| SPRI     | Single Ply Roofing Industry                                          |
| SSINA    | Specialty Steel Industry of North America                            |
| SSPC     | SSPC: The Society for Protective Coatings                            |
| STI      | Steel Tank Institute                                                 |
| SWRI     | Sealant, Waterproofing, & Restoration Institute                      |
| TCA      | Tile Council of America, Inc.                                        |
|          |                                                                      |
|          |                                                                      |

#### 1.05 FEDERAL GOVERNMENT AGENCIES:

- A. Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

|      |                                    |
|------|------------------------------------|
| CE   | Army Corps of Engineers            |
| CPSC | Consumer Product Safety Commission |
| DOC  | Department of Commerce             |
| DOD  | Department of Defense              |
| DOE  | Department of Energy               |
| EPA  | Environmental Protection Agency    |
|      |                                    |

|      |                                                |
|------|------------------------------------------------|
| FAA  | Federal Aviation Administration                |
| FCC  | Federal Communications Commission              |
| FDA  | Food and Drug Administration                   |
| GSA  | General Services Administration                |
| HUD  | Department of Housing and Urban Development    |
| NIST | National Institute of Standards and Technology |
| OSHA | Occupational Safety & Health Administration    |
| PHS  | Office of Public Health and Science            |
| SD   | State Department                               |
| TRB  | Transportation Research Board                  |
| USDA | Department of Agriculture                      |
| USPS | Postal Service                                 |

- B. Codes, Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list.

|         |                                                                |
|---------|----------------------------------------------------------------|
| ADAAG   | Americans with Disabilities Act (ADA) Accessibility Guidelines |
| BCNYS   | Building Code of New York State                                |
| CFR     | Code of Federal Regulations                                    |
| DOD     | Department of Defense Military Specifications and Standards    |
| FS      | Federal Specification                                          |
| MILSPEC | Military Specification and Standards                           |

#### 1.06 NEW YORK STATE GOVERNMENT AGENCIES:

- A. Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

|       |                                              |
|-------|----------------------------------------------|
| DASNY | Dormitory Authority of the State of New York |
| DEC   | Department of Environmental Conservation     |

|        |                                                               |
|--------|---------------------------------------------------------------|
| DHCR   | Division of Housing and Community Renewal                     |
| DOH    | Department of Health                                          |
| NYSDOL | New York State Department of Labor                            |
| DOS    | Department of State                                           |
| DOT    | Department of Transportation                                  |
| NYSPA  | New York State Power Authority                                |
| OGS    | Office of General Services                                    |
| OCFS   | Office of Children and Family Services                        |
| OMRD   | Office of Mental Retardation and Developmental Disabilities   |
| OPRHP  | Office of Parks, Recreation and Historic Preservation         |
| NYSED  | New York State Education Department (Department of Education) |
| SHPO   | State Historic Preservation Office                            |
| SUCF   | State University Construction Fund                            |
| SUNY   | State University of New York                                  |

#### 1.07 NEW YORK STATE CODES

- A. Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.
  1. BCNYS Building Code of New York State
  2. 9-NYCRR New York State Dept. of Labor Title 9 State Building Code
  3. 10-NYCRR New York State Dept. of Labor Title 10 State Hospital Code
  4. 19-NYCRR Charter XXXIII, Sub Charter A, Uniform Fire Prevention and Building Code
- B. Where these abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.
  1. BCNYS Building Code of New York State
  2. ECCNYS Energy Conservation Code of New York State
  3. PCNYS Plumbing Code of New York State of New York State
  4. MCNYS Mechanical Code of New York State
  5. FGCNYS Fuel Gas Code of New York State
  6. FCNYS Fire Code of New York State

#### 1.08 OTHER TERMS OR ACRONYMS:

- A. Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name in the following list.

- 
1. Asbestos Containing Materials
  2. Acoustical Tile
  3. Infection Control Risk Assessment
  4. Resilient Vinyl Tile
  5. Suspended Acoustical Tile
  6. Spray on Fire Resistive Materials
  7. Thermal Systems Insulation
  8. Vinyl Asbestos Tile
  9. Vinyl Composition Tile

**1.09 OTHER TERMS OR ACRONYMS:**

- A. Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name in the following list.
  - a. Asbestos Containing Materials
  - b. Acoustical Tile
  - c. Infection Control Risk Assessment
  - d. Resilient Vinyl Tile
  - e. Suspended Acoustical Tile
  - f. Spray on Fire Resistive Materials
  - g. Thermal Systems Insulation
  - h. Vinyl Asbestos Tile
  - i. Vinyl Composition Tile

**PART 2 PRODUCTS (NOT APPLICABLE)**

**PART 3 EXECUTION (NOT APPLICABLE)**

**END OF SECTION 014200**

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STATEMENT OF SPECIAL  
INSPECTIONS AND TESTS  
COVER

**SECTION 014534**  
**STATEMENT OF SPECIAL INSPECTIONS AND TESTS COVER**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Attached is NYS Education Department Statement of Special Inspections and Tests.
  - 1. The document is provided for the Contractor's reference.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION (NOT USED)**

**END OF SECTION 014534**

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**SECTION 015000**  
**TEMPORARY FACILITIES AND CONTROLS****PART 1 GENERAL****1.01 SUMMARY**

- A. This Section includes requirements for temporary facilities and controls, including temporary utilities, support facilities, and security and protection.
- B. Temporary utilities include, but are not limited to, the following:
  - 1. Water service and distribution.
  - 2. Temporary electric power and light.
  - 3. Temporary heat.
  - 4. Ventilation and Humidity Control
  - 5. Telephone service.
  - 6. Sanitary facilities, including drinking water.
  - 7. Storm and sanitary sewer.
- C. Support facilities include, but are not limited to, the following:
  - 1. Field offices and storage containers.
  - 2. Temporary roads and paving.
  - 3. Dewatering facilities and drains.
  - 4. Temporary partitions and enclosures.
  - 5. Hoists and temporary elevator use.
  - 6. Temporary project identification sign and project signage.
  - 7. Waste disposal services and dumpsters.
  - 8. Construction aids and miscellaneous services and facilities.
- D. Security and protection facilities include, but are not limited to, the following:
  - 1. Temporary fire protection.
  - 2. Barricades, warning signs, and lights.
  - 3. Tree and plant protection.
  - 4. Security enclosure and lockup.
  - 5. Temporary enclosures.
  - 6. Temporary partitions.
  - 7. Sidewalk Bridge for maintaining legal exits.
  - 8. Enclosure fence for the work site.
  - 9. Environmental protection.
- E. Related Sections:
  - 1. Division 01 Section "Summary" for work restrictions and limitations on utility interruptions.

**1.02 INFORMATIONAL SUBMITTALS**

- A. Temporary Utilities: The contractor shall submit reports of tests, inspections, meter readings, and similar procedures performed on temporary utilities.
  - B. Implementation and Termination Schedule: Within 15 days of the date established for submittal of the Contractor's Construction Schedule, the contractor shall submit a schedule indicating implementation and termination of each temporary utility for which the Contractor is responsible.
  - C. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.
  - D. Erosion and Sedimentation-Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent
  - E. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention
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program.

- F. Moisture-Protection Plan: Describe procedures and controls for protecting materials and construction from water absorption and damage, including delivery, handling, and storage provisions for materials subject to water absorption or water damage, discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water damaged Work.
  - 1. Describe delivery, handling, and storage provisions for materials subject to water absorption or water damage.
  - 2. Indicate procedures for discarding water-damaged materials, protocols for mitigating water intrusion into completed Work, and replacing water-damaged Work.
  - 3. Indicate sequencing of work that requires water, such as sprayed fire-resistive materials, plastering, and terrazzo grinding, and describe plans for dealing with water from these operations. Show procedures for verifying that wet construction has dried sufficiently to permit installation of finish materials.
- G. Dust-Control and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust-control and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:
  - 1. Locations of dust-control partitions at each phase of the work.
  - 2. HVAC system isolation schematic drawing.
  - 3. Location of proposed air filtration system discharge.
  - 4. Other dust-control measures.
  - 5. Waste management plan.
- H. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

### 1.03 DEFINITIONS

- A. Temporary Enclosure: As determined by Architect, temporary roofing is complete, insulated, all exterior wall openings are closed with temporary closures.
- B. Permanent Enclosure: As determined by Architect, permanent roofing is complete, insulated, and weather tight; exterior walls are insulated and weather tight; and all openings are closed with permanent construction or substantial temporary closures.
- C. Temporary Facilities: Construction, fixtures, fittings, and other built items required to accomplish the work but which are not incorporated into the finished work.
- D. Temporary Utilities: A type of temporary facility, primary sources of electric power, water, natural gas supply, etc., obtained from public utilities, other main distribution systems, or temporary sources constructed for the project, but not including the fixtures and equipment served.
- E. Temporary Services: Activities required during construction, which do not directly accomplish the work.

### 1.04 QUALITY ASSURANCE

- A. Regulations: The contractor shall comply with industry standards and with applicable laws and regulations of authorities having jurisdiction including, but not limited to, the following:
  - 1. Building code requirements.
  - 2. Health and safety regulations.
  - 3. Utility company regulations.
  - 4. Police, fire department and rescue squad rules.
  - 5. Environmental protection regulations.

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- B. Standards: The Contractor shall comply with NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations," ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition," and NECA Electrical Design Library "Temporary Electrical Facilities."
  - C. Trade Jurisdictions: Assigned responsibilities for installation and operation of temporary utilities are not intended to interfere with the normal application of trade regulations and union jurisdictions.
  - D. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.
  - E. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

#### **1.05 USE CHARGES**

- A. General: Installation, and removal of, and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Architect, testing agencies, and authorities having jurisdiction.
  - 1. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.
  - 2. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.
  - 3. Gas Service from Existing System: Gas Service from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.
- B. Cost or use charges for temporary facilities are not chargeable to the Owner or the Architect. The Architect will not accept a prime contractor's cost or use charges for temporary services or facilities as a basis of claim for an adjustment in the Contract Sum or the Contract Time.
- C. Other entities using temporary services and facilities include, but are not limited to, the following:
  - 1. Other nonprime contractors.
  - 2. The Owner's work forces.
  - 3. Occupants of the Project.
  - 4. The Architect.
  - 5. Testing agencies.
  - 6. Personnel of government agencies.

#### **1.06 PROJECT CONDITIONS**

- A. Temporary Utilities: The contractor shall prepare a schedule indicating dates for implementation and termination of each temporary utility for which the Contractor is responsible. At the earliest feasible time, when acceptable to the Owner, change over from use of temporary service to use of permanent service.
  - B. Conditions of Use: Keep temporary services and facilities clean. Operate in a safe and efficient manner. Relocate temporary services and facilities as the Work progresses. Do not overload facilities or permit them to interfere with progress. Take necessary fire-prevention measures. Do not allow hazardous, dangerous, or unsanitary conditions, or public nuisances to develop or persist on-site.
  - C. Temporary Use of Permanent Facilities: If the Owner permits temporary use of the permanent facilities the Installer of each permanent service shall assume responsibility for its operation, maintenance, and protection during use as a construction facility prior to the Owner's
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acceptance, regardless of previously assigned responsibilities.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

- A. Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts with 1-5/8-inch- OD top rails.
- B. Portable Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet high with galvanized-steel pipe posts; minimum 2-3/8-inch- OD line posts and 2-7/8-inch- OD corner and pull posts, with 1-5/8-inch- OD top and bottom rails.
- C. General: The contractor shall provide new materials. If acceptable to the Architect, undamaged, previously used materials in serviceable condition may be used. Provide materials suitable for use intended.
- D. Lumber and Plywood: Comply with requirements in Division 6 Section "Rough Carpentry."
  - 1. For signs and directory boards, provide exterior-type, Grade B-B high-density concrete form overlay plywood of sizes and thicknesses indicated.
  - 2. For fences and vision barriers, provide minimum 3/8-inch- thick exterior plywood.
  - 3. For safety barriers, sidewalk bridges, and similar uses, provide minimum 5/8-inch thick exterior plywood.
- E. Gypsum Wallboard: Provide 5/8 type x gypsum wallboard on interior walls of temporary offices or temporary partitions.
- F. Roofing Materials: Provide UL Class A roofing materials on roofs of job-built temporary offices, shops, and sheds.
- G. Paint: Comply with requirements of Division 9 Section "Painting."
- H. Tarpaulins: Provide waterproof, fire-resistant, UL-labeled tarpaulins with flame-spread rating of 15 or less. For temporary enclosures, provide translucent, nylon-reinforced, laminated polyethylene or polyvinyl chloride, fire-retardant tarpaulins.
- I. Water: Provide potable water approved by local health authorities.
- J. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.
- K. Dust-Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60 inches.
- L. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

### **2.02 TEMPORARY FACILITIES**

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
  - B. Common-Use Field Office (if needed for the Owner, Architect or Construction Manager): Of sufficient size to accommodate needs of user and construction personnel office activities and to accommodate project meetings specified in other Division 01 Sections. Keep office clean and orderly. Furnish and equip offices as follows:
    - 1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
    - 2. Conference room of sufficient size to accommodate meetings of 15 individuals. Provide electrical power service and 120-V ac duplex receptacles, with not less than 1 receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- square tack and marker boards.
    - 3. Drinking water and private toilet.
    - 4. Coffee machine and supplies.
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5. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F.
  6. Lighting fixtures capable of maintaining average illumination of 20 fc at desk height.
- C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations. Coordinate with Owner if use of existing building for storage and protection of materials is to be incorporated into Project.
1. Store combustible materials apart from building.

### 2.03 EQUIPMENT

- A. General: The contractor shall provide new equipment. If acceptable to the user, undamaged, previously used equipment in serviceable condition may be used. Provide equipment suitable for use intended.
- B. Water Hoses: Provide 3/4-inch heavy-duty, abrasion-resistant, flexible rubber hoses 100 feet long, with pressure rating greater than the maximum pressure of the water distribution system. Provide adjustable shutoff nozzles at hose discharge.
- C. Electrical Outlets: Provide properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-V plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button, and pilot light for connection of power tools and equipment.
- D. Electrical Power Cords: Provide grounded extension cords. Use hard-service cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.
- E. Lamps and Light Fixtures: Provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered-glass enclosures, where exposed to breakage. Provide exterior fixtures where exposed to moisture.
- F. Heating Units: Provide temporary heating units that have been tested and labeled by UL, FM, or another recognized trade association related to the type of fuel being consumed.
- G. Temporary Toilet Units: Provide self-contained, single-occupant toilet units of the chemical, aerated recirculation, or combustion type. Provide units properly vented and fully enclosed with a glass-fiber-reinforced polyester shell or similar nonabsorbent material.
- H. Fire Extinguishers: Provide hand-carried, portable, UL-rated, Class A fire extinguishers for temporary offices and similar spaces. In other locations, provide hand-carried, portable, UL-rated, Class ABC, dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for the exposures.
1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.
- I. HVAC Equipment: If temporary heat will be needed after building enclosure: Upon Building enclosure or unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
  2. Heating Units: Listed and labeled for type of fuel being consumed, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
  3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return air grille in system and remove at end of construction and clean HVAC system as required in Division 01 Section "Closeout Procedures".
  4. Air Filtration Units: HEPA primary and secondary filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.



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**PART 3 EXECUTION****3.01 INSTALLATION, GENERAL**

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

**3.02 TEMPORARY UTILITY INSTALLATION**

- A. General: Engage the appropriate local utility company to install temporary service or connect to existing service. Where the company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with company recommendations.
    - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
    - 2. Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.
    - 3. Obtain easements to bring temporary utilities to the site where the Owner's easements cannot be used for that purpose.
  - B. Use qualified personnel for installation of temporary facilities. Locate facilities where they will serve the Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required.
  - C. The contractor shall provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.
  - D. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
    - 1. Connect temporary sewers to sewage disposal systems as directed by authorities having jurisdiction.
  - E. Sewers and Drainage: If sewers are available, provide temporary connections to remove effluent that can be discharged.
    - 1. Filter out excessive amounts of soil, construction debris, chemicals, oils, and similar contaminants that might clog sewers or pollute waterways before discharge.
    - 2. Connect temporary sewers to the municipal system as directed by sewer department officials.
    - 3. Maintain temporary sewers and drainage facilities in a clean, sanitary condition. Following heavy use, restore normal conditions promptly.
  - F. Sanitary Facilities: The General Contractor will provide temporary toilets for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
    - 1. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy. Use of pit-type privies will not be permitted.
    - 2. Provide toilet tissue, paper towels, paper cups, and similar disposable materials for each facility. Provide covered waste containers for used material.
  - G. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
  - H. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.
  - I. Temporary Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics at each building addition and maintain them during construction period. Include overload-protected
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disconnects, automatic ground-fault interrupters.

1. Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
  2. Install electric power service underground, except where overhead service must be used.
  3. Power Distribution System: Install wiring overhead and rise vertically where least exposed to damage. Where permitted, wiring circuits not exceeding 125 V, ac 20 ampere rating, and lighting circuits may be nonmetallic-sheathed cable where overhead and exposed for surveillance.
  4. Provide temporary power in the areas of renovation where the existing receptacles have been removed and the proximity to power source exceeds 50'.
- J. Temporary Lighting: When an overhead floor or roof deck has been installed, provide temporary lighting with local switching.
1. Install and operate temporary lighting that will fulfill security and protection requirements without operating the entire system. Provide temporary lighting that will provide adequate illumination for construction operations and traffic conditions.
  2. Operate temporary lighting that will fulfill security and protection requirements without operating the entire system. Provide temporary lighting that will provide adequate illumination for construction operations and traffic conditions.
    - a. Security lighting for building exteriors shall be continuously operational and maintained.
    - b. Temporary lighting shall be maintained in accordance with OSHA standards for power and foot candle levels in all areas while workers occupy the space.
  3. Provide temporary lighting in the areas of renovation where the existing fixtures have been removed and the new lighting has not been installed.
- K. Temporary Heating: Provide temporary heating required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Coordinate ventilation requirements to produce the ambient condition required and minimize energy consumption. Direct fired propane or Kerosene salamanders will not be permitted.
1. Temporary Heat: Provide temporary heat in all existing areas that are under construction and/or have their permanent heat temporarily or permanently shut off for construction reasons.
  2. Provide temporary heat in all new construction areas as soon as each area of new construction is fully enclosed: walls, temporary roofs, and either windows and doors or temporary windows and doors.
  3. Temporary heat provided shall be sufficient to maintain all areas of new, fully enclosed construction (and renovated areas of existing construction that, due to construction, are temporarily without permanent heat), including concealed ceiling or chase spaces, to a minimum 500F, 24 hours a day, in winter weather as cold as 150F outside.
  4. Temporary heat must not damage any materials, new or existing, within or without the Project limits, on school property, nor shall it cause noxious odors or fumes or some other nuisance.
  5. Temporary heat must be installed, operated, maintained, and dismantled in a safe, legal manner.
  6. Provide adequate ventilation as required by Codes and labor laws in all areas of Project limits as part of the work of this Section.
- L. Heating Facilities: Except where the Owner authorizes use of the permanent system, provide vented, indirect fired, self-contained, LP-gas or fuel oil heaters with individual space thermostatic control.
1. Use of direct-fired Kerosene-burning space heaters, open flame, or salamander-type heating units is prohibited.
  2. Protect all permanent equipment put into services from dust, dust infiltration and soiling by installing filtering media at each supply and return outlet. Filters shall be changed in all air
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handling equipment including unit vents prior to owner occupancy. Failure to provide the necessary protection to the equipment may result in the contractor to be charged to clean the equipment and associated ductwork.

- M. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
    - 1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.
  - N. Drinking-Water Facilities: The Contractor shall provide containerized, tap-dispenser, bottled-water drinking-water units, including paper cup supply.
  - O. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
    - 1. Prior to commencing work, isolate the HVAC system in area where work is to be performed in accordance with approved coordination drawings.
      - a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
      - b. Maintain negative air pressure within work area using HEPA-equipped air filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
    - 2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust containment devices.
    - 3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.
  - P. Telephone Service: Where Cellular Phone communications are not provided for or not possible, provide a temporary telephone service in common-use facilities for use by all construction personnel.
    - 1. At each telephone or office, post a list of important telephone numbers.
      - a. Police and fire departments.
      - b. Ambulance service.
      - c. Contractor's home office.
      - d. Contractor's emergency after-hours telephone number.
      - e. Architect's office.
      - f. Engineers' offices.
      - g. Owner's office.
      - h. Principal subcontractors' field and home offices.
    - 2. Provide superintendent with cellular telephone or if cellular communication are not possible a portable two-way radio for use when away from field office.
  - Q. Electronic Communications Service: Provide wireless or hardwired ethernet connection with a 5-port hub/router to field office of the Owner/ Architect or CM.
  - R. Provide a desktop computer in the primary field office adequate for use by Architect and Owner to access project electronic documents and maintain electronic communications. Equip computer with not less than the following:
    - 1. Network Connectivity: 10/100BaseT Ethernet.
    - 2. Operating System: Microsoft Windows 10 Professional.
    - 3. Productivity Software:
      - a. Microsoft Office Professional,
      - b. Adobe Reader 9.0 or higher.
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4. Printer: "All-in-one" unit equipped with printer server, combining color printing, photocopying, scanning, and faxing, or separate units for each of these 3 functions.
  5. Internet Service: Broadband modem, router and ISP, equipped with hardware firewall, providing minimum 2mb upload and 10 Mbps download speeds at each computer.
  6. Internet Security: Integrated software, providing software firewall, virus, spyware, phishing and spam protection in a combined application.
  7. Backup: External hard drive, minimum 120 gigabyte, with automated backup software providing daily backups.

### 3.03 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
    1. Provide construction for temporary offices, shops, and sheds located within construction area or within 30 feet of building lines that is noncombustible according to ASTM E 136. Comply with NFPA 241.
    2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
    3. Locate field offices, storage trailers, sanitary facilities, and other temporary construction and support facilities for easy access.
    4. Maintain support facilities until near Substantial Completion. Remove prior to Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to the Owner.
  - B. Temporary Roads and Paved Areas: Provide temporary roads and paved areas as required to accommodate the work. Coordinate location of same with the Owner.
    1. Construct and maintain temporary roads and parking areas to support the indicated (H-20 minimum) loading adequately and to withstand exposure to traffic during the construction period.
    2. Temporary Roads and Parking areas: Use granular materials that will support the intended loading and traffic and maintain the areas throughout the construction period.
    3. Extend temporary roads in and around the construction area as necessary to accommodate delivery and storage of materials, equipment usage, administration, and supervision.
    4. Provide dust-control treatment that is nonpolluting and non-tracking. Reapply treatment as required to minimize dust.
  - C. Traffic Controls: Comply with requirements of authorities having jurisdiction.
    1. Protect existing site improvements to remain including curbs, pavement, and utilities.
    2. Maintain access for fire-fighting equipment and access to fire hydrants.
  - D. Temporary Parking: **Use designated areas of Owner's existing** parking areas for construction personnel.
  - E. Temporary Parking/Staging and Access Roads
    1. Provide access for suitable parking areas. Re-grade and re-seed any areas disturbed by parking/ staging.
    2. Parking Areas: Includes contractors' employees and construction vehicle parking. Minimum of 6-inch reference Item. #304.3 course.
    3. Access Roads: Includes access roads for delivery through staging area to building work areas, and to equipment and storage areas and sheds. Minimum of 10-foot wide, 9-inch reference Item. #304.3 course.
    4. Traffic Regulations:
      - a. Access through Owner's entrances shall be limited
      - b. Utilize only entrances/temporary roads as designated
      - c. Maintain all site traffic regulations
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- F. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
    - 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
    - 2. Remove snow and ice as required to minimize accumulations.
  - G. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with Division 01 Section "Execution" for progress cleaning requirements.
  - H. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
    - 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
  - I. Temporary Elevator Use: Use of elevators is not permitted.
  - J. Existing Elevator Use: Use of Owner's existing elevators will be permitted, provided elevators are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore elevators to condition existing before initial use, including replacing worn cables, guide shoes, and similar items of limited life.
    - 1. Do not load elevators beyond their rated weight capacity.
    - 2. Provide protective coverings, barriers, devices, signs, or other procedures to protect elevator car and entrance doors and frame. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work so no evidence remains of correction work. Return items that cannot be refinished in field to the shop, make required repairs and refinish entire unit, or provide new units as required.
  - K. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.
  - L. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.
    - 1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas so no evidence remains of correction work.
  - M. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.
  - N. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
    - 1. Identification Signs: Provide Project identification signs as indicated on Drawings.
      - a. See example project Identification sign following this section.
    - 2. Warning and regulatory signage provide as required to protect from hazards and as required by authorities having jurisdiction.
    - 3. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
      - a. Provide temporary, directional signs for construction personnel and visitors.
    - 4. Maintain and touch up signs, so they are legible.

### **3.04 SECURITY AND PROTECTION FACILITIES INSTALLATION**

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
  - B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
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1. Comply with work restrictions specified in Division 01 Section "Summary."
- C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways.
1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant- protection zones.
  2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
  3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from the project site during the course of the project.
  4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- E. Temporary Site Lighting: Install exterior yard and sign lights so signs are visible when Work is being performed.
- F. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
- G. Enclosure Fence: When excavation begins the contractor will install an enclosure fence with lockable entrance gates. Install in a manner that will prevent the public and animals from easily entering the site, except by the entrance gates.
1. Provide open-mesh, 6' high chain link fence with posts.
  2. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
  3. Provide min. 2 double swing access gates and man gates. Each gate is to have a chain and padlock.
  4. Provide (2) keys for each lock to the Owner.
  5. Remove fence as soon as practicable.
- H. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Obtain extended warranty for Owner. Perform control operations lawfully, using environmentally safe materials.
- I. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- J. Project Identification and Temporary Signs: Prepare Project identification and other signs in sizes indicated. Install signs where indicated to inform public and persons seeking entrance to Project. Do not permit installation of unauthorized signs.
1. Engage an experienced sign painter to apply graphics for Project identification signs. Comply with details indicated.
  2. Prepare temporary signs to provide directional information to construction personnel and visitors.
  3. Construct signs of exterior-type Grade B-B high-density concrete form overlay plywood. Support on posts or framing of preservative-treated wood or steel.
    - a. Size: 4-feet by 8-feet by 3/4-inch thick.
  4. Paint sign panel and applied graphics with exterior-grade alkyd gloss enamel over exterior primer.
  5. See Example Project Sign at the end of this section
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- K. Temporary Signs: Prepare signs to provide directional information to construction personnel and visitors for each site. Unauthorized signs are not permitted.
1. For construction traffic control/flow at entrances/exits, as designated by the Owner.
  2. For warning signs as required
  3. Per OSHA standards as necessary
  4. For trailer identification
  5. For "No Smoking" safe work site at multiple locations.
- L. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- M. Covered Walkway: Erect protective, covered walkway for passage of individuals through or adjacent to Project site. Coordinate with entrance gates, other facilities, and obstructions. Comply with regulations of authorities having jurisdiction and requirements indicated on Drawings.
1. Construct covered walkways using scaffold or shoring framing.
  2. Provide overhead decking, protective enclosure walls, handrails, barricades, warning signs, exit signs, lights, safe and well-drained walkways, and similar provisions for protection and safe passage.
  3. Paint and maintain appearance of walkway for duration of the Work.
- N. Temporary Enclosures: Provide temporary enclosure for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities.
1. Where heat is needed and the permanent building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.
  2. Install tarpaulins securely, with incombustible wood framing and other materials. Close openings of 25 sq. ft. or less with plywood or similar materials.
  3. Close openings through floor or roof decks and horizontal surfaces with load-bearing, wood-framed construction.
  4. Where temporary wood or plywood enclosure exceeds 100 sq. ft. in area, use UL labeled, fire-retardant-treated material for framing and main sheathing.
- O. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner and tenants from fumes and noise.
1. Temporary partitions shall be installed at all openings where additions connect to existing buildings, and where required to protect areas, spaces, property, personnel, building occupants; to separate and control dust, debris, noise, access, sight, fire areas, safety and security.
  2. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
  3. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant-treated plywood on construction operations side.
  4. Insulate partitions to control noise transmission to occupied areas.
  5. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
  6. Protect air-handling equipment.
  7. Provide walk-off mats at each entrance through temporary partition.
- P. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.
1. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be
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- followed. Instruct personnel in methods and procedures. Post warnings and information.
  2. Prohibit smoking in construction areas.
  3. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.
  4. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for fighting fires. Prohibit smoking in hazardous fire-exposure areas.
  5. Store combustible materials in containers in fire-safe locations
  6. Provide supervision of welding operations, combustion-type temporary heating units, and similar sources of fire ignition.
- Q. Security Enclosure and Lockup: Install substantial temporary enclosure of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft and similar violations of security.
1. Storage: Where materials and equipment must be stored, and are of value or attractive for theft, provide a secure lockup. Coordinate with the installation and release of material to minimize the opportunity for theft and vandalism.

### 3.05 MOISTURE AND MOLD CONTROL

- A. Contractor's Moisture-Protection Plan: Provide written plan for addressing any trapping of water in finished work. Document all visible signs of mold that may appear during construction. Protect stored materials and installed Work in accordance with Moisture and Mold Protection Plan.
  - B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
    1. Protect porous materials from water damage.
    2. Protect stored and installed material from flowing or standing water.
    3. Keep porous and organic materials from coming into prolonged contact with concrete.
    4. Remove standing water from decks.
    5. Keep deck openings covered or dammed.
  - C. Partially Enclosed Construction Phase: After installation of weather barriers but before Permanent Enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
    1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
    2. Keep interior spaces reasonably clean and protected from water damage.
    3. Periodically collect and remove waste containing cellulose or other organic matter.
    4. Discard or replace water-damaged material.
    5. Do not install material that is wet.
    6. Discard, replace or clean stored or installed material that begins to grow mold.
    7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.
  - D. Controlled Construction Phase of Construction: After completing and sealing of the permanent building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
    1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
    2. The Contractor is to provide temporary dehumidification and ventilation until the building systems are operational and the spaces are substantially completed.
    3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
      - a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective.
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- b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record daily readings over a forty-eight hour period. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
- c. Remove materials that cannot be completely restored to their manufactured moisture level in 48 hours.

### **3.06 OPERATION, TERMINATION, AND REMOVAL**

- A. Supervision: Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.
- B. Maintenance: Maintain facilities in good operating condition until removal.
  - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
  - 2. Protection: Prevent water-filled piping from freezing. Maintain markers for underground lines. Protect from damage during excavation operations.
- C. Operate Project-identification-sign lighting daily from dusk until 12:00 midnight.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
  - 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
  - 2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
- E. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures."

**END OF SECTION 015000**

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**SECTION 016000  
PRODUCT REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

**1.02 DEFINITIONS**

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
  - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature that is current as of date of the Contract Documents.
  - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
  - 3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

**1.03 ACTION SUBMITTALS**

- A. Submit submittals as required per each individual specification section.

**1.04 QUALITY ASSURANCE**

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
  - 1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
  - 2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

**1.05 PRODUCT DELIVERY, STORAGE, AND HANDLING**

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
  - 1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
  - 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
  - 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.

4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.
- C. Storage:
  1. Store products to allow for inspection and measurement of quantity or counting of units.
  2. Store materials in a manner that will not endanger Project structure.
  3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
  4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
  5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
  6. Protect stored products from damage and liquids from freezing.
  7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

#### **1.06 PRODUCT WARRANTIES**

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
  1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
  2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
  1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
  2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
  3. See other Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Section 017700 "Closeout Procedures."

### **PART 2 PRODUCTS**

#### **2.01 PRODUCT SELECTION PROCEDURES**

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
  1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
  2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
  3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
  4. Where products are accompanied by the term "as selected," Architect will make selection.
  5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
  6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
- B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
  2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
  3. Products:
    - a. Non-restricted List: Where Specifications include a list of names of available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with substitution requirements for consideration of an unnamed product.
  4. Manufacturers:
    - a. Non-restricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with substitution requirements for consideration of an unnamed manufacturer's product.
  5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with substitution requirements for consideration of an unnamed product by one of the other named manufacturers.
- C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
1. If no product is available within specified category matches and complies with other specified requirements, comply with requirements in Section 012500 "Substitution Procedures" for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

## **2.02 EQUIVALENT PRODUCTS**

- A. Conditions for Consideration: Architect will consider Contractor's request for equivalent product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:
1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
  2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
  3. Evidence that proposed product provides specified warranty.
  4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
  5. Samples.
- B. Refer to specification section 012519 Equivalents for additional equivalent product requirements required to be furnished by the contractor.

## **PART 3 EXECUTION (NOT USED)**

**END OF SECTION 016000**

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**SECTION 017300  
EXECUTION**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
  - 1. Construction layout.
  - 2. Field engineering and surveying.
  - 3. Installation of the Work.
  - 4. Cutting and patching.
  - 5. Coordination of Owner-installed products.
  - 6. Progress cleaning.
  - 7. Starting and adjusting.
  - 8. Protection of installed construction.

**1.02 DEFINITIONS**

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

**1.03 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For land surveyor, professional engineer, etc. licensed to practice in New York State.
- B. Certificates: Submit certificate signed by land surveyor certifying that location and elevation of improvements comply with requirements.
- C. Cutting and Patching Plan: Submit plan describing procedures at least **10** days prior to the time cutting and patching will be performed. Include the following information:
  - 1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
  - 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
  - 3. Products: List products to be used for patching and firms or entities that will perform patching work.
  - 4. Dates: Indicate when cutting and patching will be performed.
  - 5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
    - a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.
- D. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

**1.04 QUALITY ASSURANCE**

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.
- B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
  - 1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding.



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- Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include the following:
    - a. Primary operational systems and equipment.
    - b. Fire separation assemblies.
    - c. Air or smoke barriers.
    - d. Fire-suppression systems.
    - e. Mechanical systems piping and ducts.
    - f. Control systems.
    - g. Communication systems.
    - h. Fire-detection and -alarm systems.
    - i. Conveying systems.
    - j. Electrical wiring systems.
    - k. Operating systems of special construction.
  3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, or that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:
    - a. Water, moisture, or vapor barriers.
    - b. Membranes and flashings.
    - c. Exterior curtain-wall construction.
    - d. Sprayed fire-resistive material.
    - e. Equipment supports.
    - f. Piping, ductwork, vessels, and equipment.
    - g. Noise- and vibration-control elements and systems.
  4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

- A. General: Comply with requirements specified in other Sections.
  - B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
    1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.
  - C. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
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## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems, and other construction affecting the Work.
  - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.
  - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
  - 1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
  - 2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
  - 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
  - 1. Description of the Work.
  - 2. List of detrimental conditions, including substrates.
  - 3. List of unacceptable installation tolerances.
  - 4. Recommended corrections.
- D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

### **3.02 PREPARATION**

- A. Existing Utility Information: Furnish information to local utility and Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 013100 "Project Management and Coordination."

### **3.03 CONSTRUCTION LAYOUT**

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
  - B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.
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1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
  2. Establish limits on use of Project site.
  3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
  4. Inform installers of lines and levels to which they must comply.
  5. Check the location, level and plumb, of every major element as the Work progresses.
  6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
  7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

### 3.04 FIELD ENGINEERING

- A. Identification: Owner will identify existing benchmarks, control points, and property corners.
- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
1. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- C. Benchmarks: Establish and maintain a minimum of **two** permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
  2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
  3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.
- D. Certified Survey: On completion of foundation walls, major site improvements, and other work requiring field-engineering services, prepare a certified survey showing dimensions, locations, angles, and elevations of construction and sitework.
- E. Final Property Survey: Engage a land surveyor to prepare a final property survey showing significant features (real property) for Project. Include on the survey a certification, signed by land surveyor, that principal metes, bounds, lines, and levels of Project are accurately positioned as shown on the survey.
1. Show boundary lines, monuments, streets, site improvements and utilities, existing improvements and significant vegetation, adjoining properties, acreage, grade contours, and the distance and bearing from a site corner to a legal point.

### 3.05 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
1. Make vertical work plumb and make horizontal work level.

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2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
  3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.
  4. Maintain minimum headroom clearance of **96 inches]**in occupied spaces and **90 inches** in unoccupied spaces.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
  - C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
  - D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
  - E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
  - F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
  - G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
  - H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
    1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
    2. Allow for building movement, including thermal expansion and contraction.
    3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
  - I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
  - J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

### **3.06 CUTTING AND PATCHING**

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
    1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
  - B. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.
  - C. Temporary Support: Provide temporary support of work to be cut.
  - D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
  - E. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching according to requirements in Section 011000 "Summary."
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- F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to occupied areas.
  - G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
    - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
    - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
    - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
    - 4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.
    - 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
    - 6. Proceed with patching after construction operations requiring cutting are complete.
  - H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
    - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
    - 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
      - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
      - b. Restore damaged pipe covering to its original condition.
    - 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
      - a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch extending to an inside or outside corner of a wall. Provide additional coats until patch blends with adjacent surfaces.
    - 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
    - 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
  - I. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

### **3.07 OWNER-INSTALLED PRODUCTS**

- A. Site Access: Provide access to Project site for Owner's construction personnel.
  - B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.
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1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
2. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

### **3.08 PROGRESS CLEANING**

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
  1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
  2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F.
  3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
    - a. Use containers intended for holding waste materials of type to be stored.
  4. Coordinate progress cleaning for joint-use areas where Contractor and other contractors are working concurrently.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
  1. Remove liquid spills promptly.
  2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

### **3.09 STARTING AND ADJUSTING**

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: Comply with qualification requirements in Section 014000 "Quality Requirements."

**3.10 PROTECTION OF INSTALLED CONSTRUCTION**

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

**END OF SECTION 017300**

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**SECTION 017700  
CLOSEOUT PROCEDURES**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
  - 1. Substantial Completion procedures.
  - 2. Final completion procedures.
  - 3. Warranties.
  - 4. Final cleaning.
  - 5. Repair of the Work.

**1.02 ACTION SUBMITTALS**

- A. Product Data: For cleaning agents.
- B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
- C. Certified List of Incomplete Items: Final submittal at Final Completion.

**1.03 CLOSEOUT SUBMITTALS**

- A. Certificates of Release: From authorities having jurisdiction.
- B. Certificate of Insurance: For continuing coverage.
- C. Field Report: For pest control inspection.

**1.04 MAINTENANCE MATERIAL SUBMITTALS**

- A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

**1.05 SUBSTANTIAL COMPLETION PROCEDURES**

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete. The Architect will not perform a punch list inspection until the contractor's punch list is received and reviewed.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 30 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
  - 1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
  - 2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
  - 3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
  - 4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Owner. Label with manufacturer's name and model number where applicable.
    - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain **Owner's** signature for receipt of submittals.
  - 5. Submit test/adjust/balance records.



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6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 30 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
  2. Complete startup and testing of systems and equipment
  3. Submit test/adjust/balance records.
  4. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
  5. Perform preventive maintenance on equipment used prior to Substantial Completion. Complete startup testing of systems.
  6. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 017900 "Demonstration and Training."
  7. Touch up paint and otherwise repair and restore damaged finishes.
  8. Complete final cleaning requirements, including touchup painting
- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 30 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
    - a. The Architects basic services include (1) initial punch list and (1) follow-up punch list inspection to ensure all corrective action and or incomplete work has been finished. The Contractor is responsible to the Owner for all costs incurred by the Architect for additional services to provide multiple punch lists for the same work area. The cost for these additional services, may be deducted from the Contractors Contract by deduct Change Order.
  2. Results of completed inspection will form the basis of requirements for final completion.

#### **1.06 FINAL COMPLETION PROCEDURES**

- A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:
1. Submit a final Application for Payment according to Section 012900 "Payment Procedures."
  2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
  3. Submit pest-control final inspection report.
  4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
  5. Advise Owner of pending insurance changeover requirements.
  6. Advise Owner of changeover in heat and other utilities.
  7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
  8. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
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9. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
  10. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
  11. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
  12. Prepare and submit Project Record Documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
- B. Inspection: Submit a written request for final inspection to determine acceptance, a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

#### **1.07 LIST OF INCOMPLETE ITEMS (PUNCH LIST)**

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
1. Organize list of spaces in sequential order, starting with exterior areas first, and proceeding from lowest floor to highest floor.
  2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
  3. Include the following information at the top of each page:
    - a. Project name.
    - b. Date
    - c. Name of Architect.
    - d. Name of Contractor.
    - e. Page number.
  4. Submit list of incomplete items in the following format:
    - a. MS Excel electronic file. Architect will return annotated file.

#### **1.08 SUBMITTAL OF PROJECT WARRANTIES**

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Partial Occupancy: Submit properly executed warranties within **15** days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
  2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
  3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
  4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling

navigation to each item. Provide bookmarked table of contents at beginning of document.

- D. Provide additional copies of each warranty to include in operation and maintenance manuals.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

## **PART 3 EXECUTION**

### **3.01 FINAL CLEANING**

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
    - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
    - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
    - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
    - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
    - e. Remove snow and ice to provide safe access to building.
    - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
    - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
    - h. Sweep concrete floors broom clean in unoccupied spaces.
    - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
    - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
    - k. Remove labels that are not permanent.
    - l. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
    - m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
    - n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
    - o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
      - 1) Clean HVAC system in compliance with NADCA Standard 1992-01. Provide written report on completion of cleaning.

- p. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
  - q. Leave Project clean and ready for occupancy.
- C. Pest Control: Comply with pest control requirements in Section 015000 "Temporary Facilities and Controls." Prepare written report.

### **3.02 REPAIR OF THE WORK**

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
- B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

**END OF SECTION 017700**

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**SECTION 017823**  
**OPERATION AND MAINTENANCE DATA****PART 1 GENERAL****1.01 SUMMARY**

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
  - 1. Operation and maintenance documentation directory.
  - 2. Emergency manuals.
  - 3. Operation manuals for systems, subsystems, and equipment.
  - 4. Product maintenance manuals.
  - 5. Systems and equipment maintenance manuals.

**1.02 DEFINITIONS**

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

**1.03 CLOSEOUT SUBMITTALS**

- A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
  - 1. Architect, and Commissioning Authority (if applicable), will comment on whether content of operations and maintenance submittals are acceptable.
  - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operations and maintenance manuals in the following format:
  - 1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.
    - a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
    - b. Enable inserted reviewer comments on draft submittals.

**PART 2 PRODUCTS****2.01 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY**

- A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information. Include a section in the directory for each of the following:
    - 1. List of documents.
    - 2. List of systems.
    - 3. List of equipment.
    - 4. Table of contents.
  - B. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
    - 1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
    - 2. File Names and Bookmarks: Bookmark individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily
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navigated file tree. Configure electronic manual to display bookmark panel on opening file.

- C. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

## **2.02 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS**

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
1. Title page.
  2. Table of contents.
  3. Manual contents.
- B. Title Page: Include the following information:
1. Subject matter included in manual.
  2. Name and address of Project.
  3. Name and address of Owner.
  4. Date of submittal.
  5. Name and contact information for Contractor.
  6. Name and contact information for Construction Manager.
  7. Name and contact information for Architect.
  8. Name and contact information for Commissioning Authority.
  9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
  10. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
  2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

## **2.03 EMERGENCY MANUALS**

- A. Content: Organize manual into a separate section for each of the following:
1. Type of emergency.
  2. Emergency instructions.
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3. Emergency procedures.
- B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
1. Fire.
  2. Flood.
  3. Gas leak.
  4. Water leak.
  5. Power failure.
  6. Water outage.
  7. System, subsystem, or equipment failure.
  8. Chemical release or spill.
- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- D. Emergency Procedures: Include the following, as applicable:
1. Instructions on stopping.
  2. Shutdown instructions for each type of emergency.
  3. Operating instructions for conditions outside normal operating limits.
  4. Required sequences for electric or electronic systems.
  5. Special operating instructions and procedures.

## 2.04 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
  2. Performance and design criteria if Contractor has delegated design responsibility.
  3. Operating standards.
  4. Operating procedures.
  5. Operating logs.
  6. Wiring diagrams.
  7. Control diagrams.
  8. Piped system diagrams.
  9. Precautions against improper use.
  10. License requirements including inspection and renewal dates.
- B. Descriptions: Include the following:
1. Product name and model number. Use designations for products indicated on Contract Documents.
  2. Manufacturer's name.
  3. Equipment identification with serial number of each component.
  4. Equipment function.
  5. Operating characteristics.
  6. Limiting conditions.
  7. Performance curves.
  8. Engineering data and tests.
  9. Complete nomenclature and number of replacement parts.
- C. Operating Procedures: Include the following, as applicable:
1. Startup procedures.
  2. Equipment or system break-in procedures.
  3. Routine and normal operating instructions.
  4. Regulation and control procedures.
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5. Instructions on stopping.
  6. Normal shutdown instructions.
  7. Seasonal and weekend operating instructions.
  8. Required sequences for electric or electronic systems.
  9. Special operating instructions and procedures.
- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed and identify color-coding where required for identification.

## **2.05 PRODUCT MAINTENANCE MANUALS**

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Product Information: Include the following, as applicable:
1. Product name and model number.
  2. Manufacturer's name.
  3. Color, pattern, and texture.
  4. Material and chemical composition.
  5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
1. Inspection procedures.
  2. Types of cleaning agents to be used and methods of cleaning.
  3. List of cleaning agents and methods of cleaning detrimental to product.
  4. Schedule for routine cleaning and maintenance.
  5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

## **2.06 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS**

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
1. Standard maintenance instructions and bulletins.
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2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
  3. Identification and nomenclature of parts and components.
  4. List of items recommended to be stocked as spare parts.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
1. Test and inspection instructions.
  2. Troubleshooting guide.
  3. Precautions against improper maintenance.
  4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
  5. Aligning, adjusting, and checking instructions.
  6. Demonstration and training video recording, if available.
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
  2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
- H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

### **PART 3 EXECUTION**

#### **3.01 MANUAL PREPARATION**

- A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.
  - B. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.
  - C. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
  - D. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
    1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
    2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
  - E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
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1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- F. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
1. Do not use original project record documents as part of operation and maintenance manuals.
  2. Comply with requirements of newly prepared record Drawings in Section 017839 "Project Record Documents."
- G. Comply with Section 017700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

**END OF SECTION 017823**

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**SECTION 017839**  
**PROJECT RECORD DOCUMENTS****PART 1 GENERAL****1.01 SUMMARY**

- A. Section includes administrative and procedural requirements for project record documents, including the following:
  - 1. Record Drawings.
  - 2. Record Specifications.
  - 3. Record Product Data.
  - 4. Miscellaneous record submittals.
- B. Related Requirements:
  - 1. Division 01 "Multiple Contract Summary" for coordinating project record documents covering the Work of multiple contracts.
  - 2. Division 01 "Execution" for final property survey.
  - 3. Division 01 "Closeout Procedures" for general closeout procedures.
  - 4. Division 01 "Operation and Maintenance Data" for operation and maintenance manual requirements.
  - 5. Divisions 02 through 49 Sections for specific requirements for project record documents of the Work in those Sections.

**1.02 CLOSEOUT SUBMITTAL**

- A. Record Drawings: Comply with the following:
    - 1. Number of Copies: Submit **[one][ or Insert number]** set(s) of marked-up record prints.
    - 2. Number of Copies: Submit copies of record Drawings as follows:
      - a. Initial Submittal:
        - 1) Submit **[one] [or Insert number]** paper-copy set(s) of marked-up record prints.
        - 2) Submit PDF electronic files of scanned record prints and **[one]** or Insert number of file prints.
        - 3) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
        - 4) Submit Record Digital Data Files and **[one]** or Insert number set(s) of plots.
      - b. Final Submittal:
        - 1) Submit **[three] [or Insert number]** paper-copy set(s) of marked-up record prints.
        - 2) Submit PDF electronic files of scanned record prints and **[three] [or Insert number]** set(s) of prints.
        - 3) Print each drawing, whether or not changes and additional information were recorded.
        - 4) Submit Record Digital Data Files and **[one] [or Insert number]** set(s) of plots.
  - B. Record Specifications: Submit **[one paper copy] [or Insert number paper copies] [annotated PDF electronic files]** of Project's Specifications, including addenda and contract modifications.
  - C. Record Product Data: Submit **[one paper copy] [or Insert number paper copies] [annotated PDF electronic files and directories]** of each submittal.
    - 1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.
  - D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit **[one paper copy] [or Insert number paper copies] [annotated PDF electronic files and directories]** of each submittal.
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- E. Reports: Submit written report **[weekly]** indicating items incorporated into project record documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

### 1.03 RECORD DRAWINGS

- A. Record Drawings: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
1. Preparation: Mark record drawings to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
    - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    - b. Accurately record information in an acceptable drawing technique.
    - c. Record data as soon as possible after obtaining it.
    - d. Record and check the markup before enclosing concealed installations.
    - e. Cross-reference record prints to corresponding archive photographic documentation.
  2. Content: Types of items requiring marking include, but are not limited to, the following:
    - a. Dimensional changes to Drawings.
    - b. Revisions to details shown on Drawings.
    - c. Depths of foundations below first floor.
    - d. Locations and depths of underground utilities.
    - e. Revisions to routing of piping and conduits.
    - f. Revisions to electrical circuitry.
    - g. Actual equipment locations.
    - h. Duct size and routing.
    - i. Locations of concealed internal utilities.
    - j. Changes made by Change Order or [Construction] [Work] Change Directive.
    - k. Changes made following Architect's written orders.
    - l. Details not on the original Contract Drawings.
    - m. Field records for variable and concealed conditions.
    - n. Record information on the Work that is shown only schematically.
  3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
  4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
  5. Mark important additional information that was either shown schematically or omitted from original Drawings.
  6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
  7. Submit as indicated in the Article 1.2 final submittal.
- B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record drawings with Architect **[ and Construction Manager]**. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
1. Format: Same digital data software program, version, and operating system as the original Contract Drawings.
  2. Format: Annotated PDF electronic file **[ with comment function enabled]**.
  3. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
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4. Refer instances of uncertainty to Architect [ **through Construction Manager**] for resolution.
  5. Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
  6. Architect will furnish Contractor one set of digital data PDF files of the Contract Drawings for use in recording information.
    - a. See Section 013300 "Submittal Procedures" for requirements related to use of Architect's digital data files.
- C. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing record Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.
1. Format: Same digital data software program, version, and operating system as the original Contract Drawings.
  2. Consult Architect [ **and Construction Manager**] for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared record Drawings into record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.
  3. Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
  4. Submit as indicated in the Article 1.2 final submittal.

#### 1.04 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
  2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
  3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
  4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
  5. Note related Change Orders [**record Product Data,**] and record Drawings where applicable.
  6. Submit as indicated in the Article 1.2 final submittal

#### 1.05 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
  2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
  3. Note related Change Orders [**record Specifications,**] and record Drawings where applicable.
  4. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.
  5. Submit as indicated in the Article 1.2 final submittal

#### 1.06 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.
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1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.
2. Submit as indicated in the Article 1.2 final submittal

**PART 2 PRODUCT (NOT USED)****PART 3 EXECUTION****3.01 RECORDING AND MAINTENANCE**

- A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.
- B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's **[and Construction Manager's]** reference during normal working hours.

**END OF SECTION 017839**

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**SECTION 017900  
DEMONSTRATION AND TRAINING****PART 1 GENERAL****1.01 SUMMARY**

- A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
  - 1. Demonstration of operation of systems, subsystems, and equipment.
  - 2. Training in operation and maintenance of systems, subsystems, and equipment.
  - 3. Demonstration and training video recordings.

**1.02 INFORMATIONAL SUBMITTALS**

- A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
  - 1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.
- B. Qualification Data: For instructor.
- C. Attendance Record: For each training module, submit list of participants and length of instruction time.
- D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

**1.03 CLOSEOUT SUBMITTALS**

- A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.
  - 1. Identification: On each copy, provide an applied label with the following information:
    - a. Name of Project.
    - b. Name and address of videographer.
    - c. Name of Architect.
    - d. Name of Construction Manager.
    - e. Name of Contractor.
    - f. Date of video recording.
  - 2. Transcript: Prepared in PDF electronic format. Include a cover sheet with same label information as the corresponding video recording and a table of contents with links to corresponding training components. Include name of Project and date of video recording on each page.
  - 3. At completion of training, submit complete training manual(s) for Owner's use in PDF electronic file format on compact disc.

**1.04 QUALITY ASSURANCE**

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
  - B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 014000 "Quality Requirements," experienced in operation and maintenance procedures and training.
  - C. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination." Review methods and procedures
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related to demonstration and training including, but not limited to, the following:

1. Inspect and discuss locations and other facilities required for instruction.
2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
3. Review required content of instruction.
4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

#### **1.05 COORDINATION**

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

#### **1.06 INSTRUCTION PROGRAM**

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:
  1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
    - a. System, subsystem, and equipment descriptions.
    - b. Performance and design criteria if Contractor is delegated design responsibility.
    - c. Operating standards.
    - d. Regulatory requirements.
    - e. Equipment function.
    - f. Operating characteristics.
    - g. Limiting conditions.
    - h. Performance curves.
  2. Documentation: Review the following items in detail:
    - a. Emergency manuals.
    - b. Operations manuals.
    - c. Maintenance manuals.
    - d. Project record documents.
    - e. Identification systems.
    - f. Warranties and bonds.
    - g. Maintenance service agreements and similar continuing commitments.
  3. Emergencies: Include the following, as applicable:
    - a. Instructions on meaning of warnings, trouble indications, and error messages.
    - b. Instructions on stopping.
    - c. Shutdown instructions for each type of emergency.
    - d. Operating instructions for conditions outside of normal operating limits.
    - e. Sequences for electric or electronic systems.
    - f. Special operating instructions and procedures.
  4. Operations: Include the following, as applicable:
    - a. Startup procedures.
    - b. Equipment or system break-in procedures.

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- c. Routine and normal operating instructions.
  - d. Regulation and control procedures.
  - e. Control sequences.
  - f. Safety procedures.
  - g. Instructions on stopping.
  - h. Normal shutdown instructions.
  - i. Operating procedures for emergencies.
  - j. Operating procedures for system, subsystem, or equipment failure.
  - k. Seasonal and weekend operating instructions.
  - l. Required sequences for electric or electronic systems.
  - m. Special operating instructions and procedures.
- 5. Adjustments: Include the following:
    - a. Alignments.
    - b. Checking adjustments.
    - c. Noise and vibration adjustments.
    - d. Economy and efficiency adjustments.
  - 6. Troubleshooting: Include the following:
    - a. Diagnostic instructions.
    - b. Test and inspection procedures.
  - 7. Maintenance: Include the following:
    - a. Inspection procedures.
    - b. Types of cleaning agents to be used and methods of cleaning.
    - c. List of cleaning agents and methods of cleaning detrimental to product.
    - d. Procedures for routine cleaning
    - e. Procedures for preventive maintenance.
    - f. Procedures for routine maintenance.
    - g. Instruction on use of special tools.
  - 8. Repairs: Include the following:
    - a. Diagnosis instructions.
    - b. Repair instructions.
    - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
    - d. Instructions for identifying parts and components.
    - e. Review of spare parts needed for operation and maintenance.

#### **1.07 PREPARATION**

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 017823 "Operation and Maintenance Data."
- B. Set up instructional equipment at instruction location.

#### **1.08 INSTRUCTION**

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
  - B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
    - 1. Architect will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
    - 2. Owner will furnish an instructor to describe Owner's operational philosophy.
    - 3. Owner will furnish Contractor with names and positions of participants.
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- C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
    - 1. Schedule training with Owner with at least seven days' advance notice.
  - D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.
  - E. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.
  - F. Cleanup: Collect used and leftover educational materials and give to Owner. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

#### **1.09 DEMONSTRATION AND TRAINING VIDEO RECORDINGS**

- A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
    - 1. At beginning of each training module, record each chart containing learning objective and lesson outline.
  - B. Video: Provide minimum 1080 video resolution converted to format file type acceptable to Owner, on electronic media.
    - 1. Electronic Media: Read-only format compact disc with commercial-grade graphic label or flash drive as acceptable to Owner,
    - 2. File Hierarchy: Organize folder structure and file locations according to project manual table of contents. Provide complete screen-based menu.
    - 3. File Names: Utilize file names based upon name of equipment generally described in video segment, as identified in Project specifications.
    - 4. Contractor and Installer Contact File: Using appropriate software, create a file for inclusion on the Equipment Demonstration and Training DVD that describes the following for each Contractor involved on the Project, arranged according to Project table of contents:
      - a. Name of Contractor/Installer.
      - b. Business address.
      - c. Business phone number.
      - d. Point of contact.
      - e. E-mail address.
  - C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.
    - 1. Film training session(s) in segments not to exceed 15 minutes.
      - a. Produce segments to present a single significant piece of equipment per segment.
      - b. Organize segments with multiple pieces of equipment to follow order of Project Manual table of contents.
      - c. Where a training session on a particular piece of equipment exceeds 15 minutes, stop filming and pause training session. Begin training session again upon commencement of new filming segment.
  - D. Light Levels: Verify light levels are adequate to properly light equipment. Verify equipment markings are clearly visible prior to recording.
    - 1. Furnish additional portable lighting as required.
  - E. Narration: Describe scenes on video recording by audio narration by microphone while video recording is recorded. Include description of items being viewed.
  - F. Transcript: Provide a transcript of the narration. Display images and running time captured from videotape opposite the corresponding narration segment.
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- G. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

**END OF SECTION 017900**

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**SECTION 019113**  
**GENERAL COMMISSIONING REQUIREMENTS****PART 1 GENERAL****1.01 SUMMARY**

- A. Commissioning is intended to achieve the following specific objectives; this section specifies the Contractor's responsibilities for commissioning:
  - 1. Verify that the work is installed in accordance with Contract Documents and the manufacturer's recommendations and instructions, and that it receives adequate operational checkout prior to startup: Startup reports and Prefunctional Checklists executed by Contractor are utilized to achieve this.
  - 2. Verify and document that functional performance is in accordance with Contract Documents: Functional Tests executed by Contractor and witnessed by the Commissioning Authority are utilized to achieve this.
  - 3. Verify that operation and maintenance manuals submitted to Owner are complete: Detailed operation and maintenance (O&M) data submittals by Contractor are utilized to achieve this.
  - 4. Verify that the Owner's operating personnel are adequately trained: Formal training conducted by Contractor is utilized to achieve this.
- B. The Commissioning Authority directs and coordinates all commissioning activities; this section describes some but not all of the Commissioning Authority's responsibilities.

**1.02 SCOPE OF COMMISSIONING**

- A. The following are to be commissioned:
- B. HVAC System, including:
  - 1. Major and minor equipment items.
  - 2. Piping systems and equipment.
- C. Other equipment and systems explicitly identified elsewhere in Contract Documents as requiring commissioning.

**1.03 SUBMITTALS**

- A. See Section 013300 - Submittal Procedures, for submittal procedures; except:
  - 1. Make all submittals specified in this section, and elsewhere where indicated for commissioning purposes, directly to the Commissioning Authority, unless they require review by Architect/Engineer; in that case, submit to Architect/Engineer first.
  - 2. Submit one copy to the Commissioning Authority, not to be returned.
  - 3. Make commissioning submittals on time schedule specified by Commissioning Authority.
  - 4. Submittals indicated as "Draft" are intended for the use of the Commissioning Authority in preparation of Prefunctional Checklists or Functional Test requirements; submit in editable electronic format, Microsoft Word 2010 preferred.
  - 5. As soon as possible after submittals made to Architect/Engineer are approved, submit copy of approved submittal to the Commissioning Authority.
- B. Product Data: If submittals to Architect/Engineer do not include the following, submit copies as soon as possible:
  - 1. Manufacturer's product data, cut sheets, and shop drawings.
  - 2. Manufacturer's installation instructions.
  - 3. Startup, operating, and troubleshooting procedures.
  - 4. Fan and pump curves.
  - 5. Factory test reports.
  - 6. Warranty information, including details of Owner's responsibilities in regard to keeping warranties in force.

- C. Manufacturers' Instructions: Submit copies of all manufacturer-provided instructions that are shipped with the equipment as soon as the equipment is delivered.
- D. Startup Plans and Reports.
- E. Completed Prefunctional Checklists.

## **PART 2 PRODUCTS**

### **2.01 TEST EQUIPMENT**

- A. Provide all standard testing equipment required to perform startup and initial checkout and required Functional Testing; unless otherwise noted such testing equipment will NOT become the property of Owner.
- B. Calibration Tolerances: Provide testing equipment of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified. If not otherwise noted, the following minimum requirements apply:
  - 1. Temperature Sensors and Digital Thermometers: Certified calibration within past year to accuracy of 0.5 degree F and resolution of plus/minus 0.1 degree F.
  - 2. Pressure Sensors: Accuracy of plus/minus 2.0 percent of the value range being measured (not full range of meter), calibrated within the last year.
  - 3. Calibration: According to the manufacturer's recommended intervals and when dropped or damaged; affix calibration tags or keep certificates readily available for inspection.
- C. Equipment-Specific Tools: Where special testing equipment, tools and instruments are specific to a piece of equipment, are only available from the vendor, and are required in order to accomplish startup or Functional Testing, provide such equipment, tools, and instruments as part of the work at no extra cost to Owner; such equipment, tools, and instruments are to become the property of Owner.
- D. Dataloggers: Independent equipment and software for monitoring flows, currents, status, pressures, etc. of equipment.
  - 1. Dataloggers required to for Functional Tests will be provided by the Commissioning Authority and will not become the property of Owner.

## **PART 3 EXECUTION**

### **3.01 COMMISSIONING PLAN**

- A. Commissioning Authority will prepare the Commissioning Plan.
  - 1. Attend meetings called by the Commissioning Authority for purposes of completing the commissioning plan.
  - 2. Require attendance and participation of relevant subcontractors, installers, suppliers, and manufacturer representatives.
- B. Contractor is responsible for compliance with the Commissioning Plan.
- C. Commissioning Plan: The commissioning schedule, procedures, and coordination requirements for all parties in the commissioning process.
- D. Commissioning Schedule:
  - 1. Submit anticipated dates of startup of each item of equipment and system to Commissioning Authority within 60 days after award of Contract.
  - 2. Re-submit anticipated startup dates whenever revised, but not less than 4 weeks prior to startup.
  - 3. Prefunctional Checklists and Functional Tests are to be performed in sequence from components, to subsystems, to systems.
  - 4. Provide sufficient notice to Commissioning Authority for delivery of relevant Checklists and Functional Test procedures, to avoid delay.

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### 3.02 STARTUP PLANS AND REPORTS

- A. Startup Plans: For each item of equipment and system for which the manufacturer provides a startup plan, submit the plan not less than 8 weeks prior to startup.
- B. Startup Reports: For each item of equipment and system for which the manufacturer provides a startup checklist (or startup plan or field checkout sheet), document compliance by submitting the completed startup checklist prior to startup, signed and dated by responsible entity.
- C. Submit directly to the Commissioning Authority.

### 3.03 PREFUNCTIONAL CHECKLISTS

- A. A Prefunctional Checklist is required to be filled out for each item of equipment or other assembly specified to be commissioned.
    - 1. No sampling of identical or near-identical items is allowed.
    - 2. These checklists do not replace manufacturers' recommended startup checklists, regardless of apparent redundancy.
    - 3. Prefunctional Checklist forms will not be complete until after award of the contract; the following types of information will be gathered via the completed Checklist forms:
      - a. Certification by installing contractor that the unit is properly installed, started up, and operating and ready for Functional Testing.
      - b. Confirmation of receipt of each shop drawing and commissioning submittal specified, itemized by unit.
      - c. Manufacturer, model number, and relevant capacity information; list information "as specified," "as submitted," and "as installed."
      - d. Serial number of installed unit.
      - e. List of inspections to be conducted to document proper installation prior to startup and Functional Testing; these will be primarily static inspections and procedures; for equipment and systems may include normal manufacturer's start-up checklist items and minor testing.
      - f. Sensor and actuator calibration information.
  - B. Contractor is responsible for filling out Prefunctional Checklists, after completion of installation and before startup; witnessing by the Commissioning Authority is not required unless otherwise specified.
    - 1. Each line item without deficiency is to be witnessed, initialed, and dated by the actual witness; checklists are not complete until all line items are initialed and dated complete without deficiencies.
    - 2. Checklists with incomplete items may be submitted for approval provided the Contractor attests that incomplete items do not preclude the performance of safe and reliable Functional Testing; re-submission of the Checklist is required upon completion of remaining items.
    - 3. Individual Checklists may contain line items that are the responsibility of more than one installer; Contractor shall assign responsibility to appropriate installers or subcontractors, with identification recorded on the form.
    - 4. If any Checklist line item is not relevant, record reasons on the form.
    - 5. Submit completed Checklists to Commissioning Authority within two days of completion.
  - C. Commissioning Authority is responsible for furnishing the Prefunctional Checklists to Contractor.
    - 1. Initial Drafts: Contractor is responsible for initial draft of Prefunctional Checklist where so indicated in Contract Documents.
    - 2. Provide all additional information requested by Commissioning Authority to aid in preparation of checklists, such as shop drawing submittals, manufacturers' startup checklists, and O&M data.
    - 3. Commissioning Authority may add any relevant items deemed necessary regardless of whether they are explicitly mentioned in Contract Documents or not.
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4. When asked to review the proposed Checklists, do so in a timely manner.
  - D. Commissioning Authority Witnessing: Required for:
    1. Each piece of primary equipment, unless sampling of multiple similar units is allowed by the commissioning plan.
    2. A sampling of non-primary equipment, as allowed by the commissioning plan.
  - E. Deficiencies: Correct deficiencies and re-inspect or re-test, as applicable, at no extra cost to Owner.
    1. If difficulty in correction would delay progress, report deficiency to the Commissioning Authority immediately.

### 3.04 FUNCTIONAL TESTS

- A. A Functional Test is required for each item of equipment, system, or other assembly specified to be commissioned, unless sampling of multiple identical or near-identical units is allowed by the final test procedures.
  - B. Contractor is responsible for execution of required Functional Tests, after completion of Prefunctional Checklist and before closeout.
  - C. Commissioning Authority is responsible for witnessing and reporting results of Functional Tests, including preparation and completion of forms for that purpose.
  - D. Contractor is responsible for correction of deficiencies and re-testing at no extra cost to Owner; if a deficiency is not corrected and re-tested immediately, the Commissioning Authority will document the deficiency and the Contractor's stated intentions regarding correction.
    1. Deficiencies are any condition in the installation or function of a component, piece of equipment or system that is not in compliance with Contract Documents or does not perform properly.
    2. When the deficiency has been corrected, the Contractor completes the form certifying that the item is ready to be re-tested and returns the form to the Commissioning Authority; the Commissioning Authority will reschedule the test and the Contractor shall re-test.
    3. Identical or Near-Identical Items: If 10 percent, or three, whichever is greater, of identical or near-identical items fail to perform due to material or manufacturing defect, all items will be considered defective; provide a proposal for correction within 2 weeks after notification of defect, including provision for testing sample installations prior to replacement of all items.
    4. Contractor shall bear the cost of Owner and Commissioning Authority personnel time witnessing re-testing.
    5. Contractor shall bear the cost of Owner and Commissioning Authority personnel time witnessing re-testing if the test failed due to failure to execute the relevant Prefunctional Checklist correctly; if the test failed for reasons that would not have been identified in the Prefunctional Checklist process, Contractor shall bear the cost of the second and subsequent re-tests.
  - E. Functional Test Procedures:
    1. Some test procedures are included in Contract Documents; where Functional Test procedures are not included in Contract Documents, test procedures will be determined by the Commissioning Authority with input by and coordination with Contractor.
    2. Examples of Functional Testing:
      - a. Test the dynamic function and operation of equipment and systems (rather than just components) using manual (direct observation) or monitoring methods under full operation (e.g., the chiller pump is tested interactively with the chiller functions to see if the pump ramps up and down to maintain the differential pressure setpoint).
      - b. Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, fire alarm, power failure, etc.
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- c. Systems are run through all the HVAC control system's sequences of operation and components are verified to be responding as the sequence's state.
  - d. Traditional air or water test and balancing (TAB) is not Functional Testing; spot checking of TAB by demonstration to the Commissioning Authority is Functional Testing.
- F. Deferred Functional Tests: Some tests may need to be performed later, after substantial completion, due to partial occupancy, equipment, seasonal requirements, design or other site conditions; performance of these tests remains the Contractor's responsibility regardless of timing.

### 3.05 SENSOR AND ACTUATOR CALIBRATION

- A. Calibrate all field-installed temperature, relative humidity, carbon monoxide, carbon dioxide, and pressure sensors and gauges, and all actuators (dampers and valves) on this piece of equipment shall be calibrated. Sensors installed in the unit at the factory with calibration certification provided need not be field calibrated.
- B. Calibrate using the methods described below; alternate methods may be used, if approved by Commissioning Authority and Owner beforehand. See PART 2 for test instrument requirements. Record methods used on the relevant Prefunctional Checklist or other suitable forms, documenting initial, intermediate and final results.
- C. All Sensors:
  - 1. Verify that sensor location is appropriate and away from potential causes of erratic operation.
  - 2. Verify that sensors with shielded cable are grounded only at one end.
  - 3. For sensor pairs that are used to determine a temperature or pressure difference, for temperature make sure they are reading within 0.2 degree F of each other, and for pressure, within tolerance equal to 2 percent of the reading, of each other.
  - 4. Tolerances for critical applications may be tighter.
- D. Sensors Without Transmitters - Standard Application:
  - 1. Make a reading with a calibrated test instrument within 6 inches of the site sensor.
  - 2. Verify that the sensor reading, via the permanent thermostat, gauge or building automation system, is within the tolerances in the table below of the instrument-measured value.
  - 3. If not, install offset, calibrate or replace sensor.
- E. Sensors With Transmitters - Standard Application.
  - 1. Disconnect sensor.
  - 2. Connect a signal generator in place of sensor.
  - 3. Connect ammeter in series between transmitter and building automation system control panel.
  - 4. Using manufacturer's resistance-temperature data, simulate minimum desired temperature.
  - 5. Adjust transmitter potentiometer zero until 4 mA is read by the ammeter.
  - 6. Repeat for the maximum temperature matching 20 mA to the potentiometer span or maximum and verify at the building automation system.
  - 7. Record all values and recalibrate controller as necessary to comply with specified control ramps, reset schedules, proportional relationship, reset relationship and P/I reaction.
  - 8. Reconnect sensor.
  - 9. Make a reading with a calibrated test instrument within 6 inches of the site sensor.
  - 10. Verify that the sensor reading, via the permanent thermostat, gauge or building automation system, is within the tolerances in the table below of the instrument-measured value.
  - 11. If not, replace sensor and repeat.
  - 12. For pressure sensors, perform a similar process with a suitable signal generator.

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- F. Sensor Tolerances for Standard Applications: Plus/minus the following maximums:
1. Watthour, Voltage, Amperage: 1 percent of design.
  2. Pressure, Air, Water, Gas: 3 percent of design.
  3. Air Temperatures (Outside Air, Space Air, Duct Air): 0.4 degrees F.
  4. Relative Humidity: 4 percent of design.
  5. Barometric Pressure: 0.1 inch of Hg.
  6. Flow Rate, Air: 10 percent of design.
  7. Flow Rate, Water: 4 percent of design.
  8. AHU Wet Bulb and Dew Point: 2.0 degrees F.
- G. Critical Applications: For some applications more rigorous calibration techniques may be required for selected sensors. Describe any such methods used on an attached sheet.
- H. Valve/Damper Stroke Setup and Check:
1. For all valve/damper actuator positions checked, verify the actual position against the control system readout.
  2. Set pump/fan to normal operating mode.
  3. Command valve/damper closed; visually verify that valve/damper is closed and adjust output zero signal as required.
  4. Command valve/damper to open; verify position is full open and adjust output signal as required.
  5. Command valve/damper to a few intermediate positions.
  6. If actual valve/damper position does not reasonably correspond, replace actuator or add pilot positioner (for pneumatics).
- I. Isolation Valve or System Valve Leak Check: For valves not associated with coils.
1. With full pressure in the system, command valve closed.
  2. Use an ultra-sonic flow meter to detect flow or leakage.

### 3.06 TEST PROCEDURES - GENERAL

- A. Provide skilled technicians to execute starting of equipment and to execute the Functional Tests. Ensure that they are available and present during the agreed upon schedules and for sufficient duration to complete the necessary tests, adjustments and problem-solving.
- B. Provide all necessary materials and system modifications required to produce the flows, pressures, temperatures, and conditions necessary to execute the test according to the specified conditions. At completion of the test, return all affected equipment and systems to their pre-test condition.
- C. Sampling: Where Functional Testing of fewer than the total number of multiple identical or near-identical items is explicitly permitted, perform sampling as follows:
1. Identical Units: Defined as units with same application and sequence of operation; only minor size or capacity difference.
  2. Sampling is not allowed for:
    - a. Major equipment.
    - b. Life-safety-critical equipment.
    - c. Prefunctional Checklist execution.
  3. XX = the percent of the group of identical equipment to be included in each sample; defined for specific type of equipment.
  4. YY = the percent of the sample that if failed will require another sample to be tested; defined for specific type of equipment.
  5. Randomly test at least XX percent of each group of identical equipment, but not less than three units. This constitutes the "first sample."
  6. If YY percent of the units in the first sample fail, test another XX percent of the remaining identical units.
  7. If YY percent of the units in the second sample fail, test all remaining identical units.
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8. If frequent failures occur, resulting in more troubleshooting than testing, the Commissioning Authority may stop the testing and require Contractor to perform and document a checkout of the remaining units prior to continuing testing.
  - D. Manual Testing: Use hand-held instruments, immediate control system readouts, or direct observation to verify performance (contrasted to analyzing monitored data taken over time to make the "observation").
  - E. Simulating Conditions: Artificially create the necessary condition for the purpose of testing the response of a system; for example apply hot air to a space sensor using a hair dryer to see the response in a VAV box.
  - F. Simulating Signals: Disconnect the sensor and use a signal generator to send an amperage, resistance or pressure to the transducer and control system to simulate the sensor value.
  - G. Over-Writing Values: Change the sensor value known to the control system in the control system to see the response of the system; for example, change the outside air temperature value from 50 degrees F to 75 degrees F to verify economizer operation.
  - H. Indirect Indicators: Remote indicators of a response or condition, such as a reading from a control system screen reporting a damper to be 100 percent closed, are considered indirect indicators.
  - I. Monitoring: Record parameters (flow, current, status, pressure, etc.) of equipment operation using dataloggers or the trending capabilities of the relevant control systems; where monitoring of specific points is called for in Functional Test Procedures:
    1. All points that are monitored by the relevant control system shall be trended by Contractor; at the Commissioning Authority's request, Contractor shall trend up to 20 percent more points than specified at no extra charge.
    2. Other points will be monitored by the Commissioning Authority using dataloggers.
    3. At the option of the Commissioning Authority, some control system monitoring may be replaced with datalogger monitoring.
    4. Provide hard copies of monitored data in columnar format with time down left column and at least 5 columns of point values on same page.
    5. Graphical output is desirable and is required for all output if the system can produce it.
    6. Monitoring may be used to augment manual testing.

### **3.07 OPERATION AND MAINTENANCE MANUALS**

- A. See Section 017800 - Closeout Submittals for additional requirements.
- B. Commissioning Authority to submit (2) copies of manuals related to items that were commissioned to Engineer of Record for review; make changes recommended by Engineer of Record. Upon completion of changes, (2) copies of manuals shall be sent to the owner for their records.
- C. Commissioning Authority will add commissioning records to manuals after submission to Owner.

**END OF SECTION 019113**

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**SECTION 02 0800  
ASBESTOS ABATEMENT PROCEDURES**

**PART I – GENERAL**

**1.01 DESCRIPTION**

- A. All work under this contract shall be performed in strict accordance with the specifications and all applicable laws for asbestos removal projects. The Abatement Contractor shall furnish all labor, materials, supervision, services, insurance and equipment necessary for the complete and total removal of Asbestos-containing Materials (ACM) as described herein, in attachments to the specification, Job Specific Variance(s) and/or as directed by Ossining UFSD (here-in-after the "Owner") and/or the Owners Representative(s) to support the ***Suffern CSD – RP Connor – Boiler Conversion.***
- B. Abatement Contractor shall provide for personnel air monitoring to satisfy OSHA regulation 29 CFR Parts 1926.1101(f). All work performed shall be in strict accordance with applicable provisions and regulations promulgated under New York State Department of Labor, Industrial Code 56 (ICR-56).
- C. The Abatement Contractor shall satisfy the requirements for asbestos projects issued by the New York State Department of Labor concerning licensing and certification; notification; equipment; removal and disposal procedures; engineering controls; work area preparation; decontamination and clean-up procedures; and personnel air monitoring.
- D. The Abatement Contractor shall be responsible for submittal of asbestos project notification(s) and applicable fees to EPA and NYSDOL concerning this project. Project notification(s) shall be made for the cumulative total of ACM to be removed as required by ICR-56-3.4. Work practices for each individual work area established shall be consistent with the quantity of ACM contained within that work area as defined in ICR-56-2.
- E. The scope of work under this contract shall include the following:
  - 1. All asbestos-containing materials (ACM) shall be removed in accordance with these specifications. The Abatement Contractor is responsible for field verification of estimated quantities, locations and other site conditions that may affect work.
  - 2. All fixed objects remaining within the work area(s) shall be protected as required by Title 12 NYCRR Section 56-7.10(b) and as described in these specifications.
  - 3. The containerization, labeling and disposal of all asbestos waste in accordance with applicable city, state and federal regulations and these specifications.
  - 4. The Abatement Contractor will be responsible for repairing all building components damaged during abatement including, but not limited to, ceiling tiles, ceiling finishes, wall finishes and/or floor finishes, etc.
  - 5. The Abatement Contractor shall be responsible for any and all demolition required to access materials identified in scope of work and on associated drawings.
  - 6. Concealed conditions that are exposed and may require additional work shall be brought to the attention of the Owner(s) immediately. The Abatement Contractor shall not abate these areas without a written notice to proceed. If the Abatement Contractor removes additional asbestos prior to the order to proceed the additional work will not be acknowledged.

7. Permissible working hours shall be Monday through Friday 7:00 A.M. to 5:00 P.M. and/or as defined by the Owner(s) and/or Owner's Representative(s). Holidays shall be considered weekends and not included for working days. Upon written approval from the Owner, the Abatement Contractor may work past these hours. The Abatement Contractor will incur any and all costs associated for work performed beyond the defined schedule including, but not limited to: abatement activities, project/air monitoring, custodial/staffing labor, overtime, mobilizations, etc.
8. Buildings will be turned over to the Abatement Contractor as is. At that time, all electrical services and HVAC systems in the proposed work areas will be shut down. Electricity and water supply will be maintained in the building for use by the Abatement Contractor. The Abatement Contractor is responsible for securing all power in the work area(s) and establishing all temporary GFCI hookups necessary to complete his work.
9. The Abatement Contractor shall remove all identified Asbestos-containing Materials (ACM) to building substrate(s); in areas indicted. Subsequent to final air clearances, the substrate(s) shall be washed with a neutralizing agent to prepare the substrate to accept new floor covering and eliminate residual odors.
10. The Abatement Contractor must coordinate location of waste containers with the Facility and the Owner. Deliveries and storage of equipment must be coordinated with the Facility and the Owner.
11. All "Large" and "Small" asbestos abatement projects, as defined by 12 NYCRR56 shall not be performed while the building is occupied. The term "building" means a wing or major section of a building that can be completely isolated from the rest of the building with sealed non-combustible construction. The isolated portion of the building must contain exists that do not pass through the occupied portion(s) and ventilation systems must be physically separated and sealed at the isolation barriers.

## **1.02 PRE-CONTRACT SUBMITTALS**

Within three (3) days after bids are opened, the three (3) apparent low bidders shall be required to submit the following documentation:

A. Resume': Shall include the following:

1. Provide a list of projects of similar nature performed within the past two (2) years and include the dollar value of all projects. Provide project references to include owner, consultant, and air monitoring firms' name, contact person, address, and phone number, include location of project and date of completion.
2. Abatement Contractor license issued by New York State Department of Labor for asbestos work in accordance with ICR-56-3.
3. A list of owned equipment available to be used in the performance of the project.
4. The number of years engaged in asbestos removal.
5. An outline of the worker training courses, and medical surveillance program conducted by the Abatement Contractor.
6. A standard operating procedures manual describing work practices and procedures, equipment, type of decontamination facilities, respirator program, special removal techniques, etc.

7. Documentation to the satisfaction of the Owner pertaining to the Abatement Contractor's financial resources available to perform the project. Such data shall include, but not be limited to, the firm's balance sheet for the last fiscal year.

**B. Citations/Violations/Legal Proceedings**

1. Submit a notarized statement describing any citations, violations, criminal charges, or legal proceedings undertaken or issued by any law enforcement, regulatory agency, or consultant concerning performance on previous asbestos abatement contracts. Briefly describe the circumstances citing the project and involved persons and agencies as well as the outcome of any actions.
2. Answer the question: "Has your firm or its agents been issued a Stop Work order on any project within the last two years?" If "Yes" provide details as discussed above.
3. Answer the question: "Are you now, or have you been in the past, a party to any litigation or arbitrations arising out of your performance on Asbestos Abatement Contracts?" If "Yes" provide details as discussed in 1. above.
4. Describe any liquidated damages assessed within the last two years.

**C. Preliminary Schedule**

1. Provide a detailed schedule including work dates, work shift times, estimate of manpower to be utilized and the start and completion date for completion of each major work area.

**1.03 DOCUMENTATION**

- A. The Abatement Contractor shall be required to submit the following and receive the Consultant's approval prior to commencing work on this project:**
1. Provide documentation of worker training for each person assigned to the project. Documentation shall include copies of each workers valid New York State asbestos handler certificates (for those employees who may perform asbestos removal), documentation of current respirator fit test and current OSHA required training and medical examination.
  2. The attached "Asbestos Employee Medical Examination Statement" and "Asbestos Employee Training Statement" forms shall be completed, signed and submitted for each worker assigned to the project. Records of all employee training and medical surveillance shall be maintained for at least forty (40) years. Copies of the records shall be submitted to the Consultant prior to commencement.
  3. The Abatement Contractor shall submit proof of a current, valid license issued by the New York State Department of Labor pursuant to the authority vested in the Commissioner by section 906 of the Labor Laws, and that the employees performing asbestos related work on this project are certified by the State of New York as required in Part 56 of Title 12 of the Official Compilation of Codes, Rules and Regulations of the State of New York latest edition. Copies of all licenses shall be submitted prior to the commencement of the project.
  4. The Abatement Contractor shall submit a written respiratory protection program meeting the requirements of 29 CFR 1910.134 to the Consultant.
  5. The name, address, social security number and NYS DOL certificate number of the person(s) who will supervise the asbestos project.



6. The name and address of the deposit or waste disposal site or sites where the asbestos materials are to be deposited or disposed of. This site must be approved by the Owner. The manifesting procedure must also be specified.
7. The name, address and New York State Dept. of Environmental Conservation ID Number of any transporters that are to be used to transport waste.
8. A written Standard Operation Procedure (SOP) that is designed and implemented to maximize protection against human exposure to asbestos dust. The SOP shall take into consideration the workers, visitors, building employees, general public and environment. As a minimum the procedures must include the following:
  - a. Security for all work areas on an around-the-clock basis against unauthorized access.
  - b. Project organization chart including the phone numbers of at least two responsible persons who shall be authorized to dispatch men and equipment to the project in the event of an emergency; including weekends.
  - c. Description of protective clothing and NIOSH approved respirators to be used.
  - d. Description of all removal methods to be used, including HEPA air filtration and decontamination sequence with special emphasis on any procedure that may deviate from these specifications.
  - e. A list of manufacturers' certificates stating that all vacuums, negative air filtration equipment, respirators and air supply equipment meet OSHA and EPA requirements.
  - f. A list of all materials proposed to be furnished and used under this contract.
  - g. Emergency evacuation procedures in the event of fire, smoke or accidents such as injury from falling, heat exposure, electrical shock, etc.
  - h. The name, address and ELAP number of the New York State Department of Health Certified Analytical Testing Laboratory the Contractor proposes to use for the OSHA monitoring.
9. A detailed plan, in triplicate, for the phasing of the project, division of work areas and location of decontamination facilities, waste containers and temporary office.
10. Work schedule, identifying firm dates and completion for actual areas. Bar chart or critical path chart indicating phases is required.
- B. The Abatement Contractor shall post their NYS DOL contractor's license and maintain a daily log documenting the dates and time of the following items within each personal decontamination unit:
  1. Meetings; purpose, attendants, discussion (brief)
  2. Sign-in and sign-out of all persons entering the work area including name, date, time, social security number, position or function and general description of daily activity.
  3. Testing of barriers and enclosure systems using smoke tubes prior to the beginning of abatement activities and at least once a day thereafter until satisfactory clearance air monitoring results have been achieved.
  4. Inspection of all plastic barriers, twice daily, by the asbestos supervisor.

5. Loss of enclosure integrity; special or unusual events, barrier breaches, equipment failures, etc.
  6. Daily cleaning of enclosures.
  7. Personnel air monitoring test results for OSHA Compliance. Results shall be posted at the work site within 24 hours of testing and copies supplied to the Owner within five (5) days of testing. Abnormalities shall be supplied to the Owner immediately.
- C. Documentation with confirmation signature of Consultant's representative of the following shall be provided by the Abatement Contractor at the final closeout of the project.
1. Testing of barriers and enclosure systems using smoke tubes shall be performed prior to the beginning of abatement activities and at least once a day thereafter until satisfactory clearance air monitoring results have been achieved.
  2. Inspection of all plastic barriers.
  3. Removal of all polyethylene barriers.
  4. Consultant's inspections prior to encapsulation.
  5. Removal of waste materials.
  6. Decontamination of equipment (list items).
  7. Consultant's final inspection/final air tests.
- D. The Abatement Contractor shall provide records of all project information, to include the following which shall be submitted upon completion of the project and prior to approval of the Abatement Contractor's payment application:
1. The location and description of the abatement project.
  2. The name, address and social security number of the person(s) who supervised the asbestos project.
  3. Certified payroll documentation Pursuant to Article 8, Section 220 of the NYS Labor Law
  4. Copies of EPA/NYS DOL Asbestos Certificates for all Workers and Supervisors employed on the Project.
  5. Copies of Medical Approval and Respirator Fit Testing for all Asbestos Workers and Supervisors employed on the Project.
  6. Copies of Abatement Contractors Daily Sign-In Sheets & Logs for persons entering and leaving the work area. – Title 12 NYCRR Part 56-7.3.
  7. Copies of Abatement Contractor's personal air sampling laboratory results.
  8. The amounts and type of asbestos materials that was removed, enclosed, encapsulated, or disturbed.

9. The name and address of the deposit or waste disposal site or sites where the asbestos waste materials were deposited or disposed of and all related manifests, receipts and other documentation associated with the disposal of asbestos waste.
10. The name and address of any transporters used to transport waste and all related manifests, receipts and other documentation associated with the transport of asbestos waste.
11. All other information that may be required by state, federal or local regulations.
12. Copy of the Supervisor's Daily Project Log of events as described in 1.03 B, above.

#### **1.04 NOTIFICATIONS AND PERMITS**

- A. The Abatement Contractor shall be required to prepare and submit notifications to the following agencies at least ten (10) days prior to the commencement of the project:

1. Asbestos NESHAPS Contact  
U.S. Environmental Protection Agency  
NESHAPS Coordinator, Air Facilities Branch  
26 Federal Plaza  
New York, New York 10007  
(212) 264-7307
2. State of New York Department of Labor  
Division of Safety and Health  
Asbestos Control Bureau  
State Office Building Campus, Building 12, Room 454  
Albany, New York 12240
3. Owner(s): Suffern CSD  
45 Mountain Avenue  
Hillburn, NY 10931  
ATTN: John Palma, Director of Facilities  
Ph. (845) 357-7783 X11251  
E-mail. [jpalma@sufferncentral.org](mailto:jpalma@sufferncentral.org)
4. Environmental Consultant(s): Quality Environmental Solutions & Technologies, Inc. (QuES&T)  
1376 Route 9  
Wappingers Falls, New York 12590  
ATTN: Rudy Lipinski, Director of Field Operations  
Ph. (845) 298-6031  
Fx. (845) 298-6251  
E-mail. [rlipinski@qualityenv.com](mailto:rlipinski@qualityenv.com)

- B. The notification shall include but not be limited to the following information:

1. Name and address of Owner.
2. Name, address and asbestos handling license number of the Abatement Contractor.
3. Address and description of the building, including size, age, and prior use of the building or area; the amount, in square feet or linear feet of asbestos material to be removed; room designation numbers or other local information where asbestos material is found, including the type of asbestos material (friable or non-friable).

4. Scheduled starting and completion dates for removal.
5. Methods to be employed in abating asbestos containing materials.
6. Procedures and equipment, including ventilating/exhaust systems, that will be employed to comply with the Code of Federal Regulation (CFR) Title 40, Part 61 of the U.S. Environmental Protection Agency.
7. The name and address of the carting company and of the waste disposal site where the asbestos waste will be deposited.

**NOTE:** Notifications shall be submitted using standard forms as may be used by the respective agency.

For DOL (NYS) include "Asbestos Project Notification" form (DOSH-483) with proper fee, if required. For EPA include "Notification of Demolition and Renovation"; 40 CFR Part 61.

- C. The Abatement Contractor shall secure any permits required by the city, town, county, or state that may be required and the cost for obtaining the permit shall be included in his base bid.
- D. The Abatement Contractor shall erect warning signs around the work space at every point of potential entry into the work area in accordance with OSHA 1926.58k (2), (i). These signs shall bear the following information:

**DANGER**  
**CANCER AND LUNG DISEASE HAZARD**  
**AUTHORIZED PERSONNEL ONLY**  
**RESPIRATORS AND PROTECTIVE**  
**CLOTHING**  
**ARE REQUIRED IN THIS AREA**

- E. The Abatement Contractor shall post at entrances to the work place and immediate adjacent areas, notifications to building occupants which include the name and license number of the contractor, project location and size, amount and type of ACM, abatement procedures, dates of expected occurrence and name and address of the air monitor and laboratory in compliance with ICR 56-3.6.
- F. The Abatement Contractor shall post a list of emergency telephone numbers at the job site which shall include the Owner's Representative, police, emergency squad, local hospital, Environmental Protection Agency, N.Y. State Department of Labor, Occupational Safety and Health Administration and the local Department of Health.

#### **1.05 APPLICABLE STANDARDS**

Except to the extent that more explicit or more stringent requirements are written directly into the contract documents, applicable standards of the construction industry have the same force and effects (and are made a part of contract documents by reference) as if copied directly into contract documents, or as if published copies were bound herewith. Resolution of overlapping and conflicting requirements, which result from the application of several different industry standards to the same unit of work, shall be by adherence to the most stringent requirement.

A. Applicable standards listed in these Specifications form a part of this Specification and include, but are not necessarily limited to, standards promulgated by the following agencies and organizations:

1. ANSI:  
American National Standards Institute  
1430 Broadway  
New York, New York 10018
2. ASHRAE:  
American Society for Heating, Refrigerating  
and Air Conditioning Engineers  
1791 Tullie Circle NE  
Atlanta, Georgia 30329
3. ASTM:  
American Society for Testing and Materials  
1916 Race Street  
Philadelphia, Pennsylvania 19103
4. CFR  
Code of Federal Regulations Available  
from Government Printing Office  
Washington, District of Columbia 20402
5. CGA  
Compressed Gas Association  
1235 Jefferson Davis Highway  
Arlington, Virginia 22202
6. CS  
Commercial Standard of NBS  
(US Dept. of Commerce)  
Government Printing Office
7. EPA  
Environmental Protection Agency, Region II  
26 Federal Plaza  
New York, New York 10007  
Asbestos Coordinator - Room 802  
(212) 264-9538  
Part 61, Sub-Parts A & B  
National Emission Standard for Asbestos
8. FEDERAL SPECS  
Federal Specification (General Services Administration)  
7th and D Street, SW  
Washington, District of Columbia 20406
9. NBS  
National Bureau of Standards  
(US Department of Commerce)  
Gaithersburg, Maryland 20234
10. NEC  
National Electrical Code (by NFPA)

11. NFPA

National Fire Protection Association  
Batterymarch Park  
Quincy, Massachusetts 02269

12. NIOSH

National Institute for Occupational Safety and Health  
26 Federal Plaza  
New York, New York 10007

13. NYSDOH

New York State Department of Health  
Bureau of Toxic Substance Assessment  
Room 359 - 3rd Floor  
Tower Building Empire State Plaza  
Albany, New York 12237

14. NYSDEC

New York State Department of Environmental Conservation  
Room 136  
50 Wolf Road  
Albany, New York 12233-3245

15. NYSDOL

State of New York Department of Labor  
Division of Safety and Health  
Asbestos Control Program  
State Campus  
Building 12  
Albany, New York 12240

16. OSHA

Occupational Safety and Health Administration  
(US Department of Labor)  
New York Regional Office - room 3445  
1515 Broadway  
New York, New York 10036

17. UL

Underwriters Laboratories  
333 Pfingsten Road  
Northbrook, Illinois 60062

B. Federal Regulations: Those which govern asbestos abatement work or hauling and disposal of asbestos waste materials:

1. U.S. Department of Labor, Occupational Safety and Health Administration, (OSHA):

a. Asbestos Regulations

Title 29, Part 1910, of the Code of Federal Regulations.

b. Respiratory Protection

Title 29, Part 1910, Section 134 of the Code of Federal Regulations.

- c. Construction Industry  
Title 29, Part 1926, of the Code of Federal Regulations.
  - d. Access to Employee Exposure & Medical Records  
Title 29, Part 1910, Section 20 of the Code of Federal Regulations.
  - e. Hazard Communication  
Title 29, Part 1910, Section 1200 of the Code of Federal Regulations.
  - f. Specifications for Accident Prevention Signs and Tags  
Title 29, Part 1910, section 145 of the Code of Federal Regulations.
2. U.S. Environmental Protection Agency (EPA):
- a. Asbestos Hazard Emergency Response Act (AHERA) Regulation Asbestos Containing Materials in Schools Final Rule & Notice Title 40, Part 763, Subpart E of the Code of Federal Regulations.
  - b. Worker Protection Rule  
40 CFR Part 763, Subpart G, CPTS 62044, FLR 2843-9  
Federal Register, Vol. 50, No. 134, 7/12/85, P28530-28540
  - c. Regulation for Asbestos  
Title 40, Part 61, Subpart A of the Code of Federal Regulations
  - d. National Emission Standard for Asbestos  
Title 40, Part 61, Subpart M (Revised Subpart B) of the Code of Federal Regulations
  - e. Resource Conservation and Recovery Act (RCRA) 1976, 1980  
Hazardous and Solid Waste Amendments (HSWA) 1984  
Subtitle D, Subtitle C
3. U.S. Department of Transportation (DOT):
- a. Hazardous Substances: Final Rule Regulation 49 CFR, Part 171 and 172.
- C. State Regulations: Those which govern asbestos abatement work or hauling and disposal of asbestos waste materials:
- 1. New York State Department of Environmental Conservation (DEC) Regulations regarding waste collection registration. Title 6, Part 364 of the New York State Official Compilation of Codes, Rules and Regulations - 6NYCRR 364.
  - 2. New York State Right-To-Know Law
  - 3. New York State Department of Labor Asbestos Regulations Industrial Code Rule 56.
  - 4. New York State Department of Health, Title 10 Part 73 Asbestos Safety Program Requirements.
- D. Standards: Those which govern asbestos abatement work or hauling and disposal of asbestos waste materials:
- 1. American National Standards Institute (ANSI)
-

- a. Fundamentals Governing the Design and Operation of Local Exhaust Systems  
Publication Z9.2-79
  - b. Practices for Respiratory Protection  
Publication Z88.2-80
- E. Guidance Documents: Those that discuss asbestos abatement work or hauling, and disposal of asbestos waste materials are listed below only for the Abatement Contractor's information. These documents do not describe the work and are not a part of the work of this contract.
- EPA:
- 1. Guidance for Controlling Asbestos Containing Materials in Buildings (Purple Book)  
EPA560/5-85-024.
  - 2. Asbestos Waste Management Guidance EPA 530-SW-85-007.
- F. Patents and Royalties: The Abatement Contractor shall pay all royalties and/or license fees. The Abatement Contractor shall defend all suits and claims for infringement of any patent rights and save the Owner and Consultant harmless from loss including attorney fees on account thereof.

#### 1.06 DEFINITIONS

As used in or in connection with these specifications the following are terms and definitions.

**Abatement** - Procedure to control release from asbestos material. This includes removal, encapsulation and enclosure.

**Aggressive sampling** - A method of sampling in which the person collecting the air sample creates activity by the use of mechanical equipment during the sampling period to stir up settled dust and simulate activity in that area of the building.

**AIHA** - The American Industrial Hygiene Association, 475 Wolf Ledges Parkway, Akron, Ohio 44311.

**Airlock** - A system for permitting entrance and exit while restricting air movement between a containment area and an uncontaminated area. It consists of two curtained doorways separated by a distance of at least three feet such that one passes through one doorway into the airlock, allowing the doorway sheeting to overlap and close off the opening before proceeding through the second doorway, thereby preventing flow-through contamination.

**Air sampling** - The process of measuring the content of a known volume of air collected during a specific period of time.

**Amended water** - Water to which a surfactant has been added.

**Approved asbestos safety program** - A program approved by the Commissioner of Health providing training in the various disciplines that may be involved in an asbestos project.

**Area air sampling** - Any form of air sampling or monitoring where the sampling device is placed at some stationary location.



**Asbestos** - Any naturally occurring hydrated mineral silicate separable into commercially usable fibers, including chrysotile (serpentine), amosite (cumingtonite-gunerite), crocidolite (riebeckite), tremolite, anthophyllite and actinolite.

**Asbestos contract** - An oral or written agreement contained in one or more documents for the performance of work on an asbestos project and includes all labor, goods and service.

**Asbestos handler** - An individual who installs, removes, applies, encapsulates, or encloses asbestos or asbestos material, or who disturbs friable asbestos. Only individuals certified by NYS Department of Labor shall be acceptable for work under this specification.

**Asbestos handling certificate** - A certificate issued by the Commissioner of Labor of the State of New York, to a person who has satisfactorily completed an approved asbestos safety program.

**Asbestos project** - Work undertaken by a contractor which involves the installation, removal, encapsulation, application or enclosure of any ACM or the disturbance of friable ACM.

**Asbestos Safety Technician (AST)** - Individual designated to represent the Consultant, perform third party monitoring and perform compliance monitoring at the job site during the asbestos project.

**Asbestos waste material** - Asbestos material or asbestos contaminated objects requiring disposal.

**Authorized visitor** - The building owner, his or her representative or any representative of a regulatory or other agency having jurisdiction over the project.

**Background level monitoring** - A method used to determine ambient airborne concentrations inside and outside of a building or structure prior to starting an abatement project.

**Building owner** - The person in whom legal title to the premises is vested unless the premises are held in land trust, in which instance Building Owner means the person in whom beneficial title is vested.

**Clean room** - An uncontaminated area or room that is a part of the personal decontamination enclosure with provisions for storage of persons' street clothes and protective equipment.

**Cleanup** - The utilization of HEPA vacuuming to control and eliminate accumulations of asbestos material and asbestos waste material.

**Clearance air monitoring** - The employment of aggressive sampling techniques with a volume of air collected to determine the airborne concentration of residual fibers upon conclusion of an asbestos abatement project.

**Commissioner** - Commissioner of the New York State Department of Labor.

**Contractor** - A company, unincorporated association, firm, partnership or corporation and any owner or operator thereof, which engages in an asbestos project or employs persons engaged in an asbestos project.

**Curtained doorway** - A device that consists of at least three overlapping sheets of plastic over an existing or temporarily framed doorway. One sheet shall be secured at the top and left side, the second sheet at the top and right side, and the third sheet at the top and the left side. All sheets shall have weights attached to the bottom to ensure that the sheets hang straight and maintain a seal over the doorway when not in use.

**Decontamination enclosure system** - A series of connected rooms, separated from the work area and from each other by air locks, for the decontamination of persons, materials, equipment, and authorized visitors.

**Encapsulant (sealant) or encapsulating agent** - A liquid material that can be applied to asbestos material and which prevents the release of asbestos from the material by creating a membrane over the surface.

**Enclosure** - The construction of airtight walls, ceilings and floors between the asbestos material and the facility environment, or around surfaces coated with asbestos materials, or any other appropriate procedure that prevents the release of asbestos materials.

**Equipment room** - A contaminated area or room that is part of the personal decontamination enclosure system with provisions for the storage of contaminated clothing and equipment.

**Fixed object** - A unit of equipment, furniture or other fixture in the work area which cannot be readily removed from the work area.

**Friable Asbestos Material** - That condition of crumbled, pulverized, powdered, crushed or exposed asbestos capable of being released into the air by hand pressure.

**Friable material containment** - The encapsulation or enclosure of any friable asbestos material.

**Glovebag technique** - A method for removing asbestos material from heating, ventilating, and air conditioning (HVAC) ducts, piping runs, valves, joints, elbows, and other nonplanar surfaces in a noncontained work area. The glovebag assembly is a manufactured device consisting of a glovebag constructed of at least six mil transparent plastic, two inward-projecting longsleeve gloves, which may contain an inward projecting waterwand sleeve, an internal tool pouch, and an attached, labeled receptacle or portion for asbestos waste. The glovebag is constructed and installed in such a manner that it surrounds the object or area to be decontaminated and to contain all asbestos fibers released during the abatement process.

**HEPA filter** - A high efficiency particulate air filter capable of trapping and retaining 99.97 percent of particulate greater than 0.3 microns equivalent aerodynamic diameter.

**HEPA vacuum equipment** - Vacuuming equipment with a high efficiency particulate air filtration system.

**Holding area** - A chamber in the waste decontamination enclosure located between the washroom and an adjacent uncontaminated area.

**Homogeneous work area** - A site within the abatement work area that contains one type of asbestos material and where one type of abatement is used.

**Large asbestos project** - An asbestos project involving the installation, removal, disturbance, enclosure, or encapsulation of 160 square feet or more of asbestos or asbestos material or 260 linear feet or more of asbestos or asbestos material.

**Minor asbestos project** - An asbestos project involving the installation, removal, disturbance, enclosure, or encapsulation of 10 square feet or less of asbestos or asbestos material, or 25 linear feet or less of asbestos or asbestos material.

**Movable object** - A unit of equipment, furniture or fixture in the work area that can be readily removed from the work area.

**Negative air pressure equipment** - A local exhaust system equipped with HEPA filtration. The system shall be capable of creating and maintaining a negative pressure differential between the outside and the inside of the work area.

**Non-asbestos material** - Any material containing one percent or less asbestos by weight.

**Occupied area** - Any frequented portion of the work site where abatement is not taking place.

**Outside air** - The air outside the building or structure.

**Personal air monitoring** - A method used to determine an individual's exposure to airborne contaminants. The sample is collected outside the respirator in the person's breathing zone.

**Plasticize** - To cover floors, walls, ceilings and other surfaces with 6 mil fire retardant plastic sheeting as herein specified.

**Project** - Any form of work performed in connection with the abatement of asbestos or alteration, renovation, modification or demolition of a building or structure that may disturb asbestos or asbestos material.

**Removal** - The stripping of any asbestos material.

**Repair** - Corrective action using required work practices to control fiber release from damaged areas.

**Respiratory protection** - Respiratory protection required of licensed asbestos workers and authorized visitors in accordance with the applicable laws.

**Satisfactory clearance air monitoring results** - For all post- abatement samples, airborne concentrations of total fibers that are less than 0.01 fibers per cubic centimeter or background levels, whichever are greater, using phase contrast microscopy (PCM).

**Shower room** - A room between the clean room and the equipment room in the personal decontamination enclosure with hot and cold running water controllable at the top and arranged for complete showering during decontamination.

**Small asbestos project** - An asbestos project involving the installation, removal, disturbances, enclosure, or encapsulation of more than 10 and less than 160 square feet of asbestos or asbestos material of more than 25 and less than 260 linear feet of asbestos or asbestos material.

**Staging area** - The area near the waste transfer airlock where containerized asbestos waste has been placed prior to removal from the work area.

**Surfactant** - A chemical wetting agent added to water to improve its penetration.

**Visible emissions** - An emission of particulate material that can be seen without the aid of instruments.

**Washroom** - A room between the work area and the holding area in the waste decontamination enclosure system, where equipment and waste containers are wet cleaned and/or HEPA vacuumed.

**Waste decontamination enclosure system** - An area, consisting of a washroom and a holding area, designated for the controlled transfer of materials and equipment.

**Wet cleaning** - The process of eliminating asbestos contamination from surfaces, equipment or other objects by using cloths, mops, or other cleaning tools.

**Work area** - Designated rooms, spaces, or areas where asbestos abatement takes place.

**Work site** - Premises where asbestos abatement is taking place.

**Work Surface** - Substrate surface from which asbestos-containing material has been removed.

#### **1.07 UTILITIES, SERVICE AND TEMPORARY FACILITIES**

- A. The Owner shall make available to the Abatement Contractor all reasonable amounts of water and electrical power at no charge.
- B. The Abatement Contractor shall provide, at his own expense, all electrical, water, and waste connections, extensions, and construction materials, supplies, etc. All connections must be approved in advance by the Owner and all work relative to the utilities must be in accordance with the applicable building codes.
- C. The Abatement Contractor shall provide scaffolding, ladders and staging, etc. as necessary to accomplish the work of this contract. The type, erection and use of all scaffolding, ladders and staging, etc. shall comply with all applicable OSHA provisions.
- D. All connections to the Owner's water system shall include reduced pressure backflow protection or double check and double gate valves. Valves shall be temperature and pressure rated for operation of the temperatures and pressures encountered. After completion of use, connections and fittings shall be removed without damage or alteration to existing water piping and equipment. Leaking or dripping valves shall be piped to the nearest drain or located over an existing sink or grade where water will not damage existing finishes or equipment.
- E. The Abatement Contractor shall use only heavy-duty abrasion resistant hoses with a pressure rating greater than the maximum pressure of the water distribution system to provide water to each work area and to each decontamination unit. Provide fittings as required to allow for connection to existing wall hydrants or spouts, as well as temporary water heating equipment, branch piping, showers, shut-off nozzles and equipment. All water must be shut off at the end of each shift.
- F. The Abatement Contractor shall provide service to decontamination unit electrical subpanel with minimum 60-amp, 2 pole circuit breaker or fused disconnect and ground-fault circuit interrupters (GFCI), reset button and pilot light, connected to the building's main distribution panel. Subpanel and disconnect shall be sized and equipped to accommodate all electrical equipment required for completion of the work. This electrical subpanel shall be used for hot water heater, PAPR battery recharging and air sampling pumps.

- G. The Abatement Contractor shall provide UL rated 40-gallon electric hot water heater to supply hot water for the decontamination unit shower. Activate from 30-amp circuit breaker on the electrical subpanel located within the decontamination unit. Provide with relief valve compatible with water heater operation, relief valve down to drip pan on floor with type L copper. Wiring of the hot water heater shall follow NEMA, NEC, and UL standards.
- H. The Abatement Contractor shall provide identification warning signs at power outlets, which are other than 110-120-volt power. Provide polarized outlets for plug-in type outlets, to prevent insertion of 110-120 plugs into higher voltage outlets. Dry transformers shall be provided where required to provide voltages necessary for work operations. All outlets or power supplies shall be protected by ground fault circuit interrupter (GFCI) at the power source.
- I. The Abatement Contractor shall use only grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Use single lengths or use waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas of work.
- J. The Abatement Contractor shall provide general service incandescent lamps of wattage indicated or required for adequate illumination; Protect lamps with guard cages or tempered glass enclosures; Provide exterior fixtures where fixtures are exposed to moisture.
- K. The Abatement Contractor shall provide temporary heat or air conditioning as necessary to maintain comfortable working temperatures inside and immediately outside the work areas. Heating and A/C equipment shall have been tested and labeled by UL, FM or another recognized trade association related to the fuel being used. Fuel burning heaters shall not be used inside containment areas. The Contractor shall also provide a comfortable working environment for occupied areas that are impacted by the asbestos removal.
- L. The Abatement Contractor shall comply with recommendations of the NFPA standard in regard to the use and application of fire extinguishers. Locate fire extinguishers where they are most convenient and effective for their intended purpose but provide not less than one extinguisher in each work area, equipment room, clean room and outside the work area.

## **1.08 REMOVAL OF FIXTURES**

- A. In locations where the Abatement Contractor is directed to dispose of fixtures, he shall either decontaminate the fixtures and dispose of them as non-asbestos containing materials or he shall place them in an appropriate container and dispose of them as asbestos containing material.
- B. In locations where the Abatement Contractor is directed to remove and reinstall fixtures, the fixtures shall be removed, decontaminated, labeled, protected with plastic and stored by the contractor in a location as directed by the Owner.
- C. Upon completion of the asbestos removal and upon receiving satisfactory clearance air monitoring results, all items to be replaced shall be restored to their original location and reinstalled by the Abatement Contractor.

## **PART 2 – PRODUCTS**

### **2.01 MATERIALS AND EQUIPMENT**

#### **A. GENERAL REQUIREMENTS**

- 1. Materials shall be stored off the ground, away from wet or damp surfaces and under protective cover to prevent damage or contamination.

2. Damaged or deteriorating materials shall not be used and shall be removed from the premises.
3. Power tools used to drill, cut into, or otherwise disturb asbestos material shall be equipped with HEPA filtered local exhaust ventilation.
4. The Abatement Contractor shall make available to authorized visitors, ladders and/or scaffolds of sufficient dimension and quantity so that all work surfaces can be easily and safely reached for inspection. Scaffold joints and ends shall be sealed with tape to prevent incursion of asbestos. Scaffolds and ladders shall comply with all applicable codes.

**B. PLASTIC BARRIERS (POLYETHYLENE)**

1. In sizes and shapes to minimize the number of joints.
  - a. Six mil. (.006") fire-retardant for vertical protection (walls, entrances and openings).
  - b. Six mil. (.006") fire-retardant for horizontal protection (fixed equipment) and heating grilles.
  - c. Six mil. (.006") reinforced fire-retardant for floors of decon units.
2. Provide two (2) layers over all roof, wall and ceiling openings. Floor penetrations shall be sealed with a rigid material prior to plasticizing to prevent tripping and fall hazards. All seams within a layer shall be separated by a minimum distance of six feet and sealed airtight. All seams between layers shall be staggered.
3. Barrier Attachment - Commercially available duct tape (fabric or paper) and spray-on adhesive. Duct tape shall be capable of sealing joints of adjacent sheets of plastic, facilitating attachment of plastic sheets to finished or unfinished surfaces of dissimilar materials and adhering under both dry and wet conditions.

**C. SIGNS**

1. Danger signs shall be provided and shall conform to 29 CFR 1926.1101 and be 14" x 20". These signs shall bear the following information:

|                                                                                                                                                                            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p style="text-align: center;"><b>DANGER<br/>ASBESTOS<br/>CANCER AND LUNG DISEASE HAZARD<br/>RESPIRATORS AND PROTECTIVE<br/>CLOTHING<br/>ARE REQUIRED IN THIS AREA</b></p> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**D. DANGER LABELS AND TAPE**

1. Labels shall be affixed to any asbestos contaminated material in accordance with the requirements of 29 CFR 1910.1200 (f) of OSHA's Hazard Communication Standard, and shall contain the following information:

**DANGER  
CONTAINS ASBESTOS FIBERS  
AVOID BREATHING DUST  
CANCER AND LUNG DISEASE HAZARD**

2. A label shall be affixed on each container of asbestos waste in accordance with the requirements of 49 CFR Parts 171 and 172, Hazardous Substances; Final Rule (U.S. Department of Transportation), and shall contain the following information:

**RQ HAZARDOUS SUBSTANCE  
SOLID, NOS, ORM-E, NA 9188  
(ASBESTOS)**

3. A label shall be affixed on each container of asbestos waste in accordance with the requirements of 40 CFR Part 61.150, NESHAP; Asbestos; Final Rule (USEPA) and shall contain the name of the waste generator and the location at which the waste was generated.

NOTE: All containers marked as above (1,2 and 3) shall be disposed of as asbestos waste.

4. Provide 3" red barrier tape printed with black lettered "DANGER ASBESTOS REMOVAL". Locate barrier tape across all corridors, entrances and access routes to asbestos work area.

#### E. PROTECTIVE EQUIPMENT

##### 1. Respiratory Requirements

- a. Where fiber levels permit, and in compliance with regulatory requirements, Powered Air Purifying Respirators are the minimum allowable respiratory protection permitted to be utilized during removal operations.
- b. Where not in violation of NIOSH, OSHA, and any other regulatory requirements, the Abatement Contractor shall provide the following minimum respiratory protection to the maximum use concentrations indicated:

| <u>MSHA/NIOSH Approved<br/>Respiratory Protection</u>                         | <u>Maximum Use<br/>Concentration</u> |
|-------------------------------------------------------------------------------|--------------------------------------|
| Half-Mask Air Purifying<br>with HEPA Filters                                  | 10x PEL                              |
| Full-Facepiece Air Purifying<br>HEPA Filters and Quantitative<br>Fit Test     | 10x PEL                              |
| Powered Air Purifying (PAPR),<br>Loose fitting Helmet or Hood,<br>HEPA Filter | 25x PEL                              |
| Powered Air Purifying (PAPR),<br>Full Facepiece, HEPA Filter                  | 50x PEL                              |

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|                                                                                                       |           |
|-------------------------------------------------------------------------------------------------------|-----------|
| Supplied Air, Continuous Flow<br>Loose fitting Helmet or Hood                                         | 25x PEL   |
| Supplied Air, Continuous Flow<br>Full Facepiece, HEPA Filter                                          | 50x PEL   |
| Full Facepiece-Supplied Air<br>Pressure Demand, HEPA Filter                                           | 100x PEL  |
| Full Facepiece-Supplied Air<br>Pressure Demand, with Aux. SCBA,<br>Pressure Demand or Continuous Flow | >100x PEL |

2. Disposable Clothing -"Tyvek" manufactured by Dupont or approved equal.
3. NIOSH approved safety goggles to protect eyes.
4. Polyethylene bags, 6 mil. (.006") thick (use double bags).

NOTE: Workers must always wear disposable coveralls and respirator masks while in the work area. Contaminated coveralls or equipment must be left in work area and not worn into other parts of the building.

#### F. TOOLS AND EQUIPMENT

1. Airless Sprayer - An airless sprayer, suitable for application of encapsulating material, shall be used.
2. Scaffolding - Scaffolding, as required to accomplish the specified work, shall meet all applicable safety regulations.
3. Transportation Equipment - Transportation equipment, as required, shall be suitable for loading, temporary storage, transport and unloading of contaminated waste without exposure to persons or property. Watertight, hard wall containers shall be provided to retain and dispose of any asbestos waste material with sharp-edged components that may tear plastic bags or sheeting. The containers shall be marked with danger labels.
4. Surfactant - Wetting Agents - "Asbestos-Wet" - Aquatrols Corp. of America or approved equal and shall be non-carcinogenic.
5. Portable (negative air pressure) asbestos filtration system - by Micro-Trap or approved equal.
6. Vacuum, HEPA type equal to "Nilfisk" #GA73, or "Pullman/Holt" #75 ASA.
7. Amended Water Sprayer - The water sprayer shall be an airless or other low-pressure sprayer for amended water application.
8. Other Tools and Equipment - The Abatement Contractor shall provide other suitable tools for the stripping, removal, encapsulation, and disposal activities including but not limited to: hand-held scrapers, nylon brushes, sponges, rounded edge shovels, brooms, and carts.



### **PART 3 – EXECUTION**

#### **3.01 PRE-ABATEMENT WORK AREA PREPARATION**

- A. The work area shall be vacated by the occupants prior to work area preparation and not reoccupied until satisfactory clearance air monitoring results have been achieved.
- B. Caution signs shall be posted at all locations and approaches to a location where airborne concentrations of asbestos may exceed ambient background levels. Signs shall be posted that permit a person to read the sign and take the necessary protective measures to avoid exposure.
- C. Shut down and lock out electric power to all work areas. The Abatement Contractor shall provide temporary power and lighting and ensure safe installation of temporary power sources and equipment used where high humidity and/or water shall be sprayed in accordance with all applicable codes. All power to work areas shall be brought in from outside the area through a ground-fault interrupter at the source.
- D. Isolate the work area HVAC system.
- E. The personnel decontamination enclosure system shall be installed or constructed prior to preparatory work in the work area and in particular before the disturbance of asbestos material. The waste decontamination enclosure system shall be installed or constructed prior to commencement of abatement activities.
- F. Movable objects within the work area shall be pre-cleaned using HEPA filtered vacuum equipment and/or wet cleaning and such objects shall be removed from the work area to an uncontaminated location. If disposed of as asbestos waste material, cleaning is not required.
- G. Fixed objects and other items, which are to remain within the work area, shall be pre-cleaned using HEPA filtered vacuum equipment and/or wet cleaning. Such objects shall be enclosed with two layers of at least six mil plastic sheeting and sealed with tape.
- H. The work area shall be pre-cleaned using HEPA filtered vacuum equipment and/or wet cleaning. Methods that raise dust, such as dry sweeping or vacuuming with equipment not equipped with HEPA filters, shall be prohibited. Asbestos material shall not be disturbed during pre-cleaning.
- I. Isolation barriers that seal off all openings, including windows, corridors, doorways, ducts, and any other penetrations of the work area, shall be constructed using two layers of at least six mil fire-retardant plastic sheeting sealed with tape. Also, all seams in mechanical system components that pass through the work area shall be sealed. Doorways and corridors, which shall not be used for passage during work, shall also be sealed.
- J. Removal of mounted objects. After isolation barriers are in place, objects such as light fixtures, electrical track, alarm systems, ventilation equipment and other items not previously sealed, shall be double sealed with six mil fire-retardant plastic sheeting. Localized HEPA filtered vacuum equipment shall be used during fixture removal to reduce asbestos dispersal.
- K. Individual roof and floor drains shall be sealed watertight using two layers of 6-mil fire-retardant plastic sheeting and tape prior to plasticizing. Openings in floor shall be fully covered with plywood sheeting secured to the floor in such a way as to minimize a tripping hazard prior to plasticizing.
- L. Emergency and fire exits from the work area shall be maintained or alternate exits shall be established according to all applicable codes.

- M. Adequate toilet facilities shall be supplied by the Abatement Contractor and shall be located either in the clean area of the personnel decontamination enclosure or shall be readily accessible to the personnel decontamination enclosure.

**3.02 LARGE ASBESTOS PROJECT PERSONNEL DECONTAMINATION ENCLOSURE SYSTEM  
(ICR 56-7.5)**

- A. The personnel decontamination enclosure shall be constructed prior to preparatory work in the work area and in particular before the disturbance of asbestos material.
1. Construction and use of personnel decontamination enclosure systems shall be in accordance with ICR-56 and any Applicable or Site-Specific Variances utilized on this project. Such systems may consist of existing rooms outside of the work area, if the layout is appropriate, that can be enclosed is plastic sheeting and are accessible from the work area. When this situation does not exist, enclosure systems may be constructed out of metal, wood or plastic support.
  2. The personnel decontamination enclosure system shall consist of a clean room, a shower room, and an equipment room, in series, separated from each other and from the work area by three airlocks.
  3. There shall be one shower per six full shift abatement persons calculated on the basis of the largest shift.
  4. The personnel decontamination enclosure system shall be fully framed, sheathed for safety and constructed to prevent unauthorized entry.
  5. Personnel decontamination enclosure systems constructed at the work site shall utilize at least six mil fire-retardant opaque plastic sheeting. At least two layers of six mil fire-retardant reinforced plastic sheeting shall be used for the flooring of this area.
  6. All prefabricated decontamination units shall be completely decontaminated and sealed prior to separation and removal from the work area. Mobile decontamination units shall remain in place until satisfactory clearance results have been attained.
  7. The clean room shall be sized to accommodate all authorized persons. Benches, lockers and hooks shall be provided for street clothes. Shelves for storing respirators shall also be provided. Clean clothing, replacement filters for respirators, towels and other necessary items shall be provided. The clean room shall not be used for the storage of tools, equipment or materials. It shall not be used for office space. A lockable door shall be provided to permit access to the clean room from outside the work area or enclosure. It shall be used to secure the work area and decontamination enclosure during off-shift hours.
  8. The shower room shall contain one or more showers. Each shower head shall be supplied with hot and cold water adjustable at the tap. The shower enclosure shall be constructed to ensure against leakage of any kind. Uncontaminated soap, shampoo and towels shall be available at all times. Shower water shall be drained, collected and filtered through a system with at least 5.0 micron particle size collection capability. A system containing a series of several filters with progressively smaller pore sizes shall be used to avoid rapid clogging of the filtration system by large particles. Filtered wastewater shall be discharged in accordance with applicable codes. Contaminated filters shall be disposed of as asbestos waste. The shower room shall be constructed in such way that travel through the decontamination unit shall be through the shower.

9. The equipment room shall be used for the storage of equipment and tools after decontamination using a HEPA filtered vacuum and/or wet cleaning. A one day supply of replacement filters, in sealed containers, for HEPA vacuums and negative pressure ventilation equipment, extra tools, containers of surfactant and other materials and equipment that may be required during the abatement project may also be stored here. A walk-off pan filled with water shall be located in the work area just outside the equipment room for persons to clean foot covering when leaving the work area. A drum lined with a labeled, at least six mil plastic bag is required for collection of clothing and shall be located in this room. Contaminated footwear and work clothes shall be stored in this area.

### **3.03 WASTE DECONTAMINATION ENCLOSURE SYSTEM (ICR 56-7.5)**

#### **A. General Requirements**

1. A waste decontamination enclosure system shall consist of the following:
  - a. A washroom/cleanup room shall be constructed with an airlock doorway to the work area and another airlock doorway to the holding area.
  - b. The holding area shall be constructed with an airlock doorway to the washroom/cleanup room and another lockable door to the outside.
2. Where there is only one egress from the work area, the holding area of the waste decontamination enclosure system may branch off from the equipment decontamination room, which doubles as a waste washroom, of the personnel decontamination enclosure.
3. The waste washroom shall be equipped with a drain installed to collect water and deliver it to the shower drain where it shall be filtered through a system with at least 5.0 micron particle size collection capability. A system containing a series of several filters with progressively smaller pore sizes shall be used to avoid rapid clogging of the filtration system by large particles. Filtered wastewater shall be discharged in accordance with applicable codes. Contaminated filters shall be disposed of as asbestos waste.
4. The waste washroom shall be constructed in such a way that travel through the rooms shall be through the waste washroom

### **3.04 WORK AREA ENTRY AND EXIT PROCEDURES**

- #### **A. The following procedures shall be followed throughout the asbestos abatement project until satisfactory clearance air monitoring results have been achieved:**
1. All persons shall enter and exit the work area through the personnel decontamination enclosure system.
  2. All persons who enter the work area or an enclosure shall sign the entry/exit log, located in the clean room, upon every entry and exit.
  3. All persons, before entering the work area, or an enclosure shall read and be familiar with all posted regulations, personal protection requirements, including work area entry and exit procedures, and emergency procedures. The entry/exit log headings shall indicate, and the signatures shall be used to acknowledge, that these have been reviewed and understood by all persons prior to entry.

4. All persons shall proceed first to the clean room, remove all street clothing, store these items in clean sealable plastic bags or lockers and don coveralls, head covering, foot covering and gloves. All persons shall also don NIOSH approved respiratory protection. Clean respirators and protective clothing shall be utilized, by each person, for each separate entry into the work area. Respirators shall be inspected prior to each use and tested for proper seal using quantitative or qualitative fit checks.
5. Persons wearing designated personal protective equipment shall proceed from the clean room through the shower room to the equipment room, where necessary tools are collected and any additional clothing shall be donned, before entry into the work area.
6. Before leaving the work area, all persons shall remove gross contamination from the outside of respirators and protective clothing by brushing, wet cleaning, and/or HEPA vacuuming.
7. Persons shall proceed to the equipment room where all coveralls, head covering, foot covering and gloves shall be removed. Disposable clothing shall be deposited into labeled containers for disposal. Reusable contaminated clothing, footwear, head gear and gloves shall be stored in the equipment room when not being used in the work area.
8. Still wearing respirators, persons shall proceed to the shower area, clean the outside of the respirator and the exposed face area under running water prior to removal of the respirator, and then fully and vigorously shower and shampoo to remove residual asbestos contamination. Respirators shall be washed thoroughly with soap and water. Some types of respirators will require slight modification of these procedures. An airline respirator with HEPA filtered disconnect protection shall be disconnected in the equipment room and worn into the shower. A powered air-purifying respirator facepiece shall be disconnected from the filter/power pack assembly prior to entering the shower.
9. After showering and drying, all persons shall proceed to the clean room and don clean personal protective equipment if returning to the work area or street clothing if exiting the enclosure.

### **3.05 EQUIPMENT AND WASTE CONTAINER DECONTAMINATION & REMOVAL PROCEDURES**

- A. The following procedures shall be followed throughout the asbestos abatement project until satisfactory clearance air monitoring results have been achieved.
  1. External surfaces of contaminated containers and equipment shall be cleaned by wet cleaning and/or HEPA vacuuming in the work area before moving such items into the waste decontamination enclosure system airlock by persons assigned to this duty. These work area persons shall not enter the airlock.
  2. These contaminated items shall be removed from the airlock by persons stationed in the washroom during waste removal operations. These washroom persons shall remove gross contamination from the exterior of their respirators and protective clothing by brushing, HEPA vacuuming and/or wet cleaning.
  3. Once in the waste decontamination enclosure system, external surfaces of contaminated containers and equipment shall be cleaned a second time by wet cleaning.
  4. The cleaned containers of asbestos material and equipment are to be dried of any excessive pooled or beaded liquid, placed in uncontaminated plastic bags or sheeting and sealed airtight.

5. The clean recontainerized items shall be moved into the airlock that leads to the holding area. The washroom persons shall not enter this airlock or the work area until waste removal is finished for that period.
6. Containers and equipment shall be moved from the airlock and into the holding area by persons dressed in clean personal protective equipment, who have entered from uncontaminated areas.
7. The cleaned containers of asbestos material and equipment shall be placed in water tight carts with doors or tops that shall be closed and secured. These carts shall be held in the holding area pending removal. The carts shall be wet cleaned and/or HEPA vacuumed at least once each day.
8. The exit from the decontamination enclosure system shall be secured to prevent unauthorized entry.
9. Where the waste removal enclosure is part of the personnel decontamination enclosure, waste removal shall not occur during shift changes or when otherwise occupied. Precautions shall be taken to prevent short circuiting and cycling of air outward through the shower and clean room.
10. Containers labeled with Asbestos hazard warnings shall not be used to dispose of non asbestos waste.

### **3.06 ENGINEERING CONTROLS**

#### **A. Ventilation.**

1. The Abatement Contractor shall employ HEPA equipped vacuums or negative air pressure equipment for ventilation as required.
2. All negative air pressure equipment ventilation units shall be equipped with HEPA filtration. The Contractor shall provide a manufacturer's test certificate for each unit documenting the capability of trapping and retaining 99.97 percent of asbestos fibers greater than 0.3 microns equivalent aerodynamic diameter.
3. A power supply shall be available to satisfy the requirements of the total of all ventilating units.
4. On electric power failure, abatement shall stop immediately and shall not resume until power is restored and exhaust units are operating fully. On extended power failure, longer than one hour, the decontamination facilities, after the evacuation of all persons from the work area, shall be sealed airtight.
5. If extending the exhaust of the ventilation units 50 feet from the building would result in an exhaust location either in the road, blocking driveway access to the facility or within 50 feet of other buildings, a second unit will be run in series with the primary unit.

### **3.07 MAINTENANCE OF DECONTAMINATION ENCLOSURE SYSTEMS AND WORK AREA BARRIERS**

#### **A. GENERAL REQUIREMENTS**

1. The Consultant must review and approve installation before commencement of work. Upon completion of the construction of all plastic barriers and decontamination system enclosures and prior to beginning actual abatement activities.

2. All plastic barriers inside the work area, in the personnel decontamination enclosure system, in the waste decontamination enclosure system and at partitions constructed to isolate the work area from occupied areas, shall be inspected by the asbestos supervisor at least twice daily. The barriers shall be inspected before the start of and following the completion of the day's abatement activities. Inspections and observations shall be documented in the project log.
3. Damage and defects in the barriers and/or enclosure systems shall be repaired immediately upon discovery and prior to resumption of abatement activities.
4. At any time during the abatement activities, if visible emissions are observed outside of the work area or if damage occurs to the barriers, work shall be stopped, repairs made and visible residue immediately cleaned up using HEPA vacuuming methods prior to the resumption of abatement activities.
5. The Abatement Contractor shall HEPA vacuum and/or wet clean the waste decontamination enclosure system and the personnel decontamination enclosure system at the end of each day of abatement activities.

### **3.08 HANDLING AND REMOVAL PROCEDURES**

The Abatement Contractor may utilize existing provisions of ICR-56, Applicable Variances or a Site-Specific Variance, approved by the Owner's Consultant, to permit the conduct of this work.

### **3.09 ABATEMENT PROCEDURES**

#### **A. AIR SAMPLING - By Owner**

1. Air sampling and analysis shall be conducted according to the requirements of Subpart 56-4 before the start, during and after the completion of the asbestos removal project.
2. In addition to the requirements of Subpart 56-4, air monitoring shall be conducted in accordance with any approved job specific variance(s) or applicable variance utilized.
3. Clearance samples may be analyzed using PCM to maintain compliance with ICR-56.
4. If applicable, clearance samples will be analyzed using TEM to maintain compliance with ICR-56 and 40 CFR 763.90[j].

B. The provisions of the Applicable Variances or a Job Specific Variance shall apply only in those areas where approval has been granted by the NYS DOL and the Contractor has obtained concurrence from the Owner's Consultant. All other applicable provisions of Industrial Code Rule 56-1 through 56-12 shall be complied.

C. A copy of the NYS DOL Job Specific or Applicable Variance, if applicable, shall be conspicuously posted at the work area(s).

D. The Abatement Contractor shall construct a decontamination unit at the work site. The Abatement Contractor shall, as a minimum, comply with the requirements of 29 CFR 1926.1101(j); Hygiene facilities and practices for employees.

### **3.10 ENCAPSULATION PROCEDURES**

The following procedures shall be followed to seal in non-visible residue, after obtaining satisfactory clearance air monitoring results, while conducting lockdown encapsulation on any surfaces which were the subject of removal or other remediation activities:

- A. Only encapsulants rated as acceptable or marginally acceptable on the basis of Battelle Columbus Laboratory test procedures and rating requirements developed under the 1978 USEPA contract shall be used for lockdown encapsulation.
- B. Sealants considered for use in encapsulation shall first be tested to ensure that the sealant is adequate for its intended use. A section of the work surface shall be evaluated following this initial test application of the sealant to quantitatively determine the sealant's effectiveness in terms of penetrating and locking down the asbestos fibers. The American Society of Testing and Materials (ASTM) Committee E06.21.06E on Encapsulation of Building Materials has developed a guidance document to assist in the selection of an encapsulant.
- C. The encapsulant solvent or vehicle shall not contain a volatile hydrocarbon.
- D. Encapsulants shall be applied using airless spray equipment.
  - 1. Spraying is to occur at the lowest pressure range possible to minimize fiber release from encapsulant impact at the surface. It shall be applied with a consistent horizontal or vertical motion.
- E. Encapsulation shall be utilized as a surface sealant once all asbestos containing materials have been removed in a work area. In no event shall encapsulant be applied to any surface that was the subject of removal or other remediation activities prior to obtaining satisfactory clearance air monitoring.

### **3.11 CLEANUP PROCEDURES**

- A. The following cleanup procedures shall be required.
  - 1. Cleanup of accumulations of loose asbestos material shall be performed whenever enough loose asbestos materials have been removed to fill a single leak tight container of the type commensurate with the material properties. In no case shall cleanup be performed less than once prior to the close of each working day. Asbestos material shall be kept wet until cleaned up.
  - 2. Accumulations of dust shall be cleaned off all surfaces on a daily basis using HEPA vacuum cleaning methods.
  - 3. Decontamination enclosures shall be HEPA vacuumed at the end of each shift.
  - 4. Accumulations of asbestos waste material shall be containerized utilizing HEPA vacuums or rubber or plastic dust pans, squeegees or shovels. Metal shovels shall not be used to pick up or move waste.
  - 5. Excessive water accumulation or flooding in the area shall require work to stop until the water is collected and disposed of properly.
- B. The following cleanup procedures shall be required after completion of all removal activities.

1. All accumulations of asbestos waste material shall be containerized utilizing HEPA vacuums or rubber or plastic dust pan, squeegees or shovels. Metal shovels shall not be used to pick up or move waste. HEPA vacuums shall be used to clean all surfaces after gross cleanup.
2. Cleaning. All surfaces in the work area shall be HEPA vacuumed. To pick up excess liquid and wet debris, a wet purpose shop vacuum may be used and shall be decontaminated prior to removal from the work area.
3. Windows, doors, HVAC system vents and all other openings shall remain sealed. Decontamination enclosure systems shall remain in place and be utilized.
4. All containerized waste shall be removed from the work area and the holding area.
5. All tools and equipment shall be decontaminated and removed from the work area.
6. A final visual inspection and clearance air monitoring, as per the schedule for air sampling and analysis, shall be conducted.
7. The isolation barriers and decontamination unit shall be removed only after satisfactory clearance air monitoring results have been achieved.

### **3.12 SAFETY MONITORING – CONSULTANT:**

The Consultant will designate an Asbestos Safety Technician (AST) to represent the Owner during the removal program. The AST must be on the job site at all times during abatement work. Absolutely no abatement or preparation work will occur without the presence of the AST.

The AST will conduct four (4) milestone inspections.

1. Pre-commencement inspection shall be conducted as follows:
  - a. Notification in writing to the Consultant shall be made by the Abatement Contractor to request a pre-commencement inspection at least 48 hours in advance of the desired date of inspection. This inspection shall be requested prior to beginning preparatory work in another work area.
  - b. The AST shall ensure that:
    - i. The job site is properly prepared and that all containment measures are in place;
    - ii. The designated supervisor shall present to the inspector a valid supervisor's license issued by the New York Department of Labor;
    - iii. All workers shall present to the inspector a valid handler's license issued by the New York Department of Labor;
    - iv. Measures for the disposal of removed asbestos material are in place and shall conform to the adopted standards;
    - v. The Abatement Contractor has a list of emergency telephone numbers at the job site which shall include the monitoring firm employed by the Owner and telephone numbers for fire, police, emergency squad, local hospital and health officer.



- c. If all is in order, the AST shall issue a written notice to proceed in the field. If the job site is not in order, then any needed corrective action must be taken before any work is to commence. Conditional approvals shall not be granted.

Progress inspection shall be conducted as follows:

- a. Primary responsibility for ensuring that the abatement work progresses in accordance with these technical specifications and regulatory requirements rests with the Abatement Contractor. The AST shall continuously be present to observe the progress of work and perform required tests.
- b. If the AST observes irregularities at any time, he shall direct such corrective action as may be necessary. If the Abatement Contractor fails to take the corrective action required, or if the Abatement Contractor or any of their employees habitually and/or excessively violate the requirements of any regulation, then the AST shall inform the Owner who shall issue a Stop Work Order to the Abatement Contractor and have the work site secured until all violations are abated.

Clean-up inspections shall be conducted as follows:

- a. Notice for clean-up inspection shall be requested by the Abatement Contractor at least 24 hours in advance of the desired date of inspection;
  - b. The clean-up inspection shall be conducted prior to the removal of any isolation or critical barriers and before final air clearance monitoring;
  - c. The AST shall ensure that:
    - i. The work site has been properly cleaned and is free of visible asbestos containing material and debris.
    - ii. All removed asbestos has been properly placed in a locked secure container outside of the work area.
  - d. If all is in order, the AST shall issue a written notice of authorization to remove surface barriers from the work area. All isolation barriers shall remain in place until satisfactory clearance air sampling has been completed.
4. Clearance Visual Inspection shall be conducted after the removal of non-critical plastic sheeting. The AST shall insure that:
- a. The work area is free of all visible asbestos or suspect asbestos debris and residue.
  - b. All waste has been properly bagged and removed from the work area.
  - c. Should clearance visual inspection identify residual debris, as determined by the AST, the Abatement Contractor is responsible for recleaning the area at his own cost and shall bear all costs of reinspection until acceptable levels are achieved.
- B. The Abatement Contractor shall be required to receive written approval before proceeding after each milestone inspection.

### **3.13 PERSONNEL AIR MONITORING – CONTRACTOR (29 CFR 1926.1101)**

- A. Personnel air monitoring shall be provided to determine both short-term (STEL) and full shift during when abatement activities occur. Personnel sampling shall be performed in each work area in order to accurately determine the concentrations of airborne asbestos to which workers may be exposed.
- B. The Abatement Contractor shall have a qualified "Competent Person" (as specified in 29 CFR 1926 OSHA) to conduct personnel air monitoring.
- C. The laboratory performing the air sample analysis shall be certified by NYS DOH ELAP and approved by the consultant.
- D. Personnel air monitoring test results for OSHA Compliance. Results shall be posted at the work site within 24 hours of testing and copies supplied to the Owner within five (5) days of testing. Abnormalities shall be supplied to the Owner immediately.

### **3.14 CLEARANCE AIR MONITORING**

- A. Air samples will be collected in and around the work areas at the completion of abatement activities.
- B. Clearance samples may be analyzed using PCM to maintain compliance with ICR-56.
- C. If applicable, clearance samples will be analyzed using TEM to maintain compliance with ICR-56 and 40 CFR part 763 "Asbestos-Containing Materials in Schools; Final Rule and Notice" section 763.90.
- D. \*\*\*RETESTING\*\*\*  
Should clearance air monitoring yield fiber concentrations above the "Clearance" criteria of either 0.01 fibers per CC and/or background levels (PCM) –OR- seventy (70) structures per square millimeter (TEM/AHERA), the Abatement Contractor is responsible for re-cleaning the area at his own cost and shall bear all costs associated with the retesting of the work area(s) including monitoring labor, sampling, analysis, etc. until such levels are achieved.

### **3.15 RESPIRATORY PROTECTION REQUIREMENT**

- A. Respiratory protection shall be worn by all individuals inside the work area from the initiation of the asbestos project until all areas have successfully passed clearance air monitoring in accordance with these specifications. The Abatement Contractor shall keep available at all times two PAPR's with new filters and charged batteries for use by authorized visitors.
- B. All respiratory protection shall be MSHA/NIOSH approved in accordance with the provisions of 30 CFR Part II. All respiratory protection shall be provided by the Abatement Contractor and used by workers in conjunction with the written respiratory protection program.
- C. The Abatement Contractor shall provide respirators that meet the requirements of 29 CFR Parts 1910 and 1926.
  - 1. Full facepiece Type C supplied-air respirators operated in pressure demand mode equipped with an auxiliary self- contained breathing apparatus, operated in pressure demand or continuous flow, shall be worn during gross removal, demolition, renovation and/or other disturbance of ACM whenever airborne fiber concentrations inside the work area are greater than 10.0 f/cc.

2. Full facepiece Type C supplied-air respirators operated in pressure demand mode with HEPA filter disconnect protection shall be work during gross removal, demolition, renovation and/or other disturbance of ACM with an amphibole content and/or whenever airborne fiber concentrations inside the work area are equal to or greater than 0.5 f/cc and less than or equal to 10.0 f/cc.
  3. Full facepiece powered air-purifying respirators (PAPR) equipped with HEPA filters shall be worn during the removal, encapsulation, enclosure, repair and/or other disturbance of friable ACM if airborne fiber concentrations inside the work area are less than 0.5 f/cc. A supply of charged replacement batteries, HEPA filters and flow test meter shall be available in the clean room for use with powered air-purifying respirators. HEPA filters shall be changed daily or as flow testing indicates change is necessary. Any Type C supplied-air respirator operated in continuous flow, with HEPA filter disconnect protection, may be substituted for a powered air-purifying respirator.
  4. Loose fitting helmets or hoods with powered air-purifying respirators (PAPR) equipped with HEPA filters may be worn during the removal, encapsulation, enclosure, repair and/or other disturbance of friable ACM if airborne fiber concentrations inside the work area are less than 0.25 f/cc. A supply of charged replacement batteries, HEPA filters and flow test meter shall be available in the clean room for use with powered air-purifying respirators. HEPA filters shall be changed daily or as flow testing indicates change is necessary. Any Type C supplied-air respirator operated in continuous flow may be substituted for a powered air-purifying respirator.
  5. Half-mask or full-face air-purifying respirators with HEPA filters shall be worn only during the preparation of the work area and final clean up procedures provided airborne fiber concentrations inside the work area are less than 0.1 f/cc.
  6. Use of single use dust respirators is prohibited for the above respiratory protection.
- D. Workers shall be provided with personally issued and individually marked respirators. Respirators shall not be marked with any equipment that will alter the fit of the respirator in any way. Only waterproof identification markers shall be used.
- E. The Abatement Contractor shall ensure that the workers are qualitatively or quantitatively fit tested by an Industrial Hygienist initially and every six months thereafter with the type of respirator he/she will be using.
- F. Whenever the respirator design permits, workers shall perform the positive and negative air pressure fit test each time a respirator is worn. Powered air-purifying respirators shall be tested for adequate flow as specified by the manufacturer.
- G. No facial hair, which interferes with the face-to-mask sealing surface, shall be permitted to be worn when wearing respiratory protection that requires a mask-to-face seal.
- H. Contact lenses shall not be worn in conjunction with respiratory protection.
- I. If a worker wears glasses, a spectacle kit to fit their respirator shall be provided by the Abatement Contractor at the Abatement Contractor's expense.
- J. Respiratory protection maintenance and decontamination procedures shall meet the following requirement:
1. Respiratory protection shall be inspected and decontaminated on a daily basis in accordance with OSHA 29 CFR 1910.134(b); and

2. HEPA filters for negative pressure respirators shall be changed after each shower; and
  3. Respiratory protection shall be the last piece of worker protection equipment to be removed. Workers must wear respirators in the shower when going through decontamination procedures; and
  4. Airline respirators with HEPA filtered disconnect shall be disconnected in the equipment room and worn into the shower. Powered air-purifying respirator facepieces shall be worn into the shower. Filtered/power pack assemblies shall be decontaminated in accordance with manufacturers' recommendations; and
  5. Respirators shall be stored in a dry place and in such a manner that the facepiece and exhalation valves are not distorted; and
  6. Organic solvents shall not be used for washing of respirators.
- K. No visitors shall be allowed to enter the contaminated area if they do not have their medical certification and training certificate. Authorized visitors shall be provided with suitable PAPR respirators and instructions on the proper use of respirators whenever entering the work area.

### **3.16 DISPOSAL OF WASTE**

#### **A. APPLICABLE REGULATIONS**

1. All asbestos waste shall be stored, transported and disposed of as per, but not limited to, the following Regulations:
  - a. NYS Code Rule 56
  - b. U.S. Department of Transportation (DOT)  
Hazardous Substances  
Title 29, Part 171 and 172 of the code of Federal Regulations  
regarding waste collector registration
  - c. Regulations regarding waste collector registration Title 6, part 364 of the New York State Official Compilation of Codes, Rules and Regulations – 6 NYCRR 364
  - d. USEPA NESHAPS 40 CRF 61
  - e. USEPA ASBESTOS WASTE MANAGEMENT GUIDANCE EPA/530-SW-85-007

#### **B. TRANSPORTER OR HAULER - The Abatement Contractor shall bear full responsibility for proper characterization, transportation and disposal of all solid or liquid waste, generated during the project, in a legal manner. The Owner shall approve all transportation and disposal methods.**

1. The Abatement Contractor's Transporter (hauler) and disposal site shall be approved by the Owner. The Abatement Contractor shall remove within 48 hours all asbestos waste from the site after completing the clean up.
2. The Transporter must possess and present to the Owner's representative a valid New York State Department of Environmental Conservation Part 364 asbestos hauler's permit to verify license plate and permit numbers. The Owner's representative will verify the authenticity of the hauler's permit with the proper authority.

3. The Abatement Contractor shall give 24 hour notification prior to removing any waste from the site. All waste shall be removed from site only during normal working hours. No waste may be taken from the site without authorization from the Owner's representative.
4. The Abatement Contractor shall have the Transporter give the date and time of arrival at the disposal site.
5. The Transporter with the Abatement Contractor and Owner's consultant shall inspect all material in the transport container prior to taking possession and signing the Waste Manifest. The Transporter shall not have any off-site transfers or be combined with any other off-site asbestos material.
6. The Transporter must travel directly to the disposal site with no unauthorized stops.

C. WASTE STORAGE CONTAINER

1. During loading and on-site storage, the asbestos waste container shall be labeled with EPA Danger signage:

**DANGER  
CONTAINS ASBESTOS FIBERS  
AVOID CREATING DUST  
CANCER AND LUNG DISEASE HAZARD**

2. The NYS DEC Hauler's Permit number shall be on both sides and back of the container.
3. The Container will not be permitted to leave the site without the proper signage.
4. A copy of the completed waste manifest shall be forwarded directly to the Owner's Consultant by the disposal facility.
5. Packaging of Non-friable Asbestos. Use of an open top container shall require written request, by the Contractor, and written approval by the Owners Representative, and be performed in compliance with all applicable regulations.
  - a) A chute, if used, shall be air/dust tight along its lateral perimeter and at the terminal connection to the dumpster at ground level (solid wall and top container). The upper end of the chute shall be furnished with a hinged lid, to be closed when the chute is not being used.
  - b) The container shall be lined with a minimum of two (2) layers of 6 mil. Fire-retardant polyethylene draped loosely over the sides so as to facilitate being wrapped over the top of the load and sealed prior to transport from the site.
  - c) Prior to transport from the work site the Dumpster will be disconnected from the chute and sealed air/dust tight utilizing six mil plastic and tape. The waste material will be transported as an asbestos containing material by appropriate legal methods.
6. Packaging Friable Asbestos.
  - a) The container shall be a solid wall, hard top and lockable container.

- b) The container shall be locked upon arrival at the site to restrict access. Security shall be provided at the entrance to the container during the loading process and immediately locked upon completion.
- c) The interior walls, floor and ceiling shall be lined with two (2) layers of 6 mil. Fire-retardant polyethylene.
- d) The waste shall be loaded in such a manner as to protect the integrity of the individual waste packages.
- e) Prior to transport from the work site the interior of the Dumpster will sealed air/dust tight utilizing six mil plastic and tape. The waste material will be transported as an asbestos containing material by appropriate legal methods.

#### D. WASTE DISPOSAL MANIFEST

- 1. The Asbestos Waste Manifest shall be equivalent to the "Waste Shipment Record" included in 40 CFR 61. A copy of the Contractor's manifest shall be reviewed by the Owner's Consultant and shall be the only manifest used.
- 2. The Manifest shall be verified by the Owner's Consultant indicating that all the information and amounts are accurate and the proper signatures are in place.
- 3. The Manifest shall have the signatures of the Abatement Contractor and the Transporter prior to any waste being removed from the site.
- 4. The Manifest shall be signed by the Disposal Facility owner or operator to certify receipt of asbestos containing materials covered by the manifest.
- 5. A copy of the completed manifest shall be provided by the Abatement Contractor to the Owner's Consultant and remain on site for inspection.
- 6. Abatement Contractor shall maintain a waste disposal log which indicates load number, date and time left site, container size, type of waste, quantity of waste, name of hauler, NYS DES permit number, trailer and tractor license number, and date manifest was returned to Consultant.
- 7. The Disposal Facility owner or operator shall return a signed copy of the Waste Manifest directly to:

**Suffern CSD  
45 Mountain Avenue  
Hillburn, New York 10931  
ATTN: John Palma**

- 8. Copies of the completed Waste Manifest are to be sent by the disposal facility to the Hauler and Abatement Contractor.
- 9. Submit signed dump tickets and manifests with final payment request.
- 10. Final payment request will not be honored without signed dump ticket or manifests accounting for all asbestos waste removed from the site.

E. VIOLATIONS OF SPECIFICATIONS

1. Violations of the safety, hygiene, environmental, procedures herein, any applicable federal, state or local requirements or failure to cooperate with the Owner's representative shall be grounds for dismissal and/or termination of this contract.

F. VIOLATIONS OF NO SMOKING POLICY

1. The Federal Pro Children Act of 1994 prohibits School District Officials from smoking in any buildings or on the grounds that is property of the School District. The District shall be considered smoke free. The School District strongly enforces its' No Smoking Policy. It is the Contractor's responsibility to inform all workers of this policy. Any worker(s) involved with this project that are found smoking or using tobacco products will be informed that they are in violation of the Federal and State Law and School Board Policy and will be removed from site.

**3.17 LOCATION OF “ABATEMENT WORK”**

*(Please see attached Drawings for approximate locations)*

**1) RP CONNOR ELEMENTARY SCHOOL (INTERIOR ABATEMENT)**

- Abatement Contractor responsible for total and complete removal and disposal of approximately 400 SF of friable presumed asbestos-containing interiors from (2) boilers, as detailed on attached ACM Location Drawings. Abatement Contractor responsible for all demolition required to access material(s), as well as for providing all equipment necessary to access material(s). See below for breakdown:
  - Basement Boiler Room Boiler #1 (200 SF)
  - Basement Boiler Room Boiler #2 (200 SF)

**END OF LOCATION OF WORK**



### **3.18 GENERAL**

- A. The Abatement Contractor will be responsible for repairing all building components damaged during abatement including, but not limited to: ceiling tiles, ceiling finishes, wall finishes, floor finishes, etc.
- B. The Abatement Contractor shall be responsible for all demolition required to access materials identified in scope of work and on associated drawings.
- C. Concealed conditions that are exposed and may require additional work shall be brought to the attention of the Owner immediately. The Abatement Contractor shall not abate these areas without a written notice to proceed. Additional asbestos abatement performed prior to the order to proceed will not be acknowledged.
- D. The Abatement Contractor shall remove asbestos-containing floor covering to the building substrate beneath; in areas indicted. Subsequent to final air clearance the substrate shall be washed with a neutralizing agent to prepare the substrate to accept new floor covering and eliminate residual odors.
- E. Power tools used to drill, cut into or otherwise disturb asbestos containing material shall be equipped with HEPA filtered local exhaust ventilation.
- F. The Abatement Contractor shall provide access to GFCI electrical power, required to perform the area air monitoring for this project, within and immediately adjacent to each work area.
- G. Unwrapped or unbagged ACM shall be immediately placed in an impermeable waste bag or wrapped in plastic sheeting.
- H. Coordinate all removal operations with the Owner.

**Asbestos Employee Medical Examination Statement  
Certificate of Worker Release  
Asbestos Employee Training Statement  
CERTIFICATE OF WORKERS'S ACKNOWLEDGEMENT**

PROJECT NAME: **Suffern CSD: RP Connor – Boiler Conversion**

CONTRACTOR'S NAME: \_\_\_\_\_

WORKING WITH ASBESTOS INVOLVES POTENTIAL EXPOSURE TO AIRBORNE ASBESTOS FIBERS. INHALING ASBESTOS FIBERS HAS BEEN LINKED WITH VARIOUS TYPES OF CANCER AND RESPIRATORY DISEASES. SMOKING CIGARETTES AND INHALATION OF ASBESTOS FIBERS INCREASES THE RISK THAT YOU WILL DEVELOP LUNG CANCER ABOVE THAT OF THE NON-SMOKING PUBLIC.

The Contract for this project requires your employer to 1) supply proper respiratory protection devices and training on their use 2) provide training on safe work practices and on use of the equipment used on the project 3) provide a medical examination meeting the requirements of 29 CFR 1926.1101. Your signature on this certificate, documents that your employer has fulfilled these contractual obligations and you understand the information presented to you.

**\*\*\*\*\*DO NOT SIGN THIS FORM UNLESS YOU FULLY UNDERSTAND THIS INFORMATION\*\*\*\*\***

RESPIRATORY PROTECTION: I have been trained in the proper use and limitations of the type of respiratory protection devices to be used on this project. I have reviewed the written respiratory protection program manual and a copy is available for my use. Respiratory protection equipment has been provided, by the Contractor, at no cost to me.

TRAINING COURSE: I have been trained in the risks and dangers associated with handling asbestos, breathing asbestos dust, proper work procedures, personal protection and engineering controls. I have satisfactorily completed and Asbestos Safety Training Program for New York State and have been issued a New York State Department of Health Certificate of Asbestos Safety Training.

MEDICAL EXAMINATION: I have satisfactorily completed a medical examination within the last 12 months that meets the OSHA requirement for an asbestos worker and included at least 1) medical history 2) pulmonary function 3) medical examination 4) approval to wear respiratory protection devices and may have included an evaluation of a chest x-ray.

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Printed Name: \_\_\_\_\_ SS#: \_\_\_\_\_

Witness: \_\_\_\_\_ Date: \_\_\_\_\_

**Suffern CSD: RP Connor – Boiler Conversion**

**ESTIMATE OF ACM QUANTITIES**

\*\*\*\*\*  
EACH ABATEMENT CONTRACTOR SHALL READ AND ACKNOWLEDGE THE FOLLOWING NOTICE. A SIGNED AND DATED COPY OF THIS ACKNOWLEDGMENT SHALL BE SUBMITTED WITH THE ABATEMENT CONTRACTOR'S BID FOR THIS PROJECT. FAILURE TO DO SO MAY, AT THE SOLE DISCRETION OF THE OWNER, RESULT IN THE BID BEING CONSIDERED NON-RESPONSIVE AND RESULT IN DISQUALIFICATION OF THE ABATEMENT CONTRACTOR'S BID ON THIS PROJECT.

\*\*\*\*\*

**\*\*\* NOTICE \*\*\***

*The linear and square footages listed within this specification are approximates. Abatement Contractor is required to visit the work locations prior to bid submittal in order to take actual field measurements within each listed location. The Abatement Contractor shall base their bid on actual quantities determined, by them, at the site walkthrough. Estimates provided in these specifications are for informational purposes only and shall not be considered a basis for Change Orders on this project.*

\*\*\*\*\*

**Acknowledgment:** I have read and understand the above **NOTICE** regarding removal quantity estimates and understand that estimates provided in these specifications are for informational purposes only and shall not be considered a basis for Change Orders on this project. The Abatement Contractor's signatory represents to the Owner that he/she has the authority of the entity he/she represents to sign this agreement on its behalf.

Company Name: \_\_\_\_\_  
Type or Print

BY: \_\_\_\_\_  
Signature Title Date

Print Name: \_\_\_\_\_

**ASSOCIATED ASBESTOS REMOVAL LOCATION DRAWINGS**

➤ **Suffern CSD: Roofing Replacement / Restoration Project**

- ❖ **RPC AA000** – General Asbestos Abatement Notes
- ❖ **RPC AA101** – RP Connor ES – Boiler Room Asbestos Abatement Plan

**END OF SECTION 020800**

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**SECTION 024119  
SELECTIVE REMOVAL**

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.02 SUMMARY**

- A. Section Includes:
  - 1. Removal of selected portions of building or structure.
  - 2. Removal of selected site elements.
  - 3. Salvage of existing items to be reused or recycled.

**1.03 DEFINITIONS**

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.
- B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.
- C. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

**1.04 MATERIALS OWNERSHIP**

- A. Unless otherwise indicated, removal waste becomes property of Contractor.
- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during removal remain the property of Owner.
  - 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

**1.05 PREINSTALLATION MEETINGS**

- A. Pre-removal Conference: Conduct conference at Project site.
  - 1. Inspect and discuss condition of construction to be selectively removed.
  - 2. Review structural load limitations of existing structure.
  - 3. Review and finalize selective removal schedule and verify availability of materials, personnel, equipment, and facilities needed to make progress and avoid delays.
  - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective removal operations.
  - 5. Review areas where existing construction is to remain and requires protection.

**1.06 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For refrigerant recovery technician.
  - B. Schedule of Selective Removal Activities: Indicate the following:
    - 1. Detailed sequence of selective removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
    - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
    - 3. Coordination for shutoff, capping, and continuation of utility services.
    - 4. Use of elevator and stairs.
    - 5. Coordination of Owner's continuing occupancy of portions of existing building.
  - C. Pre-removal Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by removal operations.
  - D. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that
-

recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

#### **1.07 CLOSEOUT SUBMITTALS**

- A. Inventory: Submit a list of items that have been removed and salvaged.

#### **1.08 QUALITY ASSURANCE**

- A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

#### **1.09 FIELD CONDITIONS**

- A. Owner will occupy portions of building immediately adjacent to selective removal area. Conduct selective removal so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
  - 1. Before selective removal, Owner will remove the following items:
    - a. Any items to be retained by the Owner will have been removed by the Owner prior to start of work.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: Present in buildings and structures to be selectively removed. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
  - 1. Hazardous material remediation is specified elsewhere in the Contract Documents.
  - 2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective removal operations.
  - 1. Maintain fire-protection facilities in service during selective removal operations.
- G. Although care has been taken to ensure their accuracy, the locations shown for existing partitions, equipment, and structures indicated to be removed, nor their quantity, are guaranteed. It is the Contractor's responsibility to verify these conditions in the field during the bidding process before commencing work. No claims for extra payment due to incorrect locations, dimensions or quantities of items will be considered by the Owner.

#### **1.10 COORDINATION**

- A. Arrange selective removal schedule so as not to interfere with Owner's operations.

### **PART 1 PRODUCTS**

#### **2.01 PERFORMANCE REQUIREMENTS**

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ASSE A10.6 and NFPA 241.

### **PART 1 EXECUTION**

#### **3.01 EXAMINATION**

- A. Disconnect and cap utilities before starting selective removal operations.
- B. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building removal operations.

1. Perform surveys as the Work progresses to detect hazards resulting from selective removal activities.
- C. Verify that hazardous materials have been remediated before proceeding with selective removal operations.

### **3.02 PREPARATION**

- A. Refrigerant: Before starting removal, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.

### **3.03 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS**

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively removed.
  1. Arrange to shut off utilities with utility companies.
  2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective removal and that maintain continuity of services/systems to other parts of building.
  3. Disconnect and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.
    - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
    - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
    - d. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
    - e. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
    - f. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

### **3.04 PROTECTION**

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
  1. Provide protection to ensure safe passage of people around selective removal area and to and from occupied portions of building.
  2. Provide temporary weather protection, during interval between selective removal of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
  3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective removal operations.
  4. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 01 5000 "Temporary Facilities and Controls."
- B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being removed.
  1. Strengthen or add new supports when required during progress of selective removal.
- C. Remove temporary barricades and protections where hazards no longer exist.

### **3.05 SELECTIVE REMOVAL, GENERAL**

- A. General: Remove existing construction to the extent indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
  - 1. Proceed with selective removal systematically, from higher to lower level. Complete selective removal operations above each floor or tier before disturbing supporting members on the next lower level.
  - 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
  - 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
  - 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
  - 5. Maintain fire watch during and for at least 2 hours after flame-cutting operations.
  - 6. Maintain adequate ventilation when using cutting torches.
  - 7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
  - 8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
  - 9. Locate selective removal equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
  - 10. Dispose of demolished items and materials promptly.
- B. Site Access and Temporary Controls: Conduct selective removal and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- C. Removed and Salvaged Items:
  - 1. Clean salvaged items.
  - 2. Pack or crate items after cleaning. Identify contents of containers.
  - 3. Store items in a secure area until delivery to Owner.
  - 4. Transport items to Owner's storage area designated by Owner.
  - 5. Protect items from damage during transport and storage.
- D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective removal.

### **3.06 SELECTIVE REMOVAL PROCEDURES FOR SPECIFIC MATERIALS**

- A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.
  - B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.
  - C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.
  - D. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.
  - E. Roofing: Remove no more existing roofing than what can be covered in one day by new temporary roofing and so that building interior remains watertight and weathertight.
    - 1. Remove existing roof membrane, flashings, copings, and roof accessories.
    - 2. Remove existing roofing system down to substrate.
-



### **3.07 DISPOSAL OF REMOVED MATERIALS**

- A. Remove waste materials from Project site.
  - 1. Do not allow removed materials to accumulate on-site.
  - 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
  - 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
- B. Burning: Do not burn removed materials.

### **3.08 CLEANING**

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective removal operations. Return adjacent areas to condition existing before selective removal operations began.

**END OF SECTION 024119**

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**SECTION 033000  
CAST-IN-PLACE CONCRETE**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Concrete formwork.
- B. Elevated concrete slabs.
- C. Concrete reinforcement.
- D. Joint devices associated with concrete work.
- E. Miscellaneous concrete elements, including equipment pads.
- F. Concrete curing.

**1.02 RELATED REQUIREMENTS**

- A. Section 079200 - Joint Sealants: Products and installation for sealants and joint fillers for saw cut joints and isolation joints in slabs.

**1.03 REFERENCE STANDARDS**

- A. ACI 301 - Specifications for Concrete Construction 2020.
- B. ACI 302.1R - Guide to Concrete Floor and Slab Construction 2015.
- C. ACI 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete 2000 (Reapproved 2009).
- D. ACI 305R - Guide to Hot Weather Concreting 2020.
- E. ACI 306R - Guide to Cold Weather Concreting 2016.
- F. ACI 308R - Guide to External Curing of Concrete 2016.
- G. ACI 318 - Building Code Requirements for Structural Concrete 2019 (Reapproved 2022).
- H. ASTM A615/A615M - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement 2022.
- I. ASTM A767/A767M - Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement 2019.
- J. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete 2022.
- K. ASTM C33/C33M - Standard Specification for Concrete Aggregates 2018.
- L. ASTM C94/C94M - Standard Specification for Ready-Mixed Concrete 2022a.
- M. ASTM C330/C330M - Standard Specification for Lightweight Aggregates for Structural Concrete 2017a.
- N. ASTM C685/C685M - Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing 2017.
- O. ASTM C881/C881M - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete 2020a.
- P. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete 2018.
- Q. ICRI 310.2R - Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, Polymer Overlays, and Concrete Repair 2013.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
  - B. Product Data: Submit manufacturers' data on manufactured products showing compliance with specified requirements and installation instructions.
-

- C. Mix Design: Submit proposed concrete mix design.

### **1.05 QUALITY ASSURANCE**

- A. Perform work of this section in accordance with ACI 301 and ACI 318.
- B. Follow recommendations of ACI 305R when concreting during hot weather.
- C. Follow recommendations of ACI 306R when concreting during cold weather.

### **1.06 WARRANTY**

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

## **PART 2 PRODUCTS**

### **2.01 FORMWORK**

- A. Form Materials: Contractor's choice of standard products with sufficient strength to withstand hydrostatic head without distortion in excess of permitted tolerances.
  - 1. Form Coating: Release agent that will not adversely affect concrete or interfere with application of coatings.

### **2.02 REINFORCEMENT MATERIALS**

- A. Reinforcing Steel: ASTM A615/A615M, Grade 60 (60,000 psi).
  - 1. Type: Deformed billet-steel bars.
  - 2. Finish: Unfinished, unless otherwise indicated.
  - 3. Finish: Galvanized in accordance with ASTM A767/A767M, Class I, unless otherwise indicated.
- B. Steel Welded Wire Reinforcement (WWR): Galvanized, plain type, ASTM A1064/A1064M.
  - 1. Form: Coiled Rolls.
  - 2. WWR Style: 4 x 8-W6 x W10.
- C. Reinforcement Accessories:
  - 1. Tie Wire: Annealed, minimum 16 gauge, 0.0508 inch.
  - 2. Chairs, Bolsters, Bar Supports, Spacers: Sized and shaped for adequate support of reinforcement during concrete placement.
  - 3. Provide stainless steel, galvanized, plastic, or plastic coated steel components for placement within 1-1/2 inches of weathering surfaces.

### **2.03 CONCRETE MATERIALS**

- A. Cement: ASTM C150/C150M, Type I - Normal Portland type.
  - 1. Acquire cement for entire project from same source.
- B. Fine and Coarse Aggregates: ASTM C33/C33M.
- C. Lightweight Aggregate: ASTM C330/C330M.
- D. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to concrete.

### **2.04 BONDING AND JOINTING PRODUCTS**

- A. Epoxy Bonding System:
  - 1. Complying with ASTM C881/C881M and of Type required for specific application.
  - 2. Manufacturers:
    - a. Adhesives Technology Corporation; Crackbond SLV-302, Crackbond LR-321, Crackbond LR-321 LPL, Ultrabond 2100 LPL, Ultrabond 2100, Ultrabond 1, Ultrabond 2, or Ultrabond HS200: [www.atcepoxy.com/#sle](http://www.atcepoxy.com/#sle).
    - b. Euclid Chemical Company; DURAL FAST SET LV: [www.euclidchemical.com/#sle](http://www.euclidchemical.com/#sle).
    - c. Euclid Chemical Company; DURALFLEX GEL: [www.euclidchemical.com/#sle](http://www.euclidchemical.com/#sle).
    - d. Euclid Chemical Company; DURALFLEX LV: [www.euclidchemical.com/#sle](http://www.euclidchemical.com/#sle).
    - e. Euclid Chemical Company; DURAL 452 GEL, DURAL 452 LV, or DURAL 452 MV: [www.euclidchemical.com/#sle](http://www.euclidchemical.com/#sle).
    - f. Dayton Superior Corporation; \_\_\_\_\_: [www.daytonsuperior.com/#sle](http://www.daytonsuperior.com/#sle).

- g. Kaufman Products Inc; SurePoxym EPL: [www.kaufmanproducts.net/#sle](http://www.kaufmanproducts.net/#sle).
  - h. Kaufman Products Inc; SurePoxym Class B: [www.kaufmanproducts.net/#sle](http://www.kaufmanproducts.net/#sle).
  - i. Pecora; Dynapoxym Healer/Sealer: [www.pecora.com/#sle](http://www.pecora.com/#sle).
  - j. Pecora; Dynapoxym Low-Mod Epoxy: [www.pecora.com/#sle](http://www.pecora.com/#sle).
  - k. SpecChem, LLC; SpecPoxym 1000, SpecPoxym 2000, SpecPoxym 3000, or SpecPoxym 3000FS: [www.specchemllc.com/#sle](http://www.specchemllc.com/#sle).
- B. Slab Isolation Joint Filler: 1/2 inch thick, height equal to slab thickness, with removable top section that will form 1/2 inch deep sealant pocket after removal.

## **2.05 MIXING**

- A. On Project Site: Mix in drum type batch mixer, complying with ASTM C685/C685M. Mix each batch not less than 1-1/2 minutes and not more than 5 minutes.
- 1. Colored Concrete: Add pigments in strict accordance with manufacturer's instructions to achieve consistent color from batch to batch.
- B. Transit Mixers: Comply with ASTM C94/C94M.
- C. Adding Water: If concrete arrives on-site with slump less than suitable for placement, do not add water that exceeds the maximum water-cement ratio or exceeds the maximum permissible slump.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify lines, levels, and dimensions before proceeding with work of this section.

### **3.02 PREPARATION**

- A. Formwork: Comply with requirements of ACI 301. Design and fabricate forms to support all applied loads until concrete is cured, and for easy removal without damage to concrete.
- B. Verify that forms are clean and free of rust before applying release agent.
- C. Coordinate placement of embedded items with erection of concrete formwork and placement of form accessories.
- D. Prepare existing concrete surfaces to be repaired according to ICRI 310.2R, \_\_\_\_\_.
- E. Where new concrete is to be bonded to previously placed concrete, prepare existing surface by cleaning and applying bonding agent in accordance with bonding agent manufacturer's instructions.
- 1. Use epoxy bonding system for bonding to damp surfaces, for structural load-bearing applications, and where curing under humid conditions is required.
- F. Interior Slabs on Grade: Install vapor retarder under interior slabs on grade. Lap joints minimum 6 inches. Seal joints, seams and penetrations watertight with manufacturer's recommended products and follow manufacturer's written instructions. Repair damaged vapor retarder before covering.

### **3.03 INSTALLING REINFORCEMENT AND OTHER EMBEDDED ITEMS**

- A. Comply with requirements of ACI 301. Clean reinforcement of loose rust and mill scale, and accurately position, support, and secure in place to achieve not less than minimum concrete coverage required for protection.
- B. Install welded wire reinforcement in maximum possible lengths, and offset end laps in both directions. Splice laps with tie wire.

### **3.04 PLACING CONCRETE**

- A. Place concrete in accordance with ACI 304R.
- B. Place concrete for floor slabs in accordance with ACI 302.1R.
- C. Notify Architect/Engineer not less than 24 hours prior to commencement of placement operations.
- D. Finish floors level and flat, unless otherwise indicated, within the tolerances specified below.

### **3.05 SLAB JOINTING**

- A. Locate joints as indicated on drawings.
- B. Anchor joint fillers and devices to prevent movement during concrete placement.
- C. Isolation Joints: Use preformed joint filler with removable top section for joint sealant, total height equal to thickness of slab, set flush with top of slab.

### **3.06 SEPARATE FLOOR TOPPINGS**

- A. Prior to placing floor topping, roughen substrate concrete surface and remove deleterious material. Broom and vacuum clean.
- B. Place required dividers, edge strips, reinforcing, and other items to be cast in.
- C. Apply bonding agent to substrate in accordance with manufacturer's instructions.
- D. Apply sand and cement slurry coat on base course, immediately prior to placing toppings.

### **3.07 FLOOR FLATNESS AND LEVELNESS TOLERANCES**

- A. Correct defects by grinding or by removal and replacement of the defective work. Areas requiring corrective work will be identified. Re-measure corrected areas by the same process.

### **3.08 CONCRETE FINISHING**

- A. Concrete Slabs: Finish to requirements of ACI 302.1R, and as follows:
  - 1. Other Surfaces to Be Left Exposed: Trowel as described in ACI 302.1R, minimizing burnish marks and other appearance defects.

### **3.09 CURING AND PROTECTION**

- A. Comply with requirements of ACI 308R. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
- C. Surfaces Not in Contact with Forms:
  - 1. Initial Curing: Start as soon as free water has disappeared and before surface is dry. Keep continuously moist for not less than three days by water ponding, water-saturated sand, water-fog spray, or saturated burlap.
  - 2. Final Curing: Begin after initial curing but before surface is dry.

### **3.10 DEFECTIVE CONCRETE**

- A. Test Results: The testing agency shall report test results in writing to Architect/Engineer and Contractor within 24 hours of test.

### **3.11 PROTECTION**

- A. Do not permit traffic over unprotected concrete floor surface until fully cured.

### **3.12 SCHEDULE - CONCRETE TYPES AND FINISHES**

- A. Underside of Supported Floors and Structure Exposed to View: 4,000 pounds per square inch 28 day concrete, form finish with honeycomb filled surface.

**END OF SECTION 033000**

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## **SECTION 078400 FIRESTOPPING**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Firestopping systems.

#### **1.02 REFERENCE STANDARDS**

- A. FM 4991 - Approval Standard of Firestop Contractors 2013.
- B. SCAQMD 1168 - Adhesive and Sealant Applications 1989, with Amendment (2022).

#### **1.03 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Sustainable Design Submittal: Submit VOC content documentation for nonpreformed materials.
- C. Installer's qualification statement.

#### **1.04 QUALITY ASSURANCE**

- A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.
  - 1. Listing in UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.
  - 2. Valid evaluation report published by ICC Evaluation Service, Inc. (ICC-ES) at [www.icc-es.org](http://www.icc-es.org) will be considered as constituting an acceptable test report.
- B. Installer Qualifications: Company specializing in performing the work of this section and:
  - 1. Approved by Factory Mutual Research Corporation under FM 4991, or meeting any two of the following requirements:
  - 2. Verification of minimum three years documented experience installing work of this type.
  - 3. Verification of at least five satisfactorily completed projects of comparable size and type.
  - 4. Licensed by local authorities having jurisdiction (AHJ).

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Firestopping Manufacturers:
  - 1. 3M Fire Protection Products; \_\_\_\_\_: [www.3m.com/firestop/#sle](http://www.3m.com/firestop/#sle).
  - 2. A/D Fire Protection Systems Inc; \_\_\_\_\_: [www.adfire.com/#sle](http://www.adfire.com/#sle).
  - 3. Everkem Diversified Products, Inc; Intumescent Fire-Rated Putty Pads: [www.everkemproducts.com/#sle](http://www.everkemproducts.com/#sle).
  - 4. Grabber Construction Products, Inc; GrabberGard EFC: [www.grabberman.com/#sle](http://www.grabberman.com/#sle).
  - 5. Hilti, Inc; \_\_\_\_\_: [www.us.hilti.com/#sle](http://www.us.hilti.com/#sle).
  - 6. HoldRite, a Brand of Reliance Worldwide Corporation; HydroFlame 100 Firestop Sealant: [www.holdrite.com/#sle](http://www.holdrite.com/#sle).
  - 7. Nelson FireStop Products; \_\_\_\_\_: [www.nelsonfirestop.com/#sle](http://www.nelsonfirestop.com/#sle).
  - 8. Passive Fire Protection Partners; Firestop 3600EX: [www.firestop.com/#sle](http://www.firestop.com/#sle).
  - 9. Specified Technologies Inc; \_\_\_\_\_: [www.stifirestop.com/#sle](http://www.stifirestop.com/#sle).
  - 10. Tremco Commercial Sealants & Waterproofing; TREMstop Acrylic: [www.tremcosealants.com/#sle](http://www.tremcosealants.com/#sle).

#### **2.02 MATERIALS**

- A. Firestopping Materials: Any materials meeting requirements.
- B. Volatile Organic Compound (VOC) Content: Provide products having VOC content lower than that required by SCAQMD 1168.

- C. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.

**2.03 FIRESTOPPING SYSTEMS**

**END OF SECTION 078400**



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**SECTION 078413  
PENETRATION FIRESTOPPING**

**PART 1 GENERAL**

**1.01 SUMMARY**

**1.02 SECTION INCLUDES:**

- A. Penetrations in fire-resistance-rated walls.
- B. Penetrations in horizontal assemblies.

**1.03 RELATED SECTIONS:**

- A. Section 078446 "Fire-Resistive Joint Systems" for joints in or between fire-resistance-rated construction, at exterior curtain-wall/floor intersections, and in smoke barriers.

**1.04 ACTION SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Product Schedule: For each penetration firestopping system. Include location and design designation of qualified testing and inspecting agency.
- C. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping condition, submit illustration, with modifications marked, approved by penetration firestopping manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

**1.05 INFORMATIONAL SUBMITTALS**

- A. Qualification Data: For qualified Installer.
- B. Installer Certificates: From Installer indicating penetration firestopping has been installed in compliance with requirements and manufacturer's written recommendations.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for penetration firestopping.

**1.06 QUALITY ASSURANCE**

- A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."
- B. Be a member in good standing of the Fire Stop Contractors International Association
- C. Licensed by a state or local authority , where applicable
- D. Approved by the Universities Fire Marshal for each specific Job
- E. Shown to have successfully completed not less than 5 comparable size projects.
- F. Fire-Test-Response Characteristics: Penetration firestopping shall comply with the following requirements:
  - 1. Penetration firestopping tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.
  - 2. Penetration firestopping is identical to those tested per testing standard referenced in "Penetration Firestopping" Article. Provide rated systems complying with the following requirements:
  - 3. Penetration firestopping products bear classification marking of qualified testing and inspecting agency.
  - 4. Classification markings on penetration firestopping correspond to designations listed by the following:
    - a. UL in its "Fire Resistance Directory."
- G. Preinstallation Conference: Conduct conference at Project site.

### **1.07 PROJECT CONDITIONS**

- A. Environmental Limitations: Do not install penetration firestopping when ambient or substrate temperatures are outside limits permitted by penetration firestopping manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.
- B. Install and cure penetration firestopping per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

### **1.08 COORDINATION**

- A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping is installed according to specified requirements.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping.
- C. Notify Owner's testing agency at least seven days in advance of penetration firestopping installations; confirm dates and times on day preceding each series of installations.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Hilti, Inc.

### **2.02 PENETRATION FIRESTOPPING**

- A. Provide penetration firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.

### **2.03 PENETRATIONS IN FIRE-RESISTANCE-RATED WALLS: PROVIDE PENETRATION FIRESTOPPING WITH RATINGS DETERMINED PER ASTM E 814 OR UL 1479, BASED ON TESTING AT A POSITIVE PRESSURE DIFFERENTIAL OF 0.01-INCH WG.**

- A. Fire-resistance-rated walls include fire-barrier walls.
  - B. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
  - C. Penetrations in Horizontal Assemblies: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
    - 1. Horizontal assemblies include floors.
    - 2. F-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated.
    - 3. T-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
  - D. Penetrations in Smoke Barriers: Provide penetration firestopping with ratings determined per UL 1479.
    - 1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at 0.30-inch wg at both ambient and elevated temperatures.
    - 2. W-Rating: Provide penetration firestopping showing no evidence of water leakage when tested according to UL 1479.
  - E. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
  - F. VOC Content: Penetration firestopping sealants and sealant primers shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
    - 1. Sealants: 250 g/L.
    - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
-

3. Sealant Primers for Porous Substrates: 775 g/L.
- G. Low-Emitting Materials: Penetration firestopping sealants and sealant primers shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- H. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.
  1. Permanent forming/damming/backing materials, including the following:
  2. Slag-wool-fiber or rock-wool-fiber insulation.
    - a. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
    - b. Fire-rated form board.
    - c. Fillers for sealants.
  3. Temporary forming materials.
  4. Substrate primers.
  5. Collars.
  6. Steel sleeves.

## 2.04 FILL MATERIALS

- A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.
- C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced elastomeric sheet bonded to galvanized-steel sheet.
- E. Intumescent Putties: Nonhardening dielectric, water-resistant putties containing no solvents, inorganic fibers, or silicone compounds.
- F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.
- H. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.
- I. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:
  1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and nonsag formulation for openings in vertical and sloped surfaces, unless indicated firestopping limits use of nonsag grade for both opening conditions.

## 2.05 MIXING

- A. For those products requiring mixing before application, comply with penetration firestopping manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.02 PREPARATION**

- A. Surface Cleaning: Clean out openings immediately before installing penetration firestopping to comply with manufacturer's written instructions and with the following requirements:
  - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping.
  - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping. Remove loose particles remaining from cleaning operation.
  - 3. Remove laitance and form-release agents from concrete.
- B. Priming: Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent penetration firestopping from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing firestopping's seal with substrates.

### **3.03 INSTALLATION**

- A. General: Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
  - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestopping.
- C. Install fill materials for firestopping by proven techniques to produce the following results:
  - 1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.
  - 2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
  - 3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

### **3.04 IDENTIFICATION**

- A. Identify penetration firestopping with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of firestopping edge so labels will be visible to anyone seeking to remove penetrating items or firestopping. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
    - 1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
    - 2. Contractor's name, address, and phone number.
    - 3. Designation of applicable testing and inspecting agency.
    - 4. Date of installation.
    - 5. Manufacturer's name.
    - 6. Installer's name.
-

### **3.05 FIELD QUALITY CONTROL**

- A. Owner will engage a qualified testing agency to perform tests and inspections.
- B. Where deficiencies are found or penetration firestopping is damaged or removed because of testing, repair or replace penetration firestopping to comply with requirements.
- C. Proceed with enclosing penetration firestopping with other construction only after inspection reports are issued and installations comply with requirements.

### **3.06 CLEANING AND PROTECTION**

- A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping is without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping and install new materials to produce systems complying with specified requirements.

### **3.07 THROUGH-PENETRATION FIRESTOP SYSTEM SCHEDULE**

- A. Firestop Systems with No Penetrating Items: Comply with the following:
    - 1. Available UL-Classified Systems:
      - a. C-AJ-0001-0999.
      - b. W-L-0001-0999.
    - 2. Type of Fill Materials: One or more of the following:
      - a. Latex sealant.
      - b. Silicone sealant.
      - c. Intumescent putty.
      - d. Mortar.
  - B. Firestop Systems for Metallic Pipes, Conduit, or Tubing: Comply with the following:
    - 1. Available UL-Classified Systems:
      - a. C-AJ-1001-1999.
      - b. W-L-1001-1999.
    - 2. Type of Fill Materials: One or more of the following:
      - a. Latex sealant.
      - b. Silicone sealant.
      - c. Intumescent putty.
      - d. Mortar.
  - C. Firestop Systems for Nonmetallic Pipe, Conduit, or Tubing: Comply with the following:
    - 1. Available UL-Classified Systems:
      - a. C-AJ-2001-2999.
      - b. W-L-2001-2999.
    - 2. Type of Fill Materials: One or more of the following:
      - a. Latex sealant.
      - b. Silicone sealant.
      - c. Intumescent putty.
      - d. Intumescent wrap strips.
      - e. Firestop device.
  - D. Firestop Systems for Electrical Cables: Comply with the following:
    - 1. Available UL-Classified Systems:
      - a. C-AJ-3001-3999.
      - b. W-L-3001-3999.
    - 2. Type of Fill Materials: One or more of the following:
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- 
- a. Latex sealant.
    - b. Silicone sealant.
    - c. Intumescent putty.
    - d. Silicone foam.
  - E. Firestop Systems for Cable Trays: Comply with the following:
    - 1. Available UL-Classified Systems:
      - a. C-AJ-4001-4999.
      - b. W-L-4001-4999.
    - 2. Type of Fill Materials: One or more of the following:
      - a. Latex sealant.
      - b. Intumescent putty.
      - c. Silicone foam.
  - F. Firestop Systems for Insulated Pipes: Comply with the following:
    - 1. Available UL-Classified Systems:
      - a. C-AJ-5001-5999.
      - b. W-L-5001-5999.
    - 2. Type of Fill Materials: One or more of the following:
      - a. Latex sealant.
      - b. Intumescent putty.
      - c. Silicone foam.
      - d. Intumescent wrap strips.
  - G. Firestop Systems for Miscellaneous Electrical Penetrants: Comply with the following:
    - 1. Available UL-Classified Systems:
      - a. C-AJ-6001-6999.
      - b. W-L-6001-6999.
    - 2. Type of Fill Materials: One or more of the following:
      - a. Latex sealant.
      - b. Intumescent putty.
      - c. Mortar.
  - H. Firestop Systems for Miscellaneous Mechanical Penetrations: Comply with the following:
    - 1. Available UL-Classified Systems:
      - a. C-AJ-7001-7999.
      - b. W-L-7001-7999.
    - 2. Type of Fill Materials: One or both of the following:
      - a. Latex sealant.
      - b. Mortar.
  - I. Firestop Systems for Groupings of Penetrations: Comply with the following:
    - 1. Available UL-Classified Systems:
      - a. C-AJ-8001-8999.
      - b. W-L-8001-8999.
    - 2. Type of Fill Materials: One or more of the following:
      - a. Latex sealant.
      - b. Mortar.
      - c. Intumescent wrap strips.
      - d. Firestop device.
      - e. Intumescent composite sheet.
  - J. Smoke-stop Systems
    - 1. For all non-rated partitions required to control smoke only provide the following:
      - a. Mineral wool
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- b. Fire and smoke stopping sealant

**END OF SECTION 078413**

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**SECTION 099123  
INTERIOR PAINTING**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Section includes surface preparation and the application of paint systems on interior substrates.

**1.02 DEFINITIONS**

- A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523, a matte flat finish.
- B. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523, a high-side sheen flat, velvet-like finish.
- C. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523, an eggshell finish.
- D. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523, a satin-like finish.
- E. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523, a semi-gloss finish.
- F. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523, a gloss finish.

**1.03 ACTION SUBMITTALS**

- A. Product Data: For each type of product. Include preparation requirements and application instructions.

**1.04 CLOSEOUT SUBMITTALS**

- A. Coating Maintenance Manual: Provide coating maintenance manual including area summary with finish schedule, area detail designating location where each product/color/finish was used, product data pages, material safety data sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used.
- B. See Division 01 sections (including, but not limited to, 01 7700, 01 7823, 01 7839, 01 8200) for additional requirements.

**1.05 MAINTENANCE MATERIAL SUBMITTALS**

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents. Provide in unopened cans no larger than 1 gallon in size.
- B. Paint: 5 percent, but not less than 1 gal. of each material and color applied.

**1.06 QUALITY ASSURANCE**

- A. Contractor Qualifications: Contractor and contractor's staff shall have a minimum 5 years' satisfactory experience in jobs similar in size and nature of the work of this contract. Upon request provide list of projects with references for work performed in the last 5 years.

**1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Delivery and Handling: Deliver products to Project site in an undamaged condition in manufacturer's original sealed containers, complete with labels and instructions for handling, storing, unpacking, protecting, and installing. Packaging shall bear the manufacturer's label with the following information:
1. Product name and type (description).
  2. Batch date.
  3. Color number.
  4. VOC content.
  5. Environmental handling requirements.
  6. Surface preparation requirements.
  7. Application instructions.

- B. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
  - 1. Maintain containers in clean condition, free of foreign materials and residue.
  - 2. Remove rags and waste from storage areas daily.

#### **1.08 FIELD CONDITIONS**

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
- C. Lead Paint: Lead paint may be present in buildings and structures to be painted. Refer to Division 2 for report.. Examine report to become aware of locations where lead paint is present.
  - 1. Use Lead Safe Work Practices in accordance with US Dept.of Housing and Urban Development. All employees working with Lead based paint Materials shall have HUD approved training.
  - 2. Do not disturb lead paint or items suspected of containing hazardous materials except under procedures specified.
  - 3. Perform preparation for painting of substrates known to include lead paint in accordance with EPA Renovation, Repair and Painting Rule and additional requirements of authorities having jurisdiction.
- D. Color Selections: Color selections for the work at the Courthouse and Annex shall match existing.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Sherwin-Williams Company products indicated or comparable product from one of the following:
  - 1. Benjamin Moore & Co.
  - 2. Devoe
  - 3. Glidden Professional, Division of PPG Architectural Finishes, Inc.
  - 4. Pratt & Lambert.
- B. Colors: As selected by Architect from manufacturer's full range.

#### **2.02 PAINT, GENERAL**

- A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."
- B. Material Compatibility:
  - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction.
  - 1. Flat Paints and Coatings: 50 g/L.
  - 2. Nonflat Paints and Coatings: 150 g/L.
  - 3. Dry-Fog Coatings: 400 g/L.
  - 4. Primers, Sealers, and Undercoaters: 200 g/L.
  - 5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
  - 6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
  - 7. Pretreatment Wash Primers: 420 g/L.
  - 8. Floor Coatings: 100 g/L.
  - 9. Shellacs, Clear: 730 g/L.

10. Shellacs, Pigmented: 550 g/L.

- D. Low-Emitting Materials: Interior paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

### **2.03 PATCHING MATERIALS**

- A. Wood Patching Compound: 2-part polyester or epoxy-resin wood compound with a 10- to 15-minute cure at 70 deg F, in knife grade formulation and recommended by manufacturer for type of wood repair indicated. Compound shall be produced for filling damaged wood materials that have deteriorated due to weathering and exposure. Filler shall be capable of filling deep holes and capable of spreading to featheredge.
- B. Metal Patching Compound: 2-part polyester-resin metal patching compound with a 10- to 15-minute cure at 70 deg F, in knife grade formulation and recommended by manufacturer for type of metal repair indicated. Compound shall be produced for filling metal that has deteriorated due to corrosion. Filler shall be capable of filling deep holes and capable of spreading to featheredge.
- C. Interior Plaster Patching Compound: Provide spackle and plaster patching compounds and repair materials specifically manufactured for surface preparation and sanding prior to repainting.
1. Existing Keene's Cement: Refer to Division 09 Section "Gypsum Plastering."

### **2.04 CLEANING MATERIALS**

- A. Detergent Cleaning Solution: Mix 2 cups of tetrasodium polyphosphate, 1/2 cup of laundry detergent, 5 quarts of 5 percent sodium hypochlorite bleach, and 15 quarts of warm water for each 5 gal. of solution required.
- B. Job-Mixed Mold, Mildew, and Algae Remover: Mix 2 cups of tetrasodium polyphosphate, 5 quarts of 5 percent sodium hypochlorite bleach, and 15 quarts of hot water for every 5 gal. of solution required.
- C. Paint Deglosser: "Paint Deglosser" Item No. 42124 by Zinsser Company, Inc., or comparable product by an approved manufacturer.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers. Where acceptability of substrate conditions is in question, apply samples and perform in-situ testing to verify compatibility, adhesion, and film integrity of new paint application.
1. Report, in writing, conditions that may affect application, appearance, or performance of paint.

### **3.02 SUBSTRATE CONDITIONS:**

- A. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
1. Concrete: 12 percent.
  2. Masonry (Clay and CMU): 12 percent.
  3. Wood: 15 percent.
  4. Gypsum Board: 12 percent.
  5. Plaster: 12 percent.
- B. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- C. Plaster Substrates: Verify that plaster is fully cured.
- D. Spray-Textured Ceiling Substrates: Verify that surfaces are dry.

- E. Proceed with coating application only after unsatisfactory conditions have been corrected; application of coating indicates acceptance of surfaces and conditions.
  - 1. Application of coating indicates acceptance of surfaces and conditions.

### 3.03 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
  - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
  - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Glossy surfaces of old paint films shall be cleaned and dulled prior to re-painting
- E. Fill any open joints of metal walls and metal ceilings with a paintable caulk. Remove existing prior to application.
- F. Fill all joints between metal walls and wood casings with a paintable caulk. Remove existing prior to application.
- G. Plaster surfaces: Fill and patch any cracks in plaster surfaces. Sand surfaces to minimize the surface profile of cracked and peeling areas. Eliminate defects causing abrupt surface profile differences exceeding 1/32"
- H. Cracks, holes, bulges or gouges in wall and ceiling surfaces shall be spackled and sanded smooth. Loose, peeling, blistering, chalking and scaling paint shall be removed to the refusal point by scraping. Resulting edges of all areas so scraped shall be spackled to a feathered edge and sanded smooth when dry.
- I. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
  - 1. Concrete Floors: Remove oil, dust, grease, dirt, and other foreign materials. Comply with SSPC-SP-13/NACE 6 or ICRI 03732.
- J. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceed that permitted in manufacturer's written instructions.
- K. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any.
  - 1. Remove all rust with wire brushes. If areas of rust still remain, use a chemical rust remover to remove the last traces, or as much of the rust as is possible.
- L. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- M. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- N. Aluminum Substrates: Remove loose surface oxidation.
- O. Wood Substrates:
  - 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
  - 2. Sand surfaces that will be exposed to view, and dust off.
  - 3. Prime edges, ends, faces, undersides, and backsides of wood.

4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
5. Wood surfaces scheduled to be finished with an opaque finish shall be sanded as required to produce a smooth substrate for application of the new coatings. Correct new and existing abrupt surface profile differences exceeding 1/32"
- P. Wood Floors: wood surfaces scheduled to be refinished with a transparent finish shall have existing coating stripped and sanded prior to application of new coatings
- Q. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

### 3.04 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
  1. Use applicators and techniques suited for paint and substrate indicated.
  2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
  3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
  4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
  5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
  1. Paint the following work where exposed in equipment rooms:
    - a. Equipment, including panelboards.
    - b. Uninsulated metal piping.
    - c. Uninsulated plastic piping.
    - d. Pipe hangers and supports.
    - e. Metal conduit.
    - f. Plastic conduit.
    - g. Tanks that do not have factory-applied final finishes.
    - h. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
  2. Paint the following work where exposed in occupied spaces:
    - a. Equipment, including panelboards.
    - b. Uninsulated metal piping.
    - c. Uninsulated plastic piping.
    - d. Pipe hangers and supports.
    - e. Metal conduit.
    - f. Plastic conduit.
    - g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.

- h. Other items as directed by Architect.
- 3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

### 3.05 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.
- E. Do not paint over name plates or instruction labels. Keep sprinkler heads free of paint

### 3.06 INTERIOR PAINTING SCHEDULE

- A. CMU Substrates:
  - 1. Latex System:
    - a. Block Filler: Block filler, latex, interior/exterior, MPI #4 X-Green: S-W PrepRite Block Filler, B25W25, at 100 to 200 sq. ft. per gal.
    - b. Intermediate Coat: Latex, interior, matching topcoat.
    - c. Topcoat: Latex, interior, eggshell, (Gloss Level 3), MPI #52 X-Green/#145 X-Green: S-W ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series, at 4.0 mils wet, 1.7 mils dry, per coat.
    - d. Topcoat: Latex, interior, semi-gloss, (Gloss Level 4), MPI #43 X-Green: S-W ProMar 200 Zero VOC Latex Semi-Gloss, B31-2600 Series, at 4.0 mils wet, 1.6 mils dry, per coat.
- B. Metal Substrates (Aluminum, Steel, Galvanized Steel):
  - 1. Latex System:
    - a. Prime Coat: Primer, rust-inhibitive, water based, MPI #107: S-W Pro Industrial Pro-Cryl Universal Primer, B66-310 Series, at 5.0 to 10 mils wet, 2.0 to 4.0 mils dry.
    - b. Intermediate Coat: Water-based acrylic, interior, matching topcoat.
    - c. Topcoat: Water-based acrylic, semi-gloss, (Gloss Level 5), MPI #147 X-Green]: S-W Pro Industrial Acrylic Semi-Gloss Coating, B66-650 Series, at 2.5 to 4.0 mils dry, per coat.
    - d. Topcoat: Water-based acrylic, gloss, (Gloss Level 6), MPI #148 X-Green: S-W Pro Industrial Acrylic Gloss Coating, B66-660 Series, at 2.5 to 4.0 mils dry, per coat.
  - 2. Water-Based Dry-Fall System:
    - a. Top Coat: Dry-fall latex: S-W Pro Industrial Waterborne Acrylic Dryfall Flat, S-W Pro Industrial Waterborne Acrylic DryFall Eg-Shel, S-W Pro Industrial Waterborne Acrylic DryFall Semi-Gloss, at 5.8 to 6.0 mils wet, 1.7 to 2.3 mils dry. (The finish is to match adjacent existing finish).
- C. Wood Substrates: Including exposed wood items not indicated to receive shop-applied finish.
  - 1. Latex System:
    - a. Prime Coat: Primer sealer, latex, interior, MPI #39: S-W PrepRite ProBlock Primer Sealer, B51-620 Series, at 4.0 mils wet, 1.4 mils dry.
    - b. Intermediate Coat: Latex, interior, matching topcoat.
    - c. Topcoat: Latex, interior, semi-gloss, (Gloss Level 4), MPI #43 X-Green: S-W ProMar 200 Zero VOC Latex Semi-Gloss, B31-2600 Series, at 4.0 mils wet, 1.6 mils dry, per coat.
- D. Wood Substrates, Pedestrian Traffic Surfaces:

1. Wood Floor System:
  - a. First Coat: Miniwax High Build Polyurethane
  - b. Topcoat: Miniwax High Build Polyurethane.
- E. Gypsum Board Substrates:
  1. Latex System:
    - a. Prime Coat: Primer, latex, interior, MPI #149 X-Green: S-W ProMar 200 Zero VOC Latex Primer, B28W2600, at 4.0 mils wet, 1.5 mils dry.
    - b. Intermediate Coat: Latex, interior, matching topcoat.
    - c. Topcoat: Latex, interior, flat, (Gloss Level 1), MPI #53 X-Green/#143 X-Green: S-W ProMar 200 Zero VOC Latex Flat, B30-2600 Series, at 4.0 mils wet, 1.6 mils dry, per coat.
    - d. Topcoat: Latex, interior, eggshell, (Gloss Level 3), MPI #52 X-Green/#145 X-Green: S-W ProMar 200 Zero VOC Latex Eg-Shel, B20-2600 Series, at 4.0 mils wet, 1.7 mils dry, per coat.

**END OF SECTION 099123**

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**SECTION 220716  
PLUMBING EQUIPMENT INSULATION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Equipment insulation.
- B. Flexible removable and reusable blanket insulation.
- C. Covering.
- D. Breeching insulation.

**1.02 RELATED REQUIREMENTS**

- A. Section 220553 - Identification for Plumbing Piping and Equipment.
- B. Section 221005 - Plumbing Piping: Placement of hangers and hanger inserts.

**1.03 REFERENCE STANDARDS**

- A. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement 2007 (Reapproved 2019).
- B. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation 2022.
- C. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications 2013 (Reapproved 2019).
- D. ASTM C592 - Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type) 2022a.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023.
- F. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for equipment scheduled.
- C. Manufacturer's Instructions: Indicate installation procedures that ensure acceptable workmanship and installation standards will be achieved.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with not less than three years of documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum three years of experience.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.
- B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

**1.07 FIELD CONDITIONS**

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
- B. Maintain temperature during and after installation for minimum period of 24 hours.

## **PART 2 PRODUCTS**

### **2.01 REGULATORY REQUIREMENTS**

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that equipment has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

### **3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
  - B. Factory Insulated Equipment: Do not insulate.
  - C. Exposed Equipment: Locate insulation and cover seams in least visible locations.
  - D. Apply insulation close to equipment by grooving, scoring, and beveling insulation. Fasten insulation to equipment with studs, pins, clips, adhesive, wires, or bands.
  - E. Fill joints, cracks, seams, and depressions with bedding compound to form smooth surface. On cold equipment, use vapor barrier cement.
  - F. Insulated equipment containing fluids below ambient temperature: Insulate entire system.
  - G. Install cellular melamine with factory-applied jackets with a manufacturer-approved adhesive along seams, both straight lap joints and circumferential lap joints.
    - 1. Install seal over seams with factory-approved room temperature vulcanization (RTV) silicone sealant to ensure a positive vapor barrier seal in outdoor and sanitary wash down environments.
  - H. For fiberglass insulated equipment containing fluids below ambient temperature, provide vapor barrier jackets, factory-applied or field-applied, and finish with glass cloth and vapor barrier adhesive.
  - I. For hot equipment containing fluids 140 degrees F or less, do not insulate flanges and unions, but bevel and seal ends of insulation.
  - J. For hot equipment containing fluids over 140 degrees F, insulate flanges and unions with removable sections and jackets.
  - K. Fiberglass insulated equipment containing fluids above ambient temperature: Provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Finish with glass cloth and adhesive.
  - L. Inserts and Shields:
    - 1. Application: Equipment 1-1/2 inches diameter or larger.
    - 2. Shields: Galvanized steel between hangers and inserts.
    - 3. Insert location: Between support shield and equipment and under the finish jacket.
    - 4. Insert configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
    - 5. Insert material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.
  - M. Finish insulation at supports, protrusions, and interruptions.
  - N. Equipment in Mechanical Equipment Rooms or Finished Spaces: Finish with canvas jacket sized for finish painting.
  - O. Exterior Applications:
    - 1. Provide vapor barrier jacket or finish with glass mesh reinforced vapor barrier cement.
    - 2. Cover with aluminum, stainless steel, or \_\_\_\_\_.
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- P. Cover glass fiber insulation with metal mesh and finish with heavy coat of insulating cement.

**3.03 SCHEDULES**

- A. Plumbing Systems:  
1. Domestic Hot Water Storage Tanks:

**END OF SECTION 220716**

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**SECTION 220719  
PLUMBING PIPING INSULATION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Piping insulation.
- B. Flexible removable and reusable blanket insulation.
- C. Jackets and accessories.
- D. Supplies and drains for hand
- E. Section includes insulating the following pipe systems
  - 1. Domestic Cold Water Piping
  - 2. Domestic Hot Water Piping
  - 3. Domestic recirculating hot water piping
  - 4. Roof Drains and Rainwater leaders

**1.02 RELATED REQUIREMENTS**

- A. Section 099123 - Interior Painting: Painting insulation jacket.
- B. Section 221005 - Plumbing Piping: Placement of hangers and hanger inserts.

**1.03 REFERENCE STANDARDS**

- A. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus 2019, with Editorial Revision (2023).
- B. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement 2007 (Reapproved 2019).
- C. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus 2021.
- D. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form 2023.
- E. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation 2022a.
- F. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation 2022.
- G. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications 2013 (Reapproved 2019).
- H. ASTM C585 - Standard Practice for Inner and Outer Diameters of Thermal Insulation for Nominal Sizes of Pipe and Tubing 2022.
- I. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel 2008 (Reapproved 2018).
- J. ASTM C1695 - Standard Specification for Fabrication of Flexible Removable and Reusable Blanket Insulation for Hot Service 2022.
- K. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics 2019.
- L. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023.
- M. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials 2022a, with Editorial Revision (2023).

**1.04 DELIVERY, STORAGE, AND HANDLING**

- A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

- B. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.
- C. Maintain ambient conditions required by manufacturers of each product.
- D. Maintain temperature before, during, and after installation for minimum of 24 hours.

#### **1.05 COORDINATION**

- A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."
- B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.
- C. Coordinate installation and testing of heat tracing.

### **PART 2 PRODUCTS**

#### **2.01 REGULATORY REQUIREMENTS**

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

#### **2.02 GLASS FIBER**

#### **2.03 FLEXIBLE REMOVABLE AND REUSABLE BLANKET INSULATION**

- A. Insulation: ASTM C553 Type V; flexible, noncombustible.
  - 1. Comply with ASTM C1695.
  - 2. K Value: 0.37 at 100 degrees F, when tested in accordance with ASTM C177 or ASTM C518.
  - 3. Minimum Service Temperature: 32 degrees F.
  - 4. Maximum Service Temperature: 500 degrees F.
  - 5. Maximum Water Vapor Absorption: Less than 5.0 percent by weight.
  - 6. Color: Green.
  - 7. Weight: 7.65 oz per sq ft.
  - 8. Effective Thickness: 1.25 plus/minus 0.25 inch.

#### **2.04 CELLULAR GLASS**

- A. Insulation: ASTM C552, Type II, Grade 6.
  - 1. K Value: 0.35 at 100 degrees F.
  - 2. Service Temperature Range: From 250 degrees F to 800 degrees F.
  - 3. Water Vapor Permeability: 0.005 perm inch maximum per inch.
  - 4. Water Absorption: 0.5 percent by volume, maximum.

#### **2.05 JACKETS**

- A. PVC Plastic.
  - 1. Jacket: One piece molded type fitting covers and sheet material, off-white color.
    - a. Minimum Service Temperature: 0 degrees F.
    - b. Maximum Service Temperature: 150 degrees F.
    - c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
    - d. Thickness: 10 mil.
    - e. Connections: Brush on welding adhesive.
- B. ABS Plastic:
  - 1. Jacket: One piece molded type fitting covers and sheet material, off-white color.
    - a. Minimum Service Temperature: Minus 40 degrees F.
    - b. Maximum Service Temperature: 180 degrees F.
    - c. Moisture Vapor Permeability: 0.012 perm inch, when tested in accordance with ASTM E96/E96M.

- d. Thickness: 30 mil.
- e. Connections: Brush on welding adhesive.
- C. Canvas Jacket: UL listed 6 oz/sq yd plain weave cotton fabric treated with dilute fire retardant lagging adhesive.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that piping has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

### **3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with North American Insulation Manufacturers Association (NAIMA) National Insulation Standards.
- C. Exposed Piping: Locate insulation and cover seams in least visible locations.
- D. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
- E. Install cellular melamine with factory-applied jackets with a manufacturer-approved adhesive along seams, both straight lap joints and circumferential lap joints.
  - 1. Install seal over seams with factory-approved room temperature vulcanization (RTV) silicone sealant to ensure a positive vapor barrier seal in outdoor and sanitary washdown environments.
- F. Glass fiber insulated pipes conveying fluids below ambient temperature:
  - 1. Provide vapor barrier jackets, factory-applied or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
  - 2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.
- G. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.
- H. Inserts and Shields:
  - 1. Application: Piping 1-1/2 inches diameter or larger.

### **3.03 INDOOR PIPING INSULATION SCHEDULE**

- A. **Domestic Cold Water:**
  - 1. NPS 1 and Smaller: Insulation shall be one of the following:
    - a. Flexible Elastomeric: 1 inch Insert dimension thick.
    - b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1/2 inch thick.
  - 2. NPS 1-1/4 and Larger: Insulation shall be one of the following:
    - a. Flexible Elastomeric: 1 inch thick.
    - b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
- B. **Domestic Hot and Recirculated Hot Water (105-140 F):**
  - 1. NPS 1-1/4 and Smaller: Insulation shall be one of the following:
    - a. Flexible Elastomeric: 1 inch thick.
    - b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1-1/2 inch thick.
  - 2. NPS 1-1/2 and Larger: Insulation shall be one of the following:
    - a. Flexible Elastomeric: 1 inch thick.
    - b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1-1/2 inch thick.
- C. **Stormwater and Overflow:**
  - 1. All Pipe Sizes: Insulation shall be one of the following:

- a. Flexible Elastomeric: 1 inch thick.
  - b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
- D. **Roof Drain and Overflow Drain Bodies:**
  - 1. All Pipe Sizes: Insulation shall be one of the following:
    - a. Flexible Elastomeric: 1 inch thick.
    - b. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch thick.
- E. **Exposed Sanitary Drains, Domestic Water, Domestic Hot Water, and Stops for Plumbing Fixtures for People with Disabilities:**
  - 1. All Pipe Sizes: Insulation shall be the following:
    - a. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1/2 inch thick.
- F. **Sanitary Waste Piping Where Heat Tracing Is Installed:**
  - 1. All Pipe Sizes: Insulation shall be the following:
    - a. Cellular Glass: 2 inches thick.

#### **3.04 INDOOR, FIELD-APPLIED JACKET SCHEDULE**

- A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.
- B. If more than one material is listed, selection from materials listed is Contractor's option.
- C. Piping, Concealed:
- D. Piping, Exposed:
  - 1. PVC: 20 mils thick.

**END OF SECTION 220719**



**SECTION 221005  
PLUMBING PIPING**

**PART 1 GENERAL**

**1.01 REFERENCE STANDARDS**

- A. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings 2021.
- B. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings 2021.
- C. ASTM B32 - Standard Specification for Solder Metal 2020.
- D. ASTM B88 - Standard Specification for Seamless Copper Water Tube 2022.
- E. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric) 2020.
- F. NSF 61 - Drinking Water System Components - Health Effects 2022, with Errata.
- G. NSF 372 - Drinking Water System Components - Lead Content 2022.

**PART 2 PRODUCTS**

**2.01 GENERAL REQUIREMENTS**

- A. Potable Water Supply Systems: Provide piping, pipe fittings, and solder and flux (if used), that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

**2.02 DOMESTIC WATER PIPING, ABOVE GRADE**

- A. Copper Tube: ASTM B88 (ASTM B88M), Type L (B), Drawn (H).
  - 1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22, wrought copper and bronze.
  - 2. Joints: ASTM B32, alloy Sn95 solder.

**END OF SECTION 221005**

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**SECTION 223000  
PLUMBING EQUIPMENT**

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

**1.02 SECTION INCLUDES**

- A. Water Heaters:
  - 1. Commercial gas fired.
- B. Mixing Valves.
- C. Balance Valves.
- D. Diaphragm-type compression tanks.
- E. In-line circulator pumps.

**1.03 RELATED REQUIREMENTS**

**1.04 REFERENCE STANDARDS**

- A. ANSI Z21.10.1 - Gas Water Heaters, Volume I, Storage Water Heaters with Input Ratings of 75,000 Btu Per Hour or Less 2019, with Errata (2020).
- B. ANSI Z21.10.3 - Gas-Fired Water Heaters, Volume III, Storage Water Heaters with Input Ratings Above 75,000 Btu Per Hour, Circulating and Instantaneous 2019.
- C. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1: Rules for Construction of Pressure Vessels 2023.
- D. ICC (IPC) - International Plumbing Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

**1.05 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittals procedures.
- B. Product Data:
  - 1. Provide dimension drawings of water heaters indicating components and connections to other equipment and piping.
  - 2. Indicate pump type, capacity, power requirements.
  - 3. Provide certified pump curves showing pump performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable.
  - 4. Provide electrical characteristics and connection requirements.
- C. Operation and Maintenance Data: Include operation, maintenance, and inspection data, replacement part numbers and availability, and service depot location and telephone number.
- D. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- E. Project Record Documents: Record actual locations of components.

**1.06 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Certifications:
  - 1. Water Heaters: NSF approved.

2. Gas Water Heaters: Certified by CSA International to ANSI Z21.10.1, as applicable, in addition to requirements specified elsewhere.
- C. Identification: Provide pumps with manufacturer's name, model number, and rating/capacity identified by permanently attached label.
- D. Performance: Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, operate within 25 percent of midpoint of published maximum efficiency curve.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Provide temporary inlet and outlet caps. Maintain caps in place until installation.

#### **1.08 WARRANTY**

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty for domestic water heaters.

### **PART 2 PRODUCTS**

#### **2.01 WATER HEATERS (DWH-1)**

- A. Water Heater:
- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the work include, but not limited to, the following:
  1. Lochinvar: **Equal to AWLP400PM**
  2. A.O. Smith Water Products Co; \_\_\_\_\_: [www.hotwater.com/#sle](http://www.hotwater.com/#sle).)
  3. Bock Water Heaters, Inc; \_\_\_\_\_: [www.bockwaterheaters.com/#sle](http://www.bockwaterheaters.com/#sle).
  4. Rheem Manufacturing Company; \_\_\_\_\_: [www.rheem.com/#sle](http://www.rheem.com/#sle).
  5. Substitutions: See Section 016000 - Product Requirements.
- C. Commercial Gas Fired:
  1. Type: Automatic, propane-fired, detached vertical storage.
  2. Performance:
    - a. Energy Factor: 95.
    - b. Storage Capacity: 257 gal.
    - c. Input: 399,999 Btuh \_\_\_\_\_.
    - d. Minimum Recovery Rate: 138 gph with 100 degrees F temperature rise.
    - e. Maximum Working Pressure: 150 psig.
  3. Tank: Glass lined welded steel ASME labeled; multiple flue passages, 4 inch diameter inspection port, thermally insulated with minimum 2 inches glass fiber, encased in corrosion-resistant steel jacket; baked-on enamel finish; floor shield and legs.
  4. Accessories:
    - a. Water Connections: Brass.
    - b. Dip Tube: Brass.
    - c. Drain valve.
    - d. Anode: Magnesium.
  5. Certified For The Following Applications:
  6. Controls: Automatic water thermostat with temperature range adjustable from 120 to 180 degrees F, automatic reset high temperature limiting thermostat factory set at 195 degrees F, gas pressure regulator, multi-ribbon or tubular burner, 100 percent safety shut-off pilot and thermocouple, flue baffle and draft hood.

#### **2.02 MIXING VALVES (MV-1)**

- A. Thermostatic Master Tempering Valves:
  1. Manufacturers: Subject to compliance requirements, available manufacturers offering products that may be incorporated into the work include, but are not limited to, the following:
    - a. Leonard Valve Company; \_\_\_\_\_: [www.leonardvalve.com/#sle](http://www.leonardvalve.com/#sle).

- b. Powers, A Watts Brand. **Equal to LFMM432**
  - c. Lawler Valve Co.
  - d. Substitutions: See Section 016000 - Product Requirements.
- 2. Valve: Chrome plated cast brass body, stainless steel or copper alloy bellows, integral temperature adjustment.
- 3. Accessories:
  - a. Shut off & Check valve on inlets.
  - b. Volume control shut-off valve on outlet.
  - c. Stem thermometer on outlet.
  - d. Strainer stop checks on inlets.

### 2.03 BALANCE VALVES (BV-1)

- A. Balance Valves
  - 1. Manufacturers: Subject to compliance requirements, available manufacturers offering products that may be incorporated into the work include, but are not limited to, the following:
  - 2. Taco Therm Ltd; \_\_\_\_\_: [www.tacotherm.co.uk](http://www.tacotherm.co.uk).
  - 3. Bell & Gossett. **Equal to A549LFP**
  - 4. Circuit Setter
  - 5. Substitutions: See Section 016000 - Product Requirements.
- B. Body: Lead-Free Brass.
- C. Ball: 304 Stainless Steel.
- D. Seat Rings: Glass and Carbon filled TFE.
- E. Readout Valves: Brass with EPT check valves.
- F. Stem "O" Ring: EPDM.

### 2.04 DIAPHRAGM-TYPE COMPRESSION TANKS (ET-1)

- A. Expansion Tanks:
- B. Manufacturers: Subject to compliance requirements, available manufacturers offering products that may be incorporated into the work include, but are not limited to, the following:
  - 1. Watts: **Equal to Deta-42**
  - 2. Amtrol Inc; \_\_\_\_\_: [www.amtrol.com/#sle](http://www.amtrol.com/#sle).
  - 3. Bell & Gossett, a xylem brand; \_\_\_\_\_: [www.bellgossett.com/#sle](http://www.bellgossett.com/#sle).
  - 4. Taco, Inc; \_\_\_\_\_: [www.taco-hvac.com/#sle](http://www.taco-hvac.com/#sle).
  - 5. Substitutions: See Section 016000 - Product Requirements.
- C. Construction: Welded steel, tested and stamped in accordance with ASME BPVC-VIII-1; supplied with National Board Form U-1, rated for working pressure of 125 psig, with flexible EPDM diaphragm sealed into tank, and steel legs or saddles.
- D. Accessories: Pressure gauge and air-charging fitting, tank drain; precharge to 12 psig.

### 2.05 IN-LINE CIRCULATOR PUMPS (RP-1)

- A. Recirculation Pumps:
- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the work include, but are not limited to, the following:
  - 1. Armstrong Fluid Technology; \_\_\_\_\_: [www.armstrongfluidtechnology.com/#sle](http://www.armstrongfluidtechnology.com/#sle).
  - 2. Bell & Gossett, a xylem brand; \_\_\_\_\_: [www.bellgossett.com/#sle](http://www.bellgossett.com/#sle). **Equal to ECOCIRC XL 20-35**
  - 3. PACO Pumps; Grundfos Pump Corporation, USA \_\_\_\_\_.
  - 4. Substitutions: See Section 016000 - Product Requirements.
- C. Casing: Bronze, rated for 125 psig working pressure, with stainless steel rotor assembly.
- D. Impeller: Bronze.

- E. Controller: Honeywell Aquastat model **L4006A2007-U**
- F. Shaft: Alloy steel with integral thrust collar and two oil lubricated bronze sleeve bearings.
- G. Seal: Carbon rotating against a stationary ceramic seat.
- H. Drive: Flexible coupling.

## **2.06 ELECTRICAL WORK**

- A. Provide electrical motor driven equipment specified complete with motors, motor starters, controls, and wiring.
- B. Electrical characteristics to be as specified or indicated.
- C. Furnish motor starters complete with thermal overload protection and other appurtenances necessary for the motor control specified.
- D. Supply manual or automatic control and protective or signal devices required for the operation specified, and any control wiring required for controls and devices not shown.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install plumbing equipment in accordance with manufacturer's instructions, as required by code, and complying with conditions of certification, if any.
- B. Coordinate with plumbing piping and related fuel piping and gas venting work to achieve operating system.
- C. Domestic Water Storage Tanks:
  - 1. Provide steel pipe support, independent of building structural framing members.
  - 2. Clean and flush prior to delivery to site. Seal until pipe connections are made.
- D. Pumps:
  - 1. Ensure pumps operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.

**END OF SECTION 223000**

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**SECTION 230000**  
**GENERAL PROVISIONS FOR MECHANICAL WORK**

**PART 1 - GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Requirements of this Section apply to work in every Section of Division 23 equally as if incorporated therein.

**1.02 WORK INCLUDED**

- A. Work included in Division 23 - Mechanical: Materials, equipment, fabrication, installation, and tests in conformity with applicable codes and authorities having jurisdiction for Mechanical Work covered by all sections within this Division.

**1.03 SCOPE**

- A. Division of the Specification into sections is for the purpose of simplification alone. Responsibility for the work of various trades shall rest with the Contractor. Various sections of this Division are related to each other as well as the mechanical drawings. Examine all drawings and read all applicable parts of the project manual in order to ensure complete execution of all work in this Division, coordinating where required with other trades in order to avoid conflicts.
  - B. These specifications and accompanying drawings are intended to cover the furnishing of all labor, materials, equipment and services necessary for the complete installation and acceptable performance of the mechanical systems. Small items of material, equipment and appurtenances not mentioned in detail or shown on the drawings, but necessary for complete and operating systems shall be provided by this contractor without additional charge to the Owner and shall be included under this contract.
  - C. In general, specifications establish the quality of material, equipment and workmanship. The contract documents are intended to secure for the Owner, a first-class installation in every respect. Labor shall be performed by skilled mechanics, and the entire facility, when delivered to the Owner, shall be ready for satisfactory and efficient operation.
  - D. The Contractor shall carefully examine the drawings and specifications before accepting the contract. He shall call attention to any changes or additions which, in his opinion, are necessary to make possible the fulfillment of any guarantee called for by these specifications; failing which, it shall be deemed that he has accepted full responsibility for all such guarantees.
  - E. The contractor shall put his work in place as fast as is reasonably possible. He shall, at all times, keep a competent foreman in charge of the work, to make decisions necessary for the diligent advancement of the work. The Contractor shall facilitate the inspection of the work by the Owner's Representative.
  - F. The Contractor shall coordinate all work in the building in order to facilitate intelligent execution of the work. He shall also remove any rubbish as expeditiously as possible.
  - G. Materials or products specified herein and/or indicated on the drawings by trade's names, manufacturer's names, model number or catalog numbers establish the quality of materials or products to be furnished. Model numbers are to be confirmed by the manufacturer to provide required capacities and material to meet the specifications and design intent. In no instance shall an obsolete, incomplete or inaccurate trade name, manufacturer name, model number or catalog number indicated on the drawings, result in additional charges to the owner.
  - H. Points of connection or continuation of work under this contract are so marked on drawings or herein specified. In case of any doubt as to the required exact location of such points, the Owner's Representative shall decide and direct.
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- I. The plumbing contractor shall provide water services to within two (2) feet of HVAC equipment requiring same, and shall terminate service with a shutoff valve. The mechanical contractor shall make the final connection to the equipment.

#### **1.04 REFERENCE STANDARDS, CODES AND REGULATIONS**

- A. Requirements of Regulatory Agencies:
1. Nothing contained in these specifications or shown on the drawings shall be construed to conflict with any State or local laws, ordinances, rules and regulations, the UL and NFPA regulations. The Contractor shall make all changes required by the enforcing authorities. Where alterations to and / or deviations from the Contract Documents are required by the authorities having jurisdiction, report the requirements to the Engineer and secure acceptance before work is started. All such changes shall be made in a manner acceptable to the Engineer and shall be made without cost to the Owner.
  2. When drawings or specifications exceed requirements of applicable laws, ordinances, rules and regulations, comply with documents establishing the more stringent requirement. All work shall be done in full conformity with the requirements of all authorities having jurisdiction. Installation shall be made in compliance with all applicable regulations, and utility company rules, all of which shall be considered a part of this specification and shall take precedence in the order of listing.
  3. It is not the intent of drawings or specifications to repeat requirements of codes except where necessary for completeness in individual sections.
- B. Published specifications, standards, tests or recommended method of trade, industry or governmental organizations as listed below apply to all work in this Division, in addition to other standards which may be specified in individual sections:
1. Associated Air Balance Council
  2. Air Diffuser Balance Council
  3. Air Moving and Conditioning Association
  4. American Gas Association
  5. American National Standards Institute
  6. Air Conditioning and Refrigeration Institute
  7. American Society of Heating, Refrigeration and Air Conditioning Engineers
  8. American Society of Mechanical Engineers
  9. American Society for Testing and Materials
  10. Cast Iron Soil Pipe Institute
  11. ETL Testing Laboratories
  12. Factory Mutual Engineering and Research Corporation
  13. National Standard Plumbing Code
  14. National Electrical Manufacturer's Association
  15. National Fire Protection Association
  16. National Board of Fire Underwriters
  17. National Electric Code
  18. Occupational Safety and Health Administration
  19. Plumbing Drainage Institute
  20. Sheet Metal & Air Conditioning Contractors National Association
  21. Underwriters Laboratories, Inc.
- C. Furnish and file with the proper authorities, all drawings required by them in connection with the work. Contractor shall secure and obtain all approvals, permits, licenses and inspections and pay all legal and proper fees and charges in this connection, before commencing work in order to avoid delays during construction. He shall deliver the official records of the granting of the permits, etc., to the Owner's Representative.
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**1.05 QUALITY ASSURANCE**

- A. All equipment and accessories to be the product of a manufacturer regularly engaged in its manufacture.
- B. Supply all equipment and accessories new and free from defects.
- C. Supply all equipment and accessories in compliance with the applicable standards listed in Article 1.4 of this section with all applicable national, state and local codes.
- D. All items of a given type shall be the product of same manufacturer.

**1.06 DESCRIPTION OF BID DOCUMENTS**

- A. Specifications:
  - 1. Specifications, in general, describe quality and character of materials and equipment.
  - 2. Specifications are of simplified form and include incomplete sentences.
  - 3. Words or phrases such as "The Contractor shall", "shall be", "furnish", "provide", "a", "an", "the", and "all" may have been omitted for brevity.
- B. Drawings: Mechanical drawings under this contract are made a part of these specifications. Deviations from these specifications as noted below must have the approval of the Engineer or Construction Manager without an increase in contract price.
  - 1. The drawings shall be considered as being diagrammatic and for bidding purposes only. Intention is to show size, capacity, approximate location, direction and general relationship of one work phase to another, but not exact detail or arrangement. The attention of the contractor is called to the fact that while these drawings are generally to scale and are made as accurately as the scale will permit, all critical dimensions shall be determined in the field. They are not to be considered as erection drawings.
  - 2. The drawings do not indicate every fitting, elbow, offset, valve, etc. which is required to complete the job. Contractor shall prepare field erection drawings as required for the use of his mechanics to insure proper installation.
  - 3. Scaled and figured dimensions are approximate and are for estimating purposes only. Indicated dimensions are limiting dimensions.
  - 4. Before proceeding with work check and verify all dimensions in field.
  - 5. Assume all responsibility for fitting of materials and equipment to other parts of equipment and structure.
  - 6. Make adjustments that may be necessary or requested in order to resolve space problems, preserve headroom, and avoid architectural openings, structural members and work of other trades.
  - 7. For exact locations of building elements, refer to dimensional Architectural/Structural drawings.
- C. Description of systems: Provide all materials to provide functioning systems in compliance with performance requirements specified, and any modifications resulting from reviewed shop drawings and field coordinated drawings.
  - 1. Installation of all systems and equipment is subject to clarification as indicated in reviewed shop drawings and field coordination drawings.
- D. Do not use equipment exceeding dimensions indicated or equipment or arrangements that reduce required clearances or exceed specified maximum dimensions.
- E. If any part of Specifications or Drawings appears unclear or contradictory, apply to Architect for his interpretation and decision as early as possible, including during bidding period.
  - 1. Do not proceed with work without Engineer's decision.

**1.07 EQUIPMENT MANUFACTURERS**

- A. The first named manufacturer is used as the basis of design. Other named manufacturers are identified as equivalent manufacturers, not equivalent products. Naming other manufacturers does not necessarily imply conformance of any specific product with the written specifications.
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- B. The contractor is required to verify that equipment and material to be used on the project meets the requirements of the specifications and will physically fit the available space, clearance and service requirements of the particular piece of equipment and include all pertinent information when he submits material for acceptance. Contractor shall also be responsible for and bear the cost of any modifications to openings available or anticipated as being available for rigging equipment to its final installation place. This shall include openings in exterior envelope, walls and roofs, interior walls, corridors, passage ways or door openings. Any on site dismantling and any reassembly of equipment made necessary by impediment to the rigging of said equipment shall be the sole responsibility of the contractor.
- C. Contract document indicates power and physical requirements based on the equipment manufacturer's data as first named. If equipment requiring more system capacity is furnished, the contractor shall be responsible for the cost associated with modifying the design and installation of associated services, including any redesign costs associated with the engineer's review.

### 1.08 DEFINITIONS

- A. "Provide": To supply, furnish, install and connect up complete and ready safe and regular operation of particular work referred to unless specifically noted.
- B. "Install": To erect, mount and connect complete with related accessories.
- C. "Supply", "Furnish": To purchase, procure, acquire and deliver complete with related accessories.
- D. "Work": Labor, materials, equipment, apparatus, controls, accessories, and other items required for proper and complete installation.
- E. "Piping": Pipe, tube, fittings, flanges, valves, controls, strainers, hangers, supports, unions, traps, drains, insulation, and related items.
- F. "Wiring": Raceway, fittings, wire, boxes and related items.
- G. "Concealed": Items referred to as hidden from normal sight, embedded in masonry or other construction, installed in furred spaces, within double partitions or hung ceilings, in trenches, in crawl spaces, or in enclosures.
- H. "Exposed": Not installed underground or "concealed" as defined above.
- I. "Indicated", "Shown", or "Noted": As indicated, shown or noted on drawings or specifications.
- J. "Directed": Directed by Engineer.
- K. "Similar" or "Equal": Of base bid manufacture, equal in materials, weight, size, design, and efficiency of specified product.
- L. "Reviewed", "Satisfactory", or "Directed": As reviewed, satisfactory, or directed by or to Engineer.
- M. "Motor Controllers": Manual or magnetic starters (with or without switches), individual pushbuttons or hand-off-automatic (HOA) switches controlling the operation of motors.
- N. "Control or Actuating Devices": Automatic sensing and switching devices such as thermostats, pressure, float, electro-pneumatic switches and electrodes controlling operation of equipment.
- O. "Remove": Dismantle, demolish and take away from the site and dispose of in accordance with all applicable rules and regulations or, should the Owner so require, deliver to a location as designated by the Owner for the use of the Owner, at no additional costs to the Owner.
- P. "Replace": Remove existing and provide an equivalent product or material as specified.
- Q. "Extract (and Reinstall)": Carefully disassemble, dismantle existing, save or store where directed by the Owner, in such a manner as to preserve the existing condition and reinstall as indicated on the drawings or as described in the specifications.

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- R. Where any device or piece of equipment is referred to in the singular number, such reference shall be deemed to apply to as many devices as are required to complete the installation.

#### **1.09 JOB CONDITIONS**

- A. This contractor shall investigate all conditions affecting his work and shall provide such offsets, fittings, valves, sheet metal work, etc., as may be required to meet conditions at the building.
- B. The contractor shall verify all measurements at the building site and shall be responsible for the correctness of same before ordering materials or before starting work of any Section.
1. Report to Architect, in writing, conditions which will prevent proper provision of this work.
  2. Beginning work of any Section without reporting unsuitable conditions to Architect constitutes acceptance of conditions by Contractor.
  3. Perform any required removal, repair or replacement of this work caused by unsuitable conditions at no additional cost to Owner.
- C. Piping and ductwork shall be concealed or run behind furring in finished spaces unless otherwise noted to be run exposed.
- D. Horizontal piping and ductwork not run below slabs on grade shall be run as close as possible to underside of roof or floor slab above and parallel to building lines. Maintain maximum headroom in all areas.
- E. Determine possible interference between trades before the work is fabricated or installed. The contractor must coordinate his work to insure that erection will proceed without such interference. Coordination is of paramount importance and no request for additional payment will be considered where such request is based upon interference between trades.
- F. Connections to Existing Work:
1. Install new work and connect to existing work with minimum of interference to existing facilities.
  2. Temporary shutdowns of existing services:
  3. At no additional charges
    - a. At times not to interfere with normal operation of existing facilities.
    - b. Only with written consent of Owner.
  4. Maintain continuous operation of existing facilities as required with necessary temporary connections between new and existing work.
  5. Restore existing disturbed work to original condition.
- G. Removal, extraction and relocation of existing work.
1. The work includes demolition or removal of all construction indicated or specified. All materials resulting from demolition work, except as indicated or specified otherwise, shall become the property of the Contractor and shall be removed from the site. Rubbish and debris shall be removed from the site daily unless otherwise directed so as to not allow accumulation inside or outside the building. Materials that cannot be removed daily shall be stored in areas specified by the Owner.
  2. Title to all materials and equipment to be demolished, excepting Owner salvage and historical items, is vested in the Contractor upon receipt of notice to proceed. The Owner will not be responsible for the condition, loss or damage to such property after notice to proceed.
  3. The Owner reserves the "Right of First Refusal" on all material for salvage. Material for salvage shall be stored as approved by the Owner. Salvage materials shall be removed from the site before completion of the Contract. Material for salvage shall not be sold on the site.
  4. Property of the Owner: Salvaged items remaining the property of the Owner shall be removed in a manner to prevent damage and packed or crated to protect the items from damage while in storage or during shipment and relocated by the contractor at no cost, to the Owners designated storage facility on the site. Containers shall be properly identified
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- as to contents.
5. Damaged Items: Items damaged during removal or storage shall be repaired or replaced to match existing.
  6. Disconnect, remove or relocate material, equipment, plumbing fixtures, piping and other work noted and required by removal or changes in existing conditions.
  7. Where existing pipes, conduits and/or ducts which are to remain prevent installation of new work as indicated, relocate, or arrange for relocation, of existing pipes, conduits, and/or ducts.
  8. Provide new material and equipment required for relocated equipment.
  9. Plug or cap active piping or ductwork behind or below finish.
  10. Do not leave long dead-end branches.
    - a. Cap or plug as close as possible to active line.
  11. Remove unused piping, ductwork and equipment.
  12. Dispose of unusable piping, ductwork and material.

#### **1.10 CLEARANCE FROM ELECTRICAL EQUIPMENT**

- A. Piping or ductwork:
  1. Prohibited, except as noted, in:
    - a. Electric rooms and closets.
    - b. Telephone rooms and closets.
    - c. Elevator machine rooms.
    - d. Electric switchboard room.
  2. Prohibited, except as noted, over or within 5 ft. of:
    - a. Transformers.
    - b. Substations.
    - c. Switchboards.
    - d. Motor control centers.
    - e. Standby power plant.
    - f. Bus ducts.
    - g. Electrical panels.
  3. Drip pans under piping:
    - a. Only where unavoidable and approved.
    - b. 18 gauge galvanized steel.
      - 1) With bituminous paint coating.
    - c. Reinforced and supported.
    - d. Watertight.
    - e. With 1-1/4 inch drain outlet piped to floor drain or service sink.

#### **1.11 TEMPORARY FACILITIES**

- A. Temporary facilities are not included within this Section.

#### **1.12 SPECIAL TOOLS**

- A. Furnish to Owner at completion of work:
    1. One set of any special tools required to operate, adjust, dismantle or repair equipment furnished under any section of the Division.
    2. "Special tools": those not normally found in possession of mechanics or maintenance personnel.
    3. One pressure grease gun for each type of grease required.
      - a. With adapters to fit all lubricating fittings on equipment.
      - b. Include lubricant for lubricated plug valves.
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**1.13 PRODUCT DELIVERY, HANDING AND STORAGE**

- A. Provide adequate and secure storage facilities for materials and equipment during the progress of the work.
- B. Contractor shall be responsible for the condition of all materials and equipment employed in the mechanical installation until final acceptance by the Owner. Protect same from any cause whatsoever.
- C. Where necessary, ship in crated sections of size to permit passing through available space.
- D. Ship equipment in original packages, to prevent damaging or entrance of foreign matter.
- E. Handle and ship in accordance with manufacturer's recommendations.
- F. Provide protective coverings during construction.
- G. Replace at no expense to Owner, equipment or material damaged during storage or handling, as directed by Engineer.
- H. Tag all items with weatherproof tag, identifying equipment by name and purchase order number.
- I. Include packing and shipping lists.
- J. Adhere to special requirements as specified in individual sections.

**1.14 PROTECTION OF MATERIALS**

- A. Protect from damage, water, dust, etc., material, equipment and apparatus provided under this Division, both in storage and installed, until Notice of Completion has been filed.
- B. Provide temporary storage facilities for materials and equipment.
- C. Material, equipment or apparatus damaged because of improper storage or protection will be rejected.
  - 1. Remove from site and provide new, duplicate, material, equipment, or apparatus in replacement of that rejected.
- D. Cover motors and other moving machinery to protect from dirt and water during construction. Rotate moving equipment, shafts, bearings, motors etc. to prevent corrosion and to circulate lubricants.
- E. Protect premises and work of other Divisions from damage arising out of installation of work of this Division.
  - 1. Contractor shall be responsible for the replacement of all damaged or defective work, materials or equipment. Do not install sensitive or delicate equipment until major construction work is completed.
  - 2. Remove replaced parts from premises.
- F. Make good any damage to the work caused by floods, storms, accidents, acts of God, acts of negligence, strikes, violence or theft up to time of final acceptance by the Owner.
- G. Do not leave any mechanical work in a hazardous condition, even temporarily.

**1.15 REVIEW OF CONSTRUCTION**

- A. Work may be reviewed at any time by representative of the Engineer.
  - B. Advise Architect and Engineer that work is ready for review at following times:
    - 1. Prior to backfilling buried work.
    - 2. Prior to concealment of work in walls and above ceilings.
    - 3. When all requirements of Contract have been completed.
  - C. Neither backfill nor conceal work without Engineer's consent.
  - D. Maintain on job a set of Specifications and Drawings for use by Engineer's representatives.
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**1.16 SCHEDULE OF WORK**

- A. Arrange work to conform to schedule of construction established or required to comply with Contract Documents.
- B. In scheduling, anticipate means of installing equipment through available openings in structure.
- C. Confirm in writing to Architect and Engineer, within 30 days of signing of contract, anticipated number of days required to perform test, balance, and acceptance testing of mechanical systems.
  - 1. This phase must occur after completion of mechanical systems, including all control calibration and adjustment, and requires substantial completion of the building, including closure, ceilings, lighting, partitioning, etc.
  - 2. Submit for approval at this time, names and qualifications of test and balancing agencies to be used.
- D. Arrange with Owner schedule for work in each area.
- E. Unless otherwise directed by Owner, perform work during normal working hours.
- F. Work delays:
  - 1. In case noisy work interferes with Owner's operations, Owner may require work to be stopped and performed at some other time, or after normal working hours.

**1.17 ACCESS TO MECHANICAL WORK**

- A. Access doors in walls and ceilings.
- B. Access Units Fire-Resistance Ratings: Where fire-resistance rating is indicated for construction penetrated by access units, provide UL listed-and-labeled units, except for units which are smaller than minimum size requiring ratings as recognized by governing authority.
- C. Product Data, Access Units: Submit manufacturer's technical data and installation instructions for each type of access door assembly, including setting drawings, templates, instructions and directions for installation of anchorage devices.
- D. Furnish to the general contractor all access doors necessary for access through inaccessible wall or ceiling construction, for installation by the general contractor. Information on the size and location of the subject access doors is to be communicated in writing to the general contractors during the bidding period.

**1.18 CONCRETE FOR MECHANICAL WORK**

- A. Concrete for Mechanical Work
    - 1. Basins and curbs for mechanical equipment.
    - 2. Mechanical equipment foundations and housekeeping pads.
    - 3. Inertia bases for isolation of mechanical work.
    - 4. Rough grouting in and around mechanical work.
    - 5. Patching concrete cut to accommodate mechanical work.
  - B. Quality control testing for concrete is required as work of this section.
  - C. Concrete Work Codes and Standards:
    - 1. Comply with governing regulations and, where not otherwise indicated, comply with the following industry standards; whichever is the most stringent in its application to work in each instance.
      - a. ACI 301: "Specifications for Structural Concrete for Buildings"
      - b. ACI 311: "Recommended Practice for Concrete Inspection"
      - c. ACI 318: "Building Code Requirements for Reinforced Concrete"
      - d. ACI 347R: "Recommended Practice for Concrete Form work"
      - e. ACI 304R: "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete"
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- f. Concrete Reinforcing Steel Institute's, "Manual of Standard Practice"
  - D. Submittals: Shop Drawings, Mechanical Concrete Work: Submit shop drawings for structural type concrete work, showing dimensions of formed shapes of concrete; bending, placement, sizes and spacing of reinforcing steel; location of anchors, isolation units, hangers and similar devices to be integrated with concrete work; and piping penetrations, access openings, inlets and other accessories and work to be accommodated by concrete work.
  - E. Laboratory Test Reports, Mechanical Concrete Work: Submit laboratory test reports for concrete work materials, and for tested samples of placed concrete (where required as work of this section).

#### **1.19 NOISE REDUCTION**

- A. Cooperate in reducing objectionable noise or vibration caused by mechanical systems.
  - 1. To extent of adjustments to specified and installed equipment and appurtenances.
- B. Correct noise problems caused by failure to install work in accordance with Contract Documents.
  - 1. Include labor and materials required as result of such failure.

#### **1.20 CUTTING AND PATCHING**

- A. Provide all carpentry, cutting and patching required for proper installation of material and equipment specified.
- B. Do not cut or drill structural members without consent of Architect.

#### **1.21 COORDINATION DRAWINGS**

- A. Layout Shop Drawings Required:
  - 1. Prepare layout shop drawings for all areas; minimum 3/8 inch scale.
  - 2. Individual coordinated trade layout drawings are to be prepared for all areas.
  - 3. General Contractor is to assure that each trade has coordinated work with other trades, prior to submittal where submittal is required.
    - a. Include stamp on each submittal indicating that layout shop drawing has been coordinated.
  - 4. No layout shop drawing will be reviewed without stamped and signed coordinated assurance by General Contractor.
  - 5. All changes shall be clearly marked on each submitted layout drawing.
  - 6. Drawings shall show work of all trades including but not limited to'
    - a. Ductwork.
    - b. Piping: All Trades.
    - c. Mechanical Equipment.
    - d. Electrical Equipment.
    - e. Main Electrical conduits and bus ducts.
    - f. Equipment supports and suspension devices.
    - g. Structural and architectural constraints.
    - h. Show location of:
      - 1) Valves
      - 2) Piping specialties
      - 3) Dampers
      - 4) Access Doors
      - 5) Control and electrical panels
      - 6) Disconnect switches
  - 7. Drawings shall indicate coordination with work in other Divisions that must be incorporated in mechanical spaces, including, but not limited to:
    - a. Elevator equipment.
    - b. Cable trays not furnished under Division 16.

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- c. Computer equipment.
  - 8. Submission of drawings:
    - a. Prepare reproducible drawings.
    - b. Submit to other trades for review of space allocated to all trades.
    - c. Revise drawings to compensate for requirements of existing conditions and conditions created by other trades.
    - d. Review revisions and other trades.
    - e. Submit one reproducible and one blueline print to Engineer for review.
  - 9. Final prepared drawings shall show that other trades affected have made reviews and signed, by each trade, at completions of coordination.
    - a. General Contractor
    - b. Include stamp on each submittal indicating that layout shop drawing has been coordinated.
  - 10. No layout shop drawing will be reviewed without stamped and signed coordination assurance by General Contractor.
  - B. Shop Drawings:
    - 1. Layout drawings of mechanical equipment rooms and penthouses showing all related equipment and equipment clearances required by other trades.
    - 2. Layout drawings of areas in which it may be necessary to deviate substantially from layout shown on the drawings. Minor transitions in ductwork, if required due to job conditions, need not be submitted as long as the duct area is maintained. Show major relocation of ductwork and major changes in size of ducts. Coordinate shop drawings with all trades prior to ductwork fabrication.
    - 3. Details of intermediate structural steel members required to span main structural steel for the support of ductwork.
    - 4. Method of attachment of duct hangers to building construction.
    - 5. Duct material, gage, type of joints and duct reinforcing for each size range, including sketches or SMACNA plate numbers for joints, method of fabrication and reinforcing.

## 1.22 GUARANTEE

- A. Furnish guarantee covering all work in accordance with general requirements of the contract for minimum period of one year. This personal guarantee shall exist for a period of one (1) year from the date of final acceptance of the work and shall apply to defects in materials and to defective workmanship of any kind.
  - B. For factory-assembled equipment and devices on which the manufacturers furnish standard published guarantees as regular trade practice, obtain such guarantees and replace any such equipment that proves defective during the life of these guarantees.
  - C. Guarantee all work for which materials are furnished, fabricated or field erected by the contractor, all factory-assembled equipment for which no specific manufacturer's guarantee is furnished, and all work in connection with installing manufacturer's guarantee is furnished, and all work in connection with installing manufacturer's guaranteed equipment.
  - D. In the event of failure of any work, equipment or device during the life of the guarantee, repair or replace the equipment or defective work. Remove, replace or restore, at no cost to the Owner, any part of the structure or building which may be damaged either as the direct result of the defective work or in the course of the contractor's making replacement of the defective work or materials. Work shall be done at a time and in a manner as to cause no undue inconvenience to the Owner. Provide new materials, equipment, apparatus and labor to replace that determined by Engineer to be defective or faulty.
  - E. This guarantee also applies to services including Instructions, Adjusting, Testing, Noise, Balancing, etc.
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- F. Additional equipment and material guarantees and warranties may be indicated in other sections. In all cases, the more stringent guarantee or warranty shall be provided.

## **PART 2 - PRODUCTS**

### **2.01 MATERIALS AND EQUIPMENT QUALITY**

- A. Material and equipment furnished under this Division of specification shall be new. Defective or inferior materials must be replaced by contractor at no cost to Owner regardless of the stage of construction. Inferior material shall be defined as material or equipment of a quality or performance less than that specified as determined by the Owner's Representative.
- B. Provide each item of equipment with manufacturer's identification tag which is readily accessible and clearly shows model and size.

### **2.02 ACCESS TO MECHANICAL WORK**

- A. Access Doors:
1. General: Where walls and ceilings must be penetrated for access to mechanical work, access doors shall be provided. Furnish adequate size for intended and necessary access. Furnish doors with UL Fire Rating to match wall or ceiling construction. Furnish manufacturer's complete units, of type recommended for application in indicated substrate construction, in each case, complete with anchorages and hardware.
- B. Access Door Construction: Refer to Section 083113 – ACCESS DOORS AND FRAMES

## **PART 3 - EXECUTION**

### **3.01 FIELD QUALITY CONTROL**

- A. Tests:
1. Perform as specified in individual sections, and as required by authorities having jurisdiction.
  2. Duration as noted.
- B. Provide required labor, material, equipment, and connections.
- C. Furnish written report and certification those tests have been satisfactorily completed.
- D. Repair or replace defective work, as directed.
- E. Pay for restoring or replacing damaged work due to tests as directed.
- F. Pay for restoring or replacing damaged work of others, due to tests, as directed.

### **3.02 ACCESS TO MECHANICAL WORK**

- A. Coordinate installation and placement of access doors and panels with contractor for general construction.
- B. Remove or replace panels or frames that are warped, bowed, or otherwise damaged.

**END OF SECTION 230000**

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**SECTION 230002**  
**MECHANICAL AND ELECTRICAL COORDINATION****PART 1 - GENERAL****1.01 WORK INCLUDED**

- A. Work Included in This Section: Materials, equipment, fabrication, installation, and tests in conformity with applicable codes and authorities having jurisdiction for the following:
  - 1. Motors.
  - 2. Factory-wired equipment (FWE).
  - 3. Factory-wired control panels (FWCP).
  - 4. Motor controllers where provided as part of mechanical equipment.
  - 5. Motor controllers where supplied under Division 23 - Mechanical Work.
  - 6. Disconnects and safety switches for mechanical equipment.
  - 7. Fuses for equipment provided, and starters and disconnect switches.
  - 8. Emergency Pushbutton Operator Station.

**1.02 RELATED WORK SPECIFIED ELSEWHERE**

- A. Division 23 - HVAC Instrumentation and Controls, Motors.
- B. Installation and Power Wiring of Motor Controllers.

**1.03 REFERENCE STANDARDS**

- A. Published specifications standards, tests, or recommended methods of trade, industry or governmental organization as apply to work in this section where cited below:
  - 1. ANSI - American National Standards Institute.
  - 2. NEMA - National Electrical Manufacturer's Association.
  - 3. IEEE - Institute of Electrical and Electronic Engineers.

**1.04 QUALITY ASSURANCE**

- A. All equipment and accessories to be the product of a manufacturer regularly engaged in its manufacture.
- B. Supply all equipment and accessories new and free from defects.
- C. Supply all equipment and accessories in compliance with the applicable standards listed in Article 1.03 of this Section and with all applicable National, State and local codes.
- D. All items of a given-type shall be the products of the same manufacturer.

**1.05 DIVISION OF WORK**

- A. This section delineates the work required to be performed by Contractors under Division 23 and Division 26.

**1.06 WORK REQUIRED UNDER DIVISION 23**

- A. Furnish motors, manual and combination starters, pushbutton devices, contactors, disconnect switches, electric thermostats, low voltage transformers, Emergency Break Glass Stations and other electrical devices required for equipment furnished.
  - B. Install all items in piping and ductwork such as control valves, aquastats, ductstats, etc.
  - C. All external wiring of equipment, all temperature control wiring, external wiring of control circuits of magnetic starters, interlocking wiring, boiler wiring, Emergency Break Glass Stations, and mounting of control devices, etc., shall be included under Division 23. All external wiring shall be in conduit. (Unless specifically shown to be provided by the Electrical Contractor)
  - D. The Electrical Contractor, under Division 26, shall furnish and install all power wiring and conduit to junction box, to disconnect switch on unit, to motor starters and contactors, and between motor starters and contactors to motor or other load. Electrical Contractor shall be
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responsible for proper direction of rotation for all three phase equipment. The Electrical Contractor shall mount all starters, disconnects.

- E. Wiring required under Division 23 shall comply with the specifications as described in Division 26.
- F. The Plumbing Contractor, under Division 22, shall provide water and natural gas services to within two (2) feet of HVAC equipment requiring same and terminating with shut-off valves. The HVAC Contractor, under Division 23, shall make final connections to equipment.
- G. Provide disconnect switches or safety switches for equipment. (Unless specifically shown to be provided by the Electrical Contractor, starters and disconnects shown on the electrical drawings are for installation and do not require the Electrical Contractor to furnish units)
- H. Emergency Generator - Exhaust muffler and flexible exhaust connection shall be furnished by the generator manufacturer under Division 26. Installation of the exhaust system including providing piping, insulation and accessories shall be included under Division 23.

### **1.07 SUBMITTALS**

- A. Shop Drawings: Complete wiring diagrams of all power and control connections (standard diagrams will not be accepted). Deliver 2 copies of approved wiring diagrams to the Electric Contractor for installation of wiring and connections required under the Electric Contract.
- B. Product Data for Motor Controllers and Disconnect Switches: Manufacturer's catalog sheets, specifications and installation instructions. Submit enclosure type coordinated for service and location. Submit simultaneously with product data required for motors. Identify each controller for use with corresponding motor. Submit shop drawings and product data in accordance with project requirements.
- C. All warranties shall be delivered as part of the close-out submission.
- D. A receipt shall be delivered as part of the close-out submission that states all required spare parts have been delivered to the owner. This receipt must be signed and dated by the owner.

## **PART 2 - PRODUCTS**

### **2.01 ACCEPTABLE MANUFACTURERS**

- A. Motor Controllers and Disconnects
  - 1. Square D
  - 2. Allen-Bradley
  - 3. General Electric
  - 4. Cutler-Hammer

### **2.02 MOTOR CONTROLLERS**

- A. General: All starters shall be correctly sized to motor connected thereto. Provide one (1) additional auxiliary contact over and above that normally furnished, at least two (2) required. Provide overload heaters for each phase. Coordinate starters and controllers with the temperature control Contractor and sequence of operations.
  - B. Minimum Size: The minimum allowable size of single or three phase magnetic motor controller is NEMA size 0.
  - C. Enclosures: Unless otherwise indicated furnish NEMA 1 enclosures, except where installed outdoors furnish NEMA 3R enclosures.
  - D. Control Power: Furnish control power transformer (maximum control voltage 120 volts) mounted within each magnetic motor controller enclosure.
  - E. Pilot Lights: Furnish pilot lights of the neon lamp type mounted in the controller enclosure, green for running, red for not running.
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**2.03 MOTOR CONTROLLER TYPES:**

- A. Type A (Full Voltage, Manual, Non-Magnetic):
  - 1. Allen-Bradley Co. Bulletin 609 (or Bulletin 600 - single phase, 1 HP or less only).
  - 2. General Electric Co. CR-1062 (or CR-101 - single phase, 1 HP or less only).
  - 3. Cutler-Hammer. B100 (or MS - single phase, 1 HP or less only).
- B. Type A2 (2 Speed, 2 Winding, Full Voltage, Manual, Non-Magnetic):
  - 1. Allen-Bradley Co. Bulletin 609TS (or Bulletin 600 - single phase, 1 HP or less only).
  - 2. General Electric Co. CR-1062 (or CR-101 - single phase, 1 HP or less only).
  - 3. Square D Co. Class 2512, Type M (or Class 2512, Type F - single phase, 1 HP or less only).
- C. Type B (Full Voltage Magnetic):
  - 1. Allen-Bradley Co. Bulletin 709.
  - 2. General Electric Co. CR-206.
  - 3. Square D Co. Class 8536.
  - 4. Cutler-Hammer. ECN05.
- D. Type B-COM (Combination Full Voltage Magnetic/Safety Switch):
  - 1. Allen-Bradley Co. Bulletin 712.
  - 2. General Electric Co. CR-208.
  - 3. Square D Co. Class 8538.
  - 4. Cutler-Hammer. ECN16.
- E. Type B2 (2 Speed, 2 Winding, Full Voltage, Magnetic):
  - 1. Allen-Bradley Co. Bulletin 715.
  - 2. General Electric Co. CR209.
  - 3. Square D Co. Class 8810.
  - 4. Cutler-Hammer. ECN33.
- F. Type C (Automatic, Reduced Voltage, Magnetic):
  - 1. Allen-Bradley Co. Bulletin 746.
  - 2. General Electric Co. CR-231.
  - 3. Square D Co. Class 8606.
  - 4. Cutler-Hammer. ECA42.
- G. Type C-COM (Combination Automatic, Reduced Voltage, Magnetic/ Safety Switch):
  - 1. Allen-Bradley Co. Bulletin 746C.
  - 2. Square D Co. Class 8606.
  - 3. Cutler-Hammer. ECA43.
- H. Type D (Part Winding, Magnetic):
  - 1. Allen-Bradley Co. Bulletin 736.
  - 2. General Electric Co. CR-230.
  - 3. Square D Co. Class 8640.
  - 4. Cutler-Hammer. ECA45.

**2.04 REMOTE PUSH BUTTON STATIONS**

- A. Start-Stop with pilot light in NEMA 1 enclosure unless otherwise indicated.
    - 1. Allen-Bradley Co. Bulletin 800S.
    - 2. General Electric Co. CR-2943.
    - 3. Square D Co. Class 9001.
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4. Cutler-Hammer. Class 10250.

## **2.05 SAFETY SWITCHES**

- A. General Electric Co. Type TH; Square D Co. Heavy Duty Series; Cutler-Hammer HD Series; with the following:
1. Fused switches equipped with fuseholders to accept only the fuses specified in Section 16181 (U.L. Class RK-1, RK-5, L).
  2. NEMA 1 enclosure unless otherwise indicated on drawing or required. 3R for devices installed outdoors.
  3. Switch rated 240V for 120V, 208V, 240V, circuits; 600 V for 277V, 480V circuits.
  4. Switch rated 600V for 277V, 480V circuits.
  5. Solid neutral bus when neutral or grounding conductor is included with circuit.
  6. Current rating and number of poles as indicated on drawings.

## **2.06 NAMEPLATES**

- A. Phenolic Type: Standard phenolic nameplates with 3/8" minimum size lettering engraved thereon.
- B. Embossed Aluminum: Standard stamped or embossed aluminum tags: Tech Products, Inc., Seton Name Plate Corp.

## **2.07 EMERGENCY PUSHBUTTON OPERATOR STATION**

- A. Acceptable Manufacturer: Square D or equal.
- B. Switch Style: Class 9001, NEMA 4 rated emergency mushroom head pushbutton.
- C. Voltage: 120VAC, 60Hz as required.
- D. Contacts: 20A, 2-NO/2-NC contact.
- E. Operation: Manual.
- F. Normal position: Operator out.
- G. Activated position: Operator in.
- H. Reset: Manual, turn to release.
- I. Enclosure: NEMA 4.

## **2.08 CUSTOM LEGEND PLATE**

- A. "EMERGENCY BOILER SHUTOFF"

## **PART 3 - EXECUTION**

### **3.01 GENERAL**

- A. Equipment shall be connected in a neat and skillful manner. Equipment deliver with terminal boxes that are inadequate shall be equipped with special boxes that suit the conditions by the Mechanical Contractor furnishing the equipment.
- B. In general, rigid conduit or tubing shall be used, but equipment that requires movement or that would transmit vibration to conduit shall be wired with flexible (liquid tight) steel conduit not over 18" long.
- C. All equipment shall be grounded with a green-covered ground wire run inside the conduit and connected to equipment frame on one end and to grounding system on the other end.
- D. All electrical work required in the Mechanical Contract shall conform to the applicable requirements of Division 26 of these Specifications.
- E. The Heating, Ventilating, and Air Conditioning Contractor shall assign all Electrical Work required under his contract to the approved Automatic Temperature Control Contractor, who shall perform this work with qualified electricians employed by that Contractor.
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- F. The Mechanical Contractors shall cooperate with the Contractor for Electrical Work in making all necessary tests and in receiving, storing, and setting all motor-driven equipment, electrical devices, and controls furnished and/or installed under these contracts.
- G. Install heaters correlated with full load current of motors provided.
- H. Set overload devices to suit motors provided.

### **3.02 INSTALLATION**

- A. Control Wiring:
  - 1. Provide control wiring and connections.
  - 2. Where control circuit interlocking is required between individually mounted motor controllers, provide a single pole on-off switch in a threaded type box mounted adjacent to motor safety switches which are remote from the control transformer (to enable interlock circuit to be opened when the motor safety switch is opened).
- B. Nameplates: Rivet or bolt the nameplate on the cover of NEMA 1 enclosures. Rivet or bolt and gasket the nameplate on cover of NEMA 3R or NEMA 12 enclosures. Provide phenolic or embossed aluminum nameplates as follows:
  - 1. On each remote control station, indicating motor controlled.
  - 2. On each interlock circuit switch, indicating purpose of switch.
- C. Emergency Pushbutton Operator Station: Wire all switches in series with boiler control branch circuits.

### **3.03 TYPES OF MOTOR CONTROLLERS REQUIRED FOR SINGLE SPEED MOTORS (SYSTEMS UNDER 250 VOLTS)**

- A. Single Phase Motors Less than 5 HP - Manually Operated: Type A.
- B. Single Phase Motors Less than 1/2 HP - Automatically Operated: Type A.
- C. Single Phase Motors 1/2 to 5 HP - Automatically Operated: Type B.
- D. Three Phase Squirrel Cage Motors Less than 7-1/2 HP: Type B (B-COM when indicated on drawings).
- E. Three Phase Squirrel Cage Motors 7-1/2 HP and Larger: Type C (C-COM when indicated on drawings).
- F. Three Phase Hermetically Sealed Compressor Motors Less than 7-1/2 HP: Type B.
- G. Three Phase Hermetically Sealed Compressor Motors 7-1/2 HP and Larger: Type D.

### **3.04 TYPES OF MOTOR CONTROLLERS REQUIRED FOR SINGLE SPEED MOTORS (277/480 VOLT SYSTEM)**

- A. Single Phase Motors Less than 5 HP - Manually Operated: Type A.
- B. Single Phase Motors Less than 1 HP - Automatically Operated: Type A.
- C. Single Phase Motors 1 to 5 HP - Automatically Operated: Type B.
- D. Three Phase Squirrel Cage Motors Less than 15 HP: Type B (B-COM when indicated on drawings).
- E. Three Phase Squirrel Cage Motors 15 HP and Larger: Type C (C-COM when indicated on drawings).
- F. Three Phase Hermetically Sealed Compressor Motors Less than 15 HP: Type B.
- G. Three Phase Hermetically Sealed Compressor Motors 15 HP and Larger: Type D.

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**3.05 TYPES OF MOTOR CONTROLLERS REQUIRED FOR 2 SPEED MOTORS (SYSTEMS UNDER 250 VOLTS)**

- A. Single Phase Motors Less than 5 HP - Manually Operated: Type A2.
- B. Single Phase Motors Less than 1/2 HP - Automatically Operated: Type A2.
- C. Single Phase Motors 1/2 to 5 HP - Automatically Operated: Type B2.
- D. Three Phase Squirrel Cage Motors Less than 7-1/2 HP: Type B2.

**3.06 TYPES OF MOTOR CONTROLLERS REQUIRED FOR 2 SPEED MOTORS (277/480 VOLT SYSTEM)**

- A. Single Phase Motors Less than 5 HP - Manually Operated: Type A2.
- B. Single Phase Motors Less than 1 HP - Automatically Operated: Type A2.
- C. Single Phase Motors 1 to 5 HP - Automatically Operated: Type B2.
- D. Three Phase Squirrel Cage Motors Less than 15 HP: Type B2.

**3.07 DISCONNECTS**

- A. Motor Controllers: Provide safety switch for all motor controllers. Provide combination type starter-disconnect unless otherwise noted on drawings.
- B. Motors: Provide a disconnect switch for all motors. Provide a separate safety switch for motors which are not within sight of the starter.
- C. Provide safety switches for all factory packaged equipment.
- D. Provide NEMA 3R safety switch for all rooftop and outdoor equipment.
- E. Provide unit mounted disconnect switches for all equipment such as unit heaters, fans, unit ventilators, incremental units, etc

**3.08 EMERGENCY PUSHBUTTON OPERATOR STATION**

- A. Provide Emergency Pushbutton Operator Station at each boiler room exit to de-energize the primary control circuit and to close the main fuel valves to stop the flow of fuel to the burner during an emergency.
- B. Review plans for locations.
- C. Provide all conduit and wiring for interlock of each boiler.

**END OF SECTION 230002**



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**SECTION 230513**  
**COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. General construction and requirements.
- B. Applications.
- C. Single phase electric motors.
- D. Three phase electric motors.
- E. Electronically Commutated Motors (ECM).

**1.02 RELATED REQUIREMENTS**

- A. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

**1.03 REFERENCE STANDARDS**

- A. ABMA STD 9 - Load Ratings and Fatigue Life for Ball Bearings 2015 (Reaffirmed 2020).
- B. IEEE 112 - IEEE Standard Test Procedure for Polyphase Induction Motors and Generators 2017.
- C. NEMA MG 1 - Motors and Generators 2021.
- D. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

**1.04 SUBMITTALS**

- A. See Section 013300 - Submittal Procedures for submittal procedures.
- B. Product Data: Provide wiring diagrams with electrical characteristics and connection requirements.
- C. Test Reports: Indicate test results verifying nominal efficiency and power factor for three phase motors larger than 1/2 horsepower.
- D. Manufacturer's Installation Instructions: Indicate setting, mechanical connections, lubrication, and wiring instructions.
- E. Operation Data: Include instructions for safe operating procedures.
- F. Maintenance Data: Include assembly drawings, bearing data including replacement sizes, and lubrication instructions.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacture of electric motors for \_\_\_\_\_ use, and their accessories, with minimum three years documented product development, testing, and manufacturing experience.
- B. Comply with NFPA 70.
- C. Provide certificate of compliance from Authority Having Jurisdiction indicating approval of high efficiency motors.
- D. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Protect motors stored on site from weather and moisture by maintaining factory covers and suitable weather-proof covering. For extended outdoor storage, remove motors from equipment and store separately.

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**1.07 WARRANTY**

- A. See Section 017700 - Closeout Procedures for additional warranty requirements.
- B. Provide five year manufacturer warranty for motors larger than 20 horsepower.

**PART 2 PRODUCTS****2.01 MANUFACTURERS**

- A. Baldor Electric Company/ABB Group: [www.baldor.com/#sle](http://www.baldor.com/#sle).
- B. Leeson Electric Corporation: [www.leeson.com/#sle](http://www.leeson.com/#sle).
- C. Regal-Beloit Corporation (Century): [www.centuryelectricmotor.com/#sle](http://www.centuryelectricmotor.com/#sle).
- D. Substitutions: See Section 016000 - Product Requirements.

**2.02 GENERAL CONSTRUCTION AND REQUIREMENTS**

- A. Electrical Service: Refer to Section 260583 for required electrical characteristics.
- B. Electrical Service:
  - 1. Motors 1/2 HP and Smaller: 115 volts, single phase, 60 Hz.
  - 2. Motors Larger than 1/2 Horsepower: 208 volts, three phase, 60 Hz.
- C. Nominal Efficiency:
  - 1. Open Motor with Two Poles: 82.5.
  - 2. Open Motor with Four Poles: 82.5.
  - 3. Open Motor with Six Poles: 50.0.
  - 4. Enclosed Motor with Two Poles: 75.5.
  - 5. Enclosed Motor with Four Poles: 82.5.
  - 6. Enclosed Motor with Six Poles: 50.0.
- D. Construction:
  - 1. Open drip-proof type except where specifically noted otherwise.
  - 2. Design for continuous operation in 104 degrees F environment.
  - 3. Design for temperature rise in accordance with NEMA MG 1 limits for insulation class, service factor, and motor enclosure type.
- E. Visible Nameplate: Indicating motor horsepower, voltage, phase, cycles, RPM, full load amps, locked rotor amps, frame size, manufacturer's name and model number, service factor, power factor, efficiency.
- F. Wiring Terminations:
  - 1. Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated. Enclose terminal lugs in terminal box sized to NFPA 70, threaded for conduit.
  - 2. For fractional horsepower motors where connection is made directly, provide threaded conduit connection in end frame.

**2.03 APPLICATIONS**

- A. Exception: Motors less than 250 watts, for intermittent service may be the equipment manufacturer's standard and need not comply with these specifications.
- B. Single phase motors for fans, blowers, and pumps: Capacitor start, capacitor run type.
- C. Motors located in exterior locations, wet air streams downstream of sprayed coil dehumidifiers, draw through cooling towers, air cooled condensers, humidifiers, direct drive axial fans, roll filters, explosion proof environments, and dust collection systems: Totally enclosed type.

**2.04 SINGLE PHASE POWER - SPLIT PHASE MOTORS**

- A. Starting Torque: Less than 150 percent of full load torque.
  - B. Starting Current: Up to seven times full load current.
  - C. Breakdown Torque: Approximately 200 percent of full load torque.
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- D. Drip-proof Enclosure: Class A (50 degrees C temperature rise) insulation, NEMA Service Factor, prelubricated sleeve or ball bearings.
- E. Enclosed Motors: Class A (50 degrees C temperature rise) insulation, 1.0 Service Factor, prelubricated ball bearings.

## **2.05 SINGLE PHASE POWER - PERMANENT-SPLIT CAPACITOR MOTORS**

- A. Starting Torque: Exceeding one fourth of full load torque.
- B. Starting Current: Up to six times full load current.
- C. Multiple Speed: Through tapped windings.
- D. Open Drip-proof or Enclosed Air Over Enclosure: Class A (50 degrees C temperature rise) insulation, minimum 1.0 Service Factor, prelubricated sleeve or ball bearings, automatic reset overload protector.

## **2.06 SINGLE PHASE POWER - CAPACITOR START MOTORS**

- A. Starting Torque: Three times full load torque.
- B. Starting Current: Less than five times full load current.
- C. Pull-up Torque: Up to 350 percent of full load torque.
- D. Breakdown Torque: Approximately 250 percent of full load torque.
- E. Motors: Capacitor in series with starting winding; provide capacitor-start/capacitor-run motors with two capacitors in parallel with run capacitor remaining in circuit at operating speeds.
- F. Drip-proof Enclosure: Class A (50 degrees C temperature rise) insulation, NEMA Service Factor, prelubricated sleeve bearings.
- G. Enclosed Motors: Class A (50 degrees C temperature rise) insulation, 1.0 Service Factor, prelubricated ball bearings.

## **2.07 THREE PHASE POWER - SQUIRREL CAGE MOTORS**

- A. Starting Torque: Between 1 and 1-1/2 times full load torque.
- B. Starting Current: Six times full load current.
- C. Power Output, Locked Rotor Torque, Breakdown or Pull Out Torque: NEMA Design B characteristics.
- D. Design, Construction, Testing, and Performance: Comply with NEMA MG 1 for Design B motors.
- E. Insulation System: NEMA Class B or better.
- F. Testing Procedure: In accordance with IEEE 112. Load test motors to determine free from electrical or mechanical defects in compliance with performance data.
- G. Motor Frames: NEMA Standard T-Frames of steel, aluminum, or cast iron with end brackets of cast iron or aluminum with steel inserts.
- H. Thermistor System (Motor Frame Sizes 254T and Larger): Three PTC thermistors embedded in motor windings and epoxy encapsulated solid state control relay for wiring into motor starter; refer to Section 262913.
- I. Bearings: Grease lubricated anti-friction ball bearings with housings equipped with plugged provision for relubrication, rated for minimum ABMA STD 9, L-10 life of 20,000 hours. Calculate bearing load with NEMA minimum V-belt pulley with belt center line at end of NEMA standard shaft extension. Stamp bearing sizes on nameplate.
- J. Sound Power Levels: To NEMA MG 1.
- K. Part Winding Start Where Indicated: Use part of winding to reduce locked rotor starting current to approximately 60 percent of full winding locked rotor current while providing approximately

50 percent of full winding locked rotor torque.

- L. Nominal Efficiency: As indicated at full load and rated voltage when tested in accordance with IEEE 112.
- M. Nominal Power Factor: As indicated at full load and rated voltage when tested in accordance with IEEE 112.

## **2.08 ELECTRONICALLY COMMUTATED MOTORS (ECM)**

### **A. Applications:**

#### **1. Commercial:**

##### **a. Hydronic Fan Coil Unit:**

- 1) Operating Mode: Constant cfm.
- 2) Input: Motor manufacturer to coordinate control requirements with the control board of the fan coil unit and/or specified sequence of operation.
- 3) Shaft Extension: Single.
- 4) Options: User-interface.
- 5) RPM: 300 through 1250.

##### **b. Power Roof Ventilator (PRV):**

- 1) Operating Mode: Constant cfm.
- 2) Input: Motor manufacturer to coordinate control requirements with the control board of the PRV and/or specified sequence of operation.
- 3) Shaft Extension: Single.

##### **c. Hydronic Pump:**

- 1) Operating Mode: Constant speed.
- 2) Input: Motor manufacturer to coordinate control requirements with the control board of the hydronic pump and/or specified sequence of operation.
- 3) Flange Configuration: "C".

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install securely on firm foundation. Mount ball bearing motors with shaft in any position.
- C. Check line voltage and phase and ensure agreement with nameplate.

### **3.02 SCHEDULE**

#### **A. NEMA Open Motor Service Factors.**

##### **1. 1/6-1/3 hp:**

- a. 3600 rpm: 1.35.
- b. 1800 rpm: 1.35.
- c. 1200 rpm: 1.35.
- d. 900 rpm: 1.35.

##### **2. 1/2 hp:**

- a. 3600 rpm: 1.25.
- b. 1800 rpm: 1.25.
- c. 1200 rpm: 1.25.
- d. 900 rpm: 1.15.

##### **3. 3/4 hp:**

- a. 3600 rpm: 1.25.
- b. 1800 rpm: 1.25.
- c. 1200 rpm: 1.15.
- d. 900 rpm: 1.15.

##### **4. 1 hp:**

- 
- a. 3600 rpm: 1.25.
    - b. 1800 rpm: 1.15.
    - c. 1200 rpm: 1.15.
    - d. 900 rpm: 1.15.
  - 5. 1.5-150 hp:
    - a. 3600 rpm: 1.15.
    - b. 1800 rpm: 1.15.
    - c. 1200 rpm: 1.15.
    - d. 900 rpm: 1.15.
  - B. Three Phase - Energy Efficient, Open Drip-Proof Performance:
    - 1. 1200 rpm.
      - a. 2 hp:
        - 1) NEMA Frame: 184T.
        - 2) Minimum Percent Power Factor: 75.
        - 3) Minimum Percent Efficiency: 85.
      - b. 10 hp:
        - 1) NEMA Frame: 256T.
        - 2) Minimum Percent Power Factor: 74.
        - 3) Minimum Percent Efficiency: 89.
    - 2. 1800 rpm.
      - a. 2 hp:
        - 1) NEMA Frame: 145T.
        - 2) Minimum Percent Power Factor: 85.
        - 3) Minimum Percent Efficiency: 84.
      - b. 10 hp:
        - 1) NEMA Frame: 215T.
        - 2) Minimum Percent Power Factor: 85.
        - 3) Minimum Percent Efficiency: 89.

**END OF SECTION 230513**

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**SECTION 230517**  
**SLEEVES AND SLEEVE SEALS FOR HVAC PIPING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Pipe sleeves.
- B. Manufactured sleeve-seal systems.

**1.02 RELATED REQUIREMENTS**

- A. Section 078400 - Firestopping.
- B. Section 230719 - HVAC Piping Insulation.

**1.03 REFERENCE STANDARDS**

- A. ASTM C592 - Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type) 2022a.
- B. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems 2013a (Reapproved 2017).

**1.04 SUBMITTALS**

- A. See Section 013300 - Submittal Procedures, for submittal procedures.
- B. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
- B. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver and store sleeve and sleeve seals in shipping containers, with labeling in place.
- B. Provide temporary protective coating on cast iron and steel sleeves if shipped loose.

**PART 2 PRODUCTS****2.01 PIPE SLEEVES**

- A. Manufacturers:
    - 1. Flexicraft Industries; Pipe Wall Sleeve: [www.flexicraft.com/#sle](http://www.flexicraft.com/#sle).
    - 2. Substitutions: See Section 016000 - Product Requirements.
  - B. Vertical Piping:
    - 1. Sleeve Length: 1 inch above finished floor.
    - 2. Provide sealant for watertight joint.
    - 3. Blocked Out Floor Openings: Provide 1-1/2 inch angle set in silicon adhesive around opening.
    - 4. Drilled Penetrations: Provide 1-1/2 inch angle ring or square set in silicone adhesive around penetration.
  - C. Plastic or Sheet Metal: Pipe passing through interior walls, partitions, and floors, unless steel or brass sleeves are specified below.
  - D. Pipe Passing Through Below Grade Exterior Walls:
    - 1. Zinc coated or cast iron pipe.
-

- 
2. Provide watertight space with link rubber or modular seal between sleeve and pipe on both pipe ends.
  - E. Pipe Passing Through Concrete Beam Flanges, except where Brass Pipe Sleeves are Specified:
    1. Galvanized steel pipe or black iron pipe with asphalt coating.
    2. Connect sleeve with floor plate except in mechanical rooms.
  - F. Pipe Passing Through Mechanical, Laundry, and Animal Room Floors above Basement:
    1. Galvanized steel pipe or black iron pipe with asphalt coating.
    2. Connect sleeve with floor plate except in mechanical rooms.
  - G. Clearances:
    1. Provide allowance for insulated piping.
    2. Wall, Floor, Floor, Partitions, and Beam Flanges: 1 inch greater than external; pipe diameter.
    3. All Rated Openings: Caulked tight with fire stopping material in compliance with ASTM E814 in accordance with Section 078400 to prevent the spread of fire, smoke, and gases.

## **2.02 MANUFACTURED SLEEVE-SEAL SYSTEMS**

- A. Manufacturers:
  1. Advance Products & Systems, LLC; Innerlynx: [www.apsonline.com/#sle](http://www.apsonline.com/#sle).
  2. Flexicraft Industries; PipeSeal: [www.flexicraft.com/#sle](http://www.flexicraft.com/#sle).
  3. Substitutions: See Section 016000 - Product Requirements.
- B. Modular/Mechanical Seal:
  1. Synthetic rubber interlocking links continuously fill annular space between pipe and wall/casing opening.
  2. Provide watertight seal between pipe and wall/casing opening.
  3. Elastomer element size and material in accordance with manufacturer's recommendations.
  4. Glass reinforced plastic pressure end plates.

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and foreign material, from inside and outside, before assembly.

### **3.02 INSTALLATION**

- A. Route piping in orderly manner, plumb and parallel to building structure. Maintain gradient.
  - B. Install piping to conserve building space, to not interfere with use of space and other work.
  - C. Install piping and pipe sleeves to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
  - D. Inserts:
    1. Provide inserts for placement in concrete formwork.
    2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
    3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
    4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
    5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.
  - E. Structural Considerations:
    1. Do not penetrate building structural members unless indicated.
-



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- F. Provide sleeves when penetrating footings, floors, walls, and partitions. Seal pipe including sleeve penetrations to achieve fire resistance equivalent to fire separation required.
    - 1. Underground Piping: Caulk pipe sleeve watertight with lead and oakum or mechanically expandable chloroprene inserts with bitumen sealed metal components.
    - 2. Aboveground Piping:
      - a. Pack solid using mineral fiber in compliance with ASTM C592.
      - b. Fill space with an elastomer caulk to a depth of 0.50 inch where penetrations occur between conditioned and unconditioned spaces.
    - 3. All Rated Openings: Caulk tight with fire stopping material in compliance with ASTM E814 in accordance with Section 078400 to prevent the spread of fire, smoke, and gases.
    - 4. Caulk exterior wall sleeves watertight with lead and oakum or mechanically expandable chloroprene inserts with mastic-sealed components.
  - G. Manufactured Sleeve-Seal Systems:
    - 1. Install manufactured sleeve-seal systems in sleeves located in grade slabs and exterior concrete walls at piping entrances into building.
    - 2. Provide sealing elements of the size, quantity, and type required for the piping and sleeve inner diameter or penetration diameter.
    - 3. Locate piping in center of sleeve or penetration.
    - 4. Install field assembled sleeve-seal system components in annular space between sleeve and piping.
    - 5. Tighten bolting for a water-tight seal.
    - 6. Install in accordance with manufacturer's recommendations.
  - H. When installing more than one piping system material, ensure system components are compatible and joined to ensure the integrity of the system. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.

### **3.03 CLEANING**

- A. Upon completion of work, clean all parts of the installation.
- B. Clean equipment, pipes, valves, and fittings of grease, metal cuttings, and sludge that may have accumulated from the installation and testing of the system.

**END OF SECTION 230517**

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**SECTION 230519**  
**METERS AND GAUGES FOR HVAC PIPING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Flow meters.
- B. Pressure gauges and pressure gauge taps.
- C. Thermometers and thermometer wells.
- D. Static pressure gauges.
- E. Filter gauges.

**1.02 RELATED REQUIREMENTS**

- A. Section 230923 - Direct-Digital Control System for HVAC.
- B. Section 232113 - Hydronic Piping.

**1.03 REFERENCE STANDARDS**

- A. ASME B40.100 - Pressure Gauges and Gauge Attachments 2022.
- B. ASTM E1 - Standard Specification for ASTM Liquid-in-Glass Thermometers 2014 (Reapproved 2020).
- C. ASTM E77 - Standard Test Method for Inspection and Verification of Thermometers 2014 (Reapproved 2021).
- D. AWWA M6 - Water Meters -- Selection, Installation, Testing, and Maintenance 2012, with Addendum (2018).

**1.04 SUBMITTALS**

- A. See Section 013300 - Submittal Procedures, for submittal procedures.
- B. Product Data: Provide list that indicates use, operating range, total range and location for manufactured components.

**1.05 FIELD CONDITIONS**

- A. Do not install instrumentation when areas are under construction, except for required rough-in, taps, supports and test plugs.

**PART 2 PRODUCTS****2.01 LIQUID FLOW METERS**

- A. Manufacturers:
    - 1. Dwyer Instruments, Inc: [www.dwyer-inst.com/#sle](http://www.dwyer-inst.com/#sle).
    - 2. McCrometer: [www.mccrometer.com/#sle](http://www.mccrometer.com/#sle).
    - 3. Venture Measurement, a Danaher Company: [www.venturemeasurement.com/#sle](http://www.venturemeasurement.com/#sle).
    - 4. Veris Industries: [www.veris.com/#sle](http://www.veris.com/#sle).
    - 5. Substitutions: See Section 016000 - Product Requirements.
  - B. Calibrated ASME MFC-3M Venturi orifice plate and flanges with valved taps, chart for conversion of differential pressure readings to flow rate, with pressure gauge in case.
  - C. Annular element flow stations with meter set.
    - 1. Measuring Station: Type 316 stainless steel pitot type flow element inserted through welded threaded couplet, with safety shut-off valves and quick coupling connections, and permanent metal tag indicating design flow rate, reading for design flow rate, metered fluid, line size, station or location number.
      - a. Pressure rating: 275 psi.
      - b. Maximum temperature: 400 degrees F.
-

- c. Accuracy: Plus 0.55 percent to minus 2.30 percent.

## 2.02 PRESSURE GAUGES

- A. Manufacturers:
1. Dwyer Instruments, Inc: [www.dwyer-inst.com/#sle](http://www.dwyer-inst.com/#sle).
  2. Moeller Instrument Company, Inc: [www.moellerinstrument.com/#sle](http://www.moellerinstrument.com/#sle).
  3. Omega Engineering, Inc: [www.omega.com/#sle](http://www.omega.com/#sle).
  4. Substitutions: See Section 016000 - Product Requirements.
- B. Pressure Gauges: ASME B40.100, UL 393 drawn steel case, phosphor bronze bourdon tube, rotary brass movement, brass socket, with front recalibration adjustment, black scale on white background.
1. Case: Steel with brass bourdon tube.
  2. Size: 4-1/2 inch diameter.
  3. Mid-Scale Accuracy: One percent.
  4. Scale: Psi.

## 2.03 PRESSURE GAUGE TAPPINGS

- A. Gauge Cock: Tee or lever handle, brass for maximum 150 psi.
- B. Needle Valve: Brass, 1/4 inch NPT for minimum 150 psi.
- C. Pulsation Damper: Pressure snubber, brass with 1/4 inch connections.
- D. Syphon: Steel, Schedule 40, 1/4 inch angle or straight pattern.

## 2.04 STEM TYPE THERMOMETERS

- A. Manufacturers:
1. Dwyer Instruments, Inc: [www.dwyer-inst.com/#sle](http://www.dwyer-inst.com/#sle).
  2. Omega Engineering, Inc: [www.omega.com/#sle](http://www.omega.com/#sle).
  3. Weksler Glass Thermometer Corp: [www.wekslerglass.com/#sle](http://www.wekslerglass.com/#sle).
  4. Substitutions: See Section 016000 - Product Requirements.
- B. Thermometers - Fixed Mounting: Red- or blue-appearing non-toxic liquid in glass; ASTM E1; lens front tube, cast aluminum case with enamel finish.
1. Size: 9 inch scale.
  2. Window: Clear Lexan.
  3. Stem: 4 inch brass.
  4. Accuracy: 2 percent, per ASTM E77.
- C. Thermometers - Adjustable Angle: Red- or blue-appearing non-toxic liquid in glass; ASTM E1; lens front tube, cast aluminum case with enamel finish, cast aluminum adjustable joint with positive locking device; adjustable 360 degrees in horizontal plane, 180 degrees in vertical plane.
1. Size: 9 inch scale.
  2. Window: Clear Lexan.
  3. Stem: 3/4 inch NPT brass.
  4. Accuracy: 2 percent, per ASTM E77.
  5. Calibration: Degrees F.

## 2.05 DIAL THERMOMETERS

- A. Manufacturers:
1. Dwyer Instruments, Inc; \_\_\_\_\_: [www.dwyer-inst.com/#sle](http://www.dwyer-inst.com/#sle).
  2. Omega Engineering, Inc; \_\_\_\_\_: [www.omega.com/#sle](http://www.omega.com/#sle).
  3. Weksler Glass Thermometer Corp; \_\_\_\_\_: [www.wekslerglass.com/#sle](http://www.wekslerglass.com/#sle).
  4. Substitutions: See Section 016000 - Product Requirements.

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- B. Thermometers - Fixed Mounting: Dial type bimetallic actuated; ASTM E1; stainless steel case, silicone fluid damping, white with black markings and black pointer, hermetically sealed lens, stainless steel stem.
    - 1. Size: 5 inch diameter dial.
    - 2. Lens: Clear glass.
    - 3. Accuracy: 1 percent.
  - C. Thermometer: ASTM E1, stainless steel case, adjustable angle with front recalibration, bimetallic helix actuated with silicone fluid damping, white with black markings and black pointer hermetically sealed lens, stainless steel stem.
    - 1. Size: 3 inch diameter dial.
    - 2. Lens: Clear glass.
    - 3. Accuracy: 1 percent.
  - D. Thermometers: Dial type vapor or liquid actuated; ASTM E1; stainless steel case, with brass or copper bulb, copper or bronze braided capillary, white with black markings and black pointer, glass lens.
    - 1. Size: 4-1/2 inch diameter dial.
    - 2. Lens: Clear glass.
    - 3. Length of Capillary: Minimum 5 feet.
    - 4. Accuracy: 2 percent.

## 2.06 THERMOMETER SUPPORTS

- A. Socket: Brass separable sockets for thermometer stems with or without extensions as required, and with cap and chain.
- B. Flange: 3 inch outside diameter reversible flange, designed to fasten to sheet metal air ducts, with brass perforated stem.

## 2.07 TEST PLUGS

- A. Test Plug: 1/4 inch or 1/2 inch brass fitting and cap for receiving 1/8 inch outside diameter pressure or temperature probe with neoprene core for temperatures up to 200 degrees F.

## 2.08 STATIC PRESSURE GAUGES

- A. Manufacturers:
  - 1. Dwyer Instruments, Inc: [www.dwyer-inst.com/#sle](http://www.dwyer-inst.com/#sle).
  - 2. Omega Engineering, Inc: [www.omega.com/#sle](http://www.omega.com/#sle).
  - 3. Veris Industries: [www.veris.com/#sle](http://www.veris.com/#sle).
  - 4. Weksler Glass Thermometer Corp: [www.wekslerglass.com/#sle](http://www.wekslerglass.com/#sle).
  - 5. Substitutions: See Section 016000 - Product Requirements.
- B. 3-1/2 inch diameter dial in metal case, diaphragm actuated, black figures on white background, front recalibration adjustment, 2 percent of full scale accuracy.
- C. Inclined manometer, red liquid on white background with black figures, front recalibration adjustment, 3 percent of full scale accuracy.
- D. Accessories: Static pressure tips with compression fittings for bulkhead mounting, 1/4 inch diameter tubing.

## PART 3 EXECUTION

### 3.01 INSTALLATION

- A. Install in accordance with manufacturer's instructions.
  - B. Install positive displacement meters with isolating valves on inlet and outlet to AWWA M6. Provide full line size valved bypass with globe valve for liquid service meters.
  - C. Provide one pressure gauge per pump, installing taps before strainers and on suction and discharge of pump. Pipe to gauge with needle valves for isolation suction and discharge
-

pressure.

- D. Install pressure gauges with pulsation dampers. Provide gauge cock to isolate each gauge. Provide siphon on gauges in steam systems. Extend nipples and siphons to allow clearance from insulation.
- E. Install pressure gauges on the inlet and outlet piping of all hydronic zones, hydronic coils, and heat transfer equipment.
- F. Install pressure gauges upstream and downstream of all pressure reducing valves.
- G. Install thermometers in piping systems in sockets in short couplings. Enlarge pipes smaller than 2-1/2 inch for installation of thermometer sockets. Ensure sockets allow clearance from insulation.
- H. Install thermometers in air duct systems on flanges.
- I. Install thermometers in the return duct, outside air duct, inlet duct, and supply duct of all air handling systems and terminal units.
- J. Install thermometers on the inlet and outlet piping of all hydronic zones, hydronic coils, and heat transfer equipment.
- K. Install thermometer sockets adjacent to controls system thermostat, transmitter, or sensor sockets. Refer to Section 230943. Where thermometers are provided on local panels, duct or pipe mounted thermometers are not required.
- L. Locate duct mounted thermometers minimum 10 feet downstream of mixing dampers, coils, or other devices causing air turbulence.
- M. Provide instruments with scale ranges selected according to service with largest appropriate scale.
- N. Install gauges and thermometers in locations where they are easily read from normal operating level. Install vertical to 45 degrees off vertical.
- O. Adjust gauges and thermometers to final angle, clean windows and lenses, and calibrate to zero.
- P. Locate test plugs adjacent to pressure gauges and pressure gauge taps.

### 3.02 SCHEDULE

- A. Pressure Gauges, Location and Scale Range:
  - 1. Pumps, 0 to \_\_\_\_ psi.
  - 2. Expansion tanks, 0 to \_\_\_\_ psi.
- B. Pressure Gauge Tappings, Location:
  - 1. Boiler - inlets and outlets.
- C. Stem Type Thermometers, Location and Scale Range:
  - 1. Boilers - inlets and outlets, 0 to \_\_\_\_ degrees F.

**END OF SECTION 230519**

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**SECTION 230523**  
**GENERAL-DUTY VALVES FOR HVAC PIPING****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Applications.
- B. Angle valves.
- C. Ball valves.
- D. Butterfly valves.
- E. Check valves.
- F. Gate valves.
- G. Plug valves.
- H. Chainwheels.

**1.02 RELATED REQUIREMENTS**

- A. Section 078400 - Firestopping.
- B. Section 230553 - Identification for HVAC Piping and Equipment.
- C. Section 230719 - HVAC Piping Insulation.
- D. Section 232113 - Hydronic Piping.

**1.03 ABBREVIATIONS AND ACRONYMS**

- A. CWP: Cold working pressure.
- B. EPDM: Ethylene propylene copolymer rubber.
- C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.
- D. NRS: Nonrising stem.
- E. OS&Y: Outside screw and yoke.
- F. PTFE: Polytetrafluoroethylene.
- G. RS: Rising stem.
- H. SWP: Steam working pressure.
- I. TFE: Tetrafluoroethylene.
- J. WOG: Water, oil, and gas.

**1.04 REFERENCE STANDARDS**

- A. API STD 594 - Check Valves: Flanged, Lug, Wafer, and Butt-Welding 2022.
  - B. ASME B1.20.1 - Pipe Threads, General Purpose, Inch 2013 (Reaffirmed 2018).
  - C. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250 2020.
  - D. ASME B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard 2020.
  - E. ASME B16.10 - Face-to-Face and End-to-End Dimensions of Valves 2022.
  - F. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings 2021.
  - G. ASME B16.34 - Valves — Flanged, Threaded, and Welding End 2020.
  - H. ASME B31.9 - Building Services Piping 2020.
  - I. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings 2004 (Reapproved 2019).
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- J. ASTM A395/A395M - Standard Specification for Ferritic Ductile Iron Pressure-Retaining Castings for Use at Elevated Temperatures 1999 (Reapproved 2022).
  - K. ASTM A536 - Standard Specification for Ductile Iron Castings 1984, with Editorial Revision (2019).
  - L. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings 2017.
  - M. AWWA C606 - Grooved and Shouldered Joints 2022.
  - N. MSS SP-45 - Drain and Bypass Connections 2020.
  - O. MSS SP-67 - Butterfly Valves 2022.
  - P. MSS SP-68 - High Pressure Butterfly Valves with Offset Design 2021.
  - Q. MSS SP-70 - Gray Iron Gate Valves, Flanged and Threaded Ends 2011.
  - R. MSS SP-71 - Gray Iron Swing Check Valves, Flanged and Threaded Ends 2018.
  - S. MSS SP-72 - Ball Valves with Flanged or Butt-Welding Ends for General Service 2010a.
  - T. MSS SP-80 - Bronze Gate, Globe, Angle, and Check Valves 2019.
  - U. MSS SP-85 - Gray Iron Globe and Angle Valves, Flanged and Threaded Ends 2011.
  - V. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends 2010, with Errata .

#### **1.05 SUBMITTALS**

- A. See Section 013300 - Submittal Procedures, for submittal procedures.
- B. Product Data: Provide data on valves including manufacturers catalog information. Submit performance ratings, rough-in details, weights, support requirements, and piping connections.
- C. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- D. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, maintenance and repair data, and parts listings.

#### **1.06 QUALITY ASSURANCE**

- A. Manufacturer:
  - 1. Obtain valves for each valve type from single manufacturer.
  - 2. Company must specialize in manufacturing products specified in this section, with not less than three years of documented experience.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Prepare valves for shipping as follows:
    - 1. Minimize exposure of operable surfaces by setting plug and ball valves to open position.
    - 2. Protect valve parts exposed to piped medium against rust and corrosion.
    - 3. Protect valve piping connections such as grooves, weld ends, threads, and flange faces.
    - 4. Adjust globe, gate, and angle valves to the closed position to avoid clattering.
    - 5. Secure check valves in either the closed position or open position.
    - 6. Adjust butterfly valves to closed or partially closed position.
  - B. Use the following precautions during storage:
    - 1. Maintain valve end protection and protect flanges and specialties from dirt.
      - a. Provide temporary inlet and outlet caps.
      - b. Maintain caps in place until installation.
    - 2. Store valves in shipping containers and maintain in place until installation.
      - a. Store valves indoors in dry environment.
  - C. Exercise the following precautions for handling:
    - 1. Handle large valves with sling, modified to avoid damage to exposed parts.
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2. Avoid the use of operating handles or stems as rigging or lifting points.

## **PART 2 PRODUCTS**

### **2.01 APPLICATIONS**

- A. Provide the following valves for the applications if not indicated on drawings:
  1. Throttling (Hydronic): Butterfly and Ball.
  2. Isolation (Shutoff): Butterfly and Ball.
  3. Swing Check (Pump Outlet):
    - a. 2 NPS and Smaller: Bronze with bronze disc.
    - b. 2-1/2 NPS and Larger: Iron with lever and weight, lever and spring, center-guided metal, or center-guided with resilient seat.
  4. Dead-End: Butterfly, single-flange (lug) type.
- B. Required Valve End Connections for Non-Wafer Types:
  1. Steel Pipe:
    - a. 2 NPS and Smaller: Threaded ends.
    - b. 2-1/2 NPS and Larger: Grooved ends or flanged.
  2. Copper Tube:
    - a. 2 NPS and Smaller: Threaded ends (Exception: Solder-joint valve-ends).
- C. Heating Hot Water Valves:
  1. 2 NPS and Smaller, Brass and Bronze Valves:
    - a. Threaded ends.
    - b. Angle: Bronze disc, Class 125.
    - c. Ball: Full port, two piece, stainless steel trim.
    - d. Swing Check: Bronze disc, Class 125.
    - e. Gate: NRS, Class 125.
  2. 2-1/2 NPS and Larger, Iron Valves:
    - a. 2-1/2 NPS to 4 NPS: Threaded ends.
    - b. Ball: 2-1/2 NPS to 10 NPS, Class 150.
    - c. Butterfly: High performance, single flange, Class 150.
    - d. Swing Check: Metal seats, Class 125.
    - e. Swing Check: 2-1/2 NPS to 12 NPS, lever and spring closure control, Class 125.
    - f. Grooved-End Swing Check: 3 NPS to 12 NPS, 300 CWP.
    - g. Center-Guided Check: Compact-wafer, metal seat, Class 125.
    - h. Plate-Type Check: Single plate, metal seat, Class 125.
    - i. Gate: NRS, Class 125.

### **2.02 GENERAL REQUIREMENTS**

- A. Valve Pressure and Temperature Ratings: No less than rating indicated; as required for system pressures and temperatures.
  - B. Valve Sizes: Match upstream piping unless otherwise indicated.
  - C. Valve Actuator Types:
    1. Gear Actuator: Quarter-turn valves 8 NPS and larger.
    2. Handwheel: Valves other than quarter-turn types.
    3. Hand Lever: Quarter-turn valves 6 NPS and smaller.
    4. Chainwheel: Device for attachment to valve handwheel, stem, or other actuator, of size and with chain for mounting height, as indicated in the "Valve Installation" Article.
  - D. Valves in Insulated Piping: Provide 2 NPS stem extensions and the following features:
    1. Gate Valves: Rising stem.
    2. Ball Valves: Extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
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- 3. Butterfly Valves: Extended neck.
  - 4. Memory Stops: Fully adjustable after insulation is installed.
  - E. Memory Stops: Fully adjustable after insulation is installed.
  - F. Valve-End Connections:
    - 1. Threaded End Valves: ASME B1.20.1.
    - 2. Flanges on Iron Valves: ASME B16.1 for flanges on iron valves.
    - 3. Pipe Flanges and Flanged Fittings 1/2 NPS through 24 NPS: ASME B16.5.
    - 4. Solder Joint Connections: ASME B16.18.
    - 5. Grooved End Connections: AWWA C606.
  - G. General ASME Compliance:
    - 1. Ferrous Valve Dimensions and Design Criteria: ASME B16.10 and ASME B16.34.
    - 2. Building Services Piping Valves: ASME B31.9.
  - H. Bronze Valves:
    - 1. Fabricate from dezincification resistant material.
    - 2. Copper alloys containing more than 15 percent zinc are not permitted.
  - I. Valve Bypass and Drain Connections: MSS SP-45.
  - J. Source Limitations: Obtain each valve type from a single manufacturer.

### **2.03 BRONZE, ANGLE VALVES**

- A. Class 125: CWP Rating: 200 psig; and Class 150: CWP Rating: 300 psig:.
  - 1. Comply with MSS SP-80, Type 1.
  - 2. Body: Bronze; ASTM B62, with integral seat and screw in bonnet.
  - 3. Ends: Threaded.
  - 4. Stem: Bronze.
  - 5. Disc: Bronze, PTFE, or TFE.
  - 6. Packing: Asbestos free.
  - 7. Handwheel: Bronze or aluminum.

### **2.04 BRASS, BALL VALVES**

- A. One Piece, Reduced Port with Brass Trim:
  - 1. Comply with MSS SP-110.
  - 2. CWP Rating: 400 psig.
  - 3. Body: Forged brass.
  - 4. Ends: Threaded.
  - 5. Seats: PTFE or TFE.
  - 6. Stem: Brass.
  - 7. Ball: Chrome-plated brass.
- B. Two Piece, Full Port with Stainless Steel Trim and Threaded Connections:
  - 1. Comply with MSS SP-110.
  - 2. SWP Rating: 150 psig.
  - 3. CWP Rating: 600 psig, WOG.
  - 4. Vacuum Rating: 14.2 psig.
  - 5. Body: Forged brass.
  - 6. Seats: PTFE.
  - 7. Stem: Stainless Steel.
  - 8. Ball: Chrome-plated brass.

### **2.05 BRONZE, BALL VALVES**

- A. General:
    - 1. Fabricate from dezincification resistant material.
    - 2. Copper alloys containing more than 15 percent zinc are not permitted.
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- B. One Piece, Reduced Port with Stainless Steel Trim:
    - 1. Comply with MSS SP-110.
    - 2. CWP Rating: 400 psig.
    - 3. CWP Rating: 600 psig.
    - 4. Body: Bronze.
    - 5. Ends: Threaded.
    - 6. Seats: PTFE.
    - 7. Stem: Stainless steel.
    - 8. Ball: Stainless steel, vented.
  - C. Two Piece, Full Port with Stainless Steel Trim:
    - 1. Comply with MSS SP-110.
    - 2. SWP Rating: 150 psig.
    - 3. CWP Rating: 600 psig.
    - 4. Body: Forged bronze or dezincified-brass alloy.
    - 5. Ends: Threaded.
    - 6. Seats: PTFE.
    - 7. Stem: Stainless steel.
    - 8. Ball: Stainless steel, vented.

## **2.06 STAINLESS STEEL, BALL VALVES**

- A. One-Piece, Standard Port with Stainless-Steel Trim:
  - 1. Comply with MSS SP-110.
  - 2. SWP Rating: 150 psig.
  - 3. CWP Rating: 800 psig.
  - 4. Body: Stainless steel.
  - 5. Ends: Threaded.
  - 6. Seats: PTFE.
  - 7. Stem: Stainless steel.
  - 8. Ball: Stainless steel.
- B. Two Piece, Large Port with Stainless Steel Trim:
  - 1. Comply with MSS SP-110.
  - 2. SWP Rating: 150 psig.
  - 3. CWP Rating: 1,000 psig.
  - 4. Vacuum Rating: 14.2 psig.
  - 5. Body: Stainless steel.
  - 6. Ends: Threaded.
  - 7. Seats: PTFE.
  - 8. Stem: Stainless steel.
  - 9. Ball: Stainless steel.

## **2.07 IRON, BALL VALVES**

- A. Split Body, Full Port:
  - 1. Comply with MSS SP-72.
  - 2. CWP Rating: 200 psig.
  - 3. Body: ASTM A126, gray iron.
  - 4. Ends: Flanged.
  - 5. Seats: PTFE.
  - 6. Stem: Stainless steel.
  - 7. Ball: Stainless steel.

## **2.08 HIGH-PERFORMANCE, SINGLE FLANGE BUTTERFLY VALVES**

- A. Lug type: Bi-directional dead end service without downstream flange.
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1. Comply with MSS SP-68.
  2. Class 150: CWP Rating: 285 psig and Class 300: CWP Rating: 720 psig at 100 degrees F.
  3. Body: Provide carbon steel, cast iron, ductile Iron, or stainless steel.
  4. Seat: Metal or reinforced PTFE.
  5. Offset stem: Stainless steel.
  6. Disc: Carbon steel.

## **2.09 BRASS, INLINE CHECK VALVES**

- A. Class 150: CWP Rating: 300 psig, WOG.
- B. Maximum Service Temperature: 250 deg F.
- C. Body: Forged brass.
- D. Disc: Forged brass.
- E. Seal: PTFE, bubble tight.
- F. End-Connections: Threaded.

## **2.10 BRASS, HORIZONTAL SWING CHECK VALVES**

- A. Threaded End-Connections:
  1. Class 125: CWP Rating: 200 psig, WOG.
  2. Body: Forged brass.
  3. Disc: Forged brass.
  4. Hinge-Pin, Screw, and Cap: Forged brass.

## **2.11 BRONZE, SWING CHECK VALVES**

- A. Class 125: CWP Rating: 200 psig (1380 kPa) and Class 150: CWP Rating: 300 psig (2070 kPa).
  1. Comply with MSS SP-80, Type 3.
  2. Body Design: Horizontal flow.
  3. Body Material: Bronze, ASTM B62.
  4. Ends: Threaded.
  5. Disc: Bronze.

## **2.12 IRON, FLANGED END SWING CHECK VALVES**

- A. Class 125: CWP Rating: 200 psig (1380 kPa) with Metal Seats.
  1. Comply with MSS SP-71, Type I.
  2. Design: Clear or full waterway with flanged ends.
  3. Body: Gray iron with bolted bonnet in accordance with ASTM A126.
  4. Trim: Bronze.
  5. Disc Holder: Bronze.
  6. Gasket: Asbestos free.

## **2.13 IRON, GROOVED-END SWING CHECK VALVES**

- A. 300 CWP:
  1. 2 NPS to 8 NPS.
  2. CWP Rating: 300 psig.
  3. Body Material: ASTM A536, Grade 65-45-12 ductile iron.
  4. Seal: EPDM or Nitrile.
  5. Disc: Ductile iron.
  6. Coating: Black, non-lead paint.

## **2.14 IRON, PLATE-TYPE CHECK VALVES**

- A. Class 125 Single-Plate:
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1. Comply with API STD 594.
2. 2-1/2 NPS to 12 NPS, CWP Rating: 200 psig.
3. Body Design: Wafer, spring-loaded plate.
4. Body Material: ASTM A126, gray iron.
5. Resilient Seat: EPDM or NBR.

## **2.15 BRONZE, GATE VALVES**

- A. Non-Rising Stem (NRS) or Rising Stem (RS):
  1. Comply with MSS SP-80, Type I.
  2. Class 125: CWP Rating: 200 psig.
  3. Class 150: CWP Rating: 300 psig.
  4. Body Material: Bronze with integral seat and union-ring bonnet.
  5. Ends: Threaded or solder joint.
  6. Stem: Bronze.
  7. Disc: Solid wedge; bronze.
  8. Packing: Asbestos free.
  9. Handwheel: Malleable iron, bronze, or aluminum.

## **2.16 IRON, GATE VALVES**

- A. NRS or OS&Y:
  1. Comply with MSS SP-70, Type I.
  2. Class 125: 2-1/2 NPS to 12 NPS, CWP Rating: 200 psig.
  3. Body Material: Gray iron with bolted bonnet.
  4. Ends: Flanged.
  5. Trim: Bronze.
  6. Disc: Solid wedge.
  7. Packing and Gasket: Asbestos free.

## **2.17 CHAINWHEELS**

- A. Description: Valve actuation assembly with sprocket rim, brackets, and chain.
  1. Brackets: Type, number, size, and fasteners required to mount actuator on valve.
  2. Attachment: For connection to ball, butterfly, and plug valve stems.
  3. Sprocket Rim with Chain Guides: Ductile iron include zinc coating.
  4. Chain: Hot-dip galvanized steel. Sized to fit sprocket rim.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Discard all packing materials and verify that valve interior, including threads and flanges, are completely clean without signs of damage or degradation that could result in leakage.
- B. Verify valve parts to be fully operational in all positions from closed to fully open.
- C. Confirm gasket material to be suitable for the service, to be of correct size, and without defects that could compromise effectiveness.
- D. Should valve is determined to be defective, replace with new valve.

### **3.02 INSTALLATION**

- A. Provide unions or flanges with valves to facilitate equipment removal and maintenance while maintaining system operation and full accessibility for servicing.
- B. Provide separate valve support as required and locate valve with stem at or above center of piping, maintaining unimpeded stem movement.
- C. Install check valves where necessary to maintain direction of flow as follows:
  1. Swing Check: Install horizontal maintaining hinge pin level.

- D. Provide chainwheels on operators for valves 4 NPS and larger where located 96 NPS or more above finished floor, terminating 60 NPS above finished floor.

**END OF SECTION 230523**

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**SECTION 230529**  
**HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Support and attachment components for equipment, piping, and other HVAC/hydronic work.

**1.02 RELATED REQUIREMENTS**

- A. Section 033000 - Cast-in-Place Concrete: Concrete equipment pads.

**1.03 REFERENCE STANDARDS**

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2023.
- C. ASTM A181/A181M - Standard Specification for Carbon Steel Forgings, for General-Purpose Piping 2023.
- D. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.
- E. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings 1999, with Editorial Revision (2022).
- F. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel 2023.
- G. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023.
- H. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials 2022a, with Editorial Revision (2023).
- I. MFMA-4 - Metal Framing Standards Publication 2004.
- J. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation 2018, with Amendment (2019).
- K. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
1. Coordinate sizes and arrangement of supports and bases with the actual equipment and components to be installed.
  2. Coordinate the work with other trades to provide additional framing and materials required for installation.
  3. Coordinate compatibility of support and attachment components with mounting surfaces at the installed locations.
  4. Coordinate the arrangement of supports with ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
  5. Notify Architect/Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
1. Do not install products on or provide attachment to concrete surfaces until concrete has fully cured in accordance with Section 033000.

**1.05 SUBMITTALS**

- A. See Section 013300 - Submittal Procedures, for submittal procedures.
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- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel (strut) framing systems, nonpenetrating rooftop supports, post-installed concrete and masonry anchors, and thermal insulated pipe supports.
- C. Shop Drawings: Include details for fabricated hangers and supports where materials or methods other than those indicated are proposed for substitution.
  - 1. Application of protective inserts, saddles, and shields at pipe hangers for each type of insulation and hanger.
- D. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

### 1.06 QUALITY ASSURANCE

- A. Comply with applicable building code.
- B. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

### 1.07 DELIVERY, STORAGE, AND HANDLING

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

## PART 2 PRODUCTS

### 2.01 SUPPORT AND ATTACHMENT COMPONENTS

- A. General Requirements:
  - 1. Comply with MSS SP-58.
  - 2. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of plumbing work.
  - 3. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
  - 4. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported with a minimum safety factor of 4.0. Include consideration for vibration, equipment operation, and shock loads where applicable.
  - 5. Do not use wire, chain, perforated pipe strap, or wood for permanent supports unless specifically indicated or permitted.
  - 6. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
    - a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
    - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
    - c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
    - d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Materials for Metal Fabricated Supports: Comply with Section 055000.
- C. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
  - 1. Manufacturers:
    - a. Cooper B-Line, a division of Eaton Corporation: [www.cooperindustries.com/#sle](http://www.cooperindustries.com/#sle).
    - b. Ferguson Enterprises Inc: [www.fnw.com/#sle](http://www.fnw.com/#sle).
    - c. Thomas & Betts Corporation: [www.tnb.com/#sle](http://www.tnb.com/#sle).
    - d. Unistrut, a brand of Atkore International Inc: [www.unistrut.com/#sle](http://www.unistrut.com/#sle).



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2. Provide factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
  3. Comply with MFMA-4.
  4. Channel Material:
    - a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
    - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
  5. Minimum Channel Thickness: Steel sheet, 12 gauge, 0.1046 inch.
  6. Minimum Channel Dimensions: 1-5/8 inch width by 13/16 inch height.
- D. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
1. Minimum Size, Unless Otherwise Indicated or Required:
    - a. Equipment Supports: 1/2 inch diameter.
    - b. Piping up to 1 inch (27 mm) nominal: 1/4 inch diameter.
    - c. Piping larger than 1 inch (27 mm) nominal: 3/8 inch diameter.
    - d. Trapeze Support for Multiple Pipes: 3/8 inch diameter.
- E. Thermal Insulated Pipe Supports:
1. Manufacturers:
    - a. Buckaroos, Inc: [www.buckaroos.com/#sle](http://www.buckaroos.com/#sle).
    - b. KB Enterprises: [www.snappitz.com/#sle](http://www.snappitz.com/#sle).
  2. General Construction and Requirements:
    - a. Insulated pipe supports to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.
    - b. Surface Burning Characteristics: Flame spread index/smoke developed index of 5/30, maximum, when tested in accordance with ASTM E84 or UL 723.
    - c. Pipe supports to be provided for nominally sized, 1/2 inch to 30 inch iron pipes.
    - d. Insulation inserts to consist of rigid phenolic foam insulation surrounded by a 360 degree, PVC jacketing.
  3. PVC Jacket:
    - a. Pipe insulation protection shields to be provided with a ball bearing hinge and locking seam.
    - b. Minimum Service Temperature: Minus 40 degrees F.
    - c. Maximum Service Temperature: 180 degrees F.
    - d. Moisture Vapor Transmission: 0.0071 perm inch, when tested in accordance with ASTM E96/E96M.
    - e. Thickness: 60 mil.
    - f. Connections: Brush on welding adhesive.
  4. Pipe insulation protection shields to be provided at the hanger points and guide locations on pipes requiring insulation as indicated on drawings.
  5. Products:
    - a. Buckaroos, Inc; CoolDry: [www.buckaroos.com/#sle](http://www.buckaroos.com/#sle).
- F. Pipe Supports:
1. Liquid Temperatures Up To 122 degrees F:
    - a. Overhead Support: MSS SP-58 Types 1, 3 through 12.
    - b. Support From Below: MSS SP-58 Types 35 through 38.
  2. Operating Temperatures from 122 to 446 degrees F:
    - a. Overhead Support: MSS SP-58 Type 1 or 3 through 12, with appropriate saddle of MSS SP-58 Type 40 for insulated pipe.
    - b. Roller Support: MSS SP-58 Types 41 or 43 through 46, with appropriate saddle of MSS SP-58 Type 39 for insulated pipe.
    - c. Sliding Support: MSS SP-58 Types 35 through 38.
- G. Pipe Stanchions: For pipe runs, use stanchions of same type and material where vertical adjustment is required for stationary pipe.
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1. Manufacturers:
    - a. Anvil International; H-Block: [www.anvilintl.com/#sle](http://www.anvilintl.com/#sle).
  2. Material: Malleable iron, ASTM A47/A47M; or carbon steel, ASTM A36/A36M.
  3. Provide coated or plated saddles to isolate steel hangers from dissimilar metal tube or pipe.
- H. Beam Clamps: MSS SP-58 Types 19 through 23, 25 or 27 through 30 based on required load.
1. Manufacturers:
    - a. Ferguson Enterprises Inc: [www.fnw.com/#sle](http://www.fnw.com/#sle).
  2. Material: ASTM A36/A36M carbon steel or ASTM A181/A181M forged steel.
  3. Provide clamps with hardened steel cup-point set screws and lock-nuts for anchoring in place.
- I. Riser Clamps:
1. Manufacturers:
    - a. Ferguson Enterprises Inc; \_\_\_\_\_: [www.fnw.com/#sle](http://www.fnw.com/#sle).
  2. Provide copper plated clamps for copper tubing support.
  3. For insulated pipe runs, provide two bolt-type clamps designed for installation under insulation.
- J. Offset Pipe Clamps: Double-leg design two-piece pipe clamp.
- K. Strut Clamps: Two-piece pipe clamp.
- L. Insulation Clamps: Two bolt-type clamps designed for installation under insulation.
- M. Pipe Hangers: For a given pipe run, use hangers of the same type and material.
1. Material: Malleable iron, ASTM A47/A47M; or carbon steel, ASTM A36/A36M.
  2. Provide coated or plated hangers to isolate steel hangers from dissimilar metal tube or pipe.
- N. Intermediate Pipe Guides: Use pipe clamps with oversize pipe sleeve that provides clearance around pipe.
1. Pipe Diameter 6 inches and Smaller: Provide minimum clearance of 0.16 inch.
  2. Pipe Diameter 8 inches: Provide U-bolts with double nuts providing minimum clearance of 0.28 inch.
  3. Pipe Diameter 8 inches: 0.625 inch U-bolt.
  4. Pipe Diameter 10 inches: 0.75 inch U-bolt.
  5. Pipe Diameter 12 to 16 inches: 0.875 inch U-bolt.
  6. Pipe Diameter 18 to 30 inches: 1 inch U-bolt.
- O. Pipe Alignment Guides: Galvanized steel.
1. Pipe Diameter 8 inches and Smaller: Spider or sleeve type.
  2. Pipe Diameter 10 inches and Larger: Roller type.
- P. Dielectric Barriers: Provide between metallic supports and metallic piping and associated items of dissimilar type; acceptable dielectric barriers include rubber or plastic sheets or coatings attached securely to pipe or item.
- Q. Nonpenetrating Rooftop Supports for Low-Slope Roofs:
1. Manufacturers:
    - a. Anvil International; H-Block: [www.anvilintl.com/#sle](http://www.anvilintl.com/#sle).
    - b. Cooper B-Line, a division of Eaton Corporation: [www.cooperindustries.com/#sle](http://www.cooperindustries.com/#sle).
    - c. Erico International Corporation, a brand of Pentair: [www.erico.com/#sle](http://www.erico.com/#sle).
    - d. Ferguson Enterprises Inc: [www.fnw.com/#sle](http://www.fnw.com/#sle).
    - e. PHP Systems/Design: [www.phpsd.com/#sle](http://www.phpsd.com/#sle).
    - f. Unistrut, a brand of Atkore International Inc: [www.unistrut.com/#sle](http://www.unistrut.com/#sle).
  2. Provide steel pedestals with thermoplastic or rubber base that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the
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- roofing assembly, with support fixtures as specified.
  - 3. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
  - 4. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports.
  - 5. Mounting Height: Provide minimum clearance of 6 inches under supported component to top of roofing.
  - R. Pipe Shields for Insulated Piping:
    - 1. Manufacturers:
      - a. Anvil International: [www.anvilintl.com/#sle](http://www.anvilintl.com/#sle).
    - 2. General Construction and Requirements:
      - a. Surface Burning Characteristics: Comply with ASTM E84 or UL 723.
      - b. Shields Material: UV-resistant polypropylene with glass fill.
      - c. Maximum Insulated Pipe Outer Diameter: 12-5/8 inch.
      - d. Minimum Service Temperature: Minus 40 degrees F.
      - e. Maximum Service Temperature: 178 degrees F.
      - f. Pipe shields to be provided at hanger, support, and guide locations on pipe requiring insulation or additional support.
  - S. Anchors and Fasteners:
    - 1. Manufacturers - Mechanical Anchors:
      - a. Hilti, Inc: [www.us.hilti.com/#sle](http://www.us.hilti.com/#sle).
      - b. ITW Red Head, a division of Illinois Tool Works, Inc: [www.itwredhead.com/#sle](http://www.itwredhead.com/#sle).
      - c. Powers Fasteners, Inc: [www.powers.com/#sle](http://www.powers.com/#sle).
      - d. Simpson Strong-Tie Company Inc: [www.strongtie.com/#sle](http://www.strongtie.com/#sle).
    - 2. Manufacturers - Powder-Actuated Fastening Systems:
      - a. Hilti, Inc: [www.us.hilti.com/#sle](http://www.us.hilti.com/#sle).
      - b. ITW Ramset, a division of Illinois Tool Works, Inc: [www.ramset.com/#sle](http://www.ramset.com/#sle).
      - c. Powers Fasteners, Inc: [www.powers.com/#sle](http://www.powers.com/#sle).
      - d. Simpson Strong-Tie Company Inc: [www.strongtie.com/#sle](http://www.strongtie.com/#sle).
    - 3. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
    - 4. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
    - 5. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
    - 6. Hollow Masonry: Use toggle bolts.
    - 7. Hollow Stud Walls: Use toggle bolts.
    - 8. Steel: Use beam clamps, machine bolts, or welded threaded studs.
    - 9. Sheet Metal: Use sheet metal screws.
    - 10. Wood: Use wood screws.
    - 11. Plastic and lead anchors are not permitted.
    - 12. Hammer-driven anchors and fasteners are not permitted.
    - 13. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
      - a. Comply with MFMA-4.
      - b. Channel Material: Use galvanized steel.
      - c. Minimum Channel Thickness: Steel sheet, 12 gauge, 0.1046 inch minimum base metal thickness.
      - d. Manufacturer: Same as manufacturer of metal channel (strut) framing system.
    - 14. Post-Installed Concrete and Masonry Anchors: Evaluated and recognized by ICC Evaluation Service, LLC (ICC-ES) for compliance with applicable building code.
  - T. Pipe Installation Accessories:
    - 1. Copper Pipe Supports:
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- a. Manufacturers:
    - 1) HoldRite, a brand of Reliance Worldwide Corporation: [www.holdrite.com/#sle](http://www.holdrite.com/#sle).
  2. Thermal Insulated Pipe Supports:
    - a. Manufacturers:
      - 1) HoldRite, a brand of Reliance Worldwide Corporation: [www.holdrite.com/#sle](http://www.holdrite.com/#sle).
  3. Overhead Pipe Supports:
    - a. Manufacturers:
      - 1) HoldRite, a brand of Reliance Worldwide Corporation: [www.holdrite.com/#sle](http://www.holdrite.com/#sle).
  4. Plenum Pipe Supports:
    - a. Manufacturers:
      - 1) HoldRite, a brand of Reliance Worldwide Corporation: [www.holdrite.com/#sle](http://www.holdrite.com/#sle).
  5. Telescoping Pipe Supports:
    - a. Manufacturers:
      - 1) HoldRite, a brand of Reliance Worldwide Corporation: [www.holdrite.com/#sle](http://www.holdrite.com/#sle).
  6. Inserts and Clamps:
    - a. Manufacturers:
      - 1) HoldRite, a brand of Reliance Worldwide Corporation: [www.holdrite.com/#sle](http://www.holdrite.com/#sle).

## **2.02 RETROFIT PIPING COVER SYSTEM**

- A. Manufacturers:
  1. DecoShield Systems, Inc: [www.decoshield.com/#sle](http://www.decoshield.com/#sle).
- B. General Requirements:
  1. Surface Burning Characteristics: Flame spread index/smoke developed index of 20/250, maximum, when tested in accordance with ASTM E84 or UL 723.
- C. Materials:
  1. Piping Cover System: Removal-resistant, modular, snap-fit cover units, clips, and anchors for use with CPVC, steel, and copper piping systems.
  2. Cover Units: L-shaped and U-shaped cross-section units of flame retardant resin material, paintable finish.
  3. Unit Length: 7.5 feet.
  4. Provide coupling fittings for joining units end to end and prefabricated inside and outside corner fittings and end caps as required.
  5. Provide mounting clips to secure covers to wall-ceiling per manufacturer requirements.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive support and attachment components.
- C. Verify that conditions are satisfactory for installation prior to starting work.

### **3.02 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
  - B. Install anchors and fasteners in accordance with ICC Evaluation Services, LLC (ICC-ES) evaluation report conditions of use where applicable.
  - C. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.
  - D. Unless specifically indicated or approved by Architect/Engineer, do not provide support from suspended ceiling support system or ceiling grid.
  - E. Unless specifically indicated or approved by Architect/Engineer, do not provide support from roof deck.
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- F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
  - G. Provide thermal insulated pipe supports complete with hangers and accessories. Install thermal insulated pipe supports during the installation of the piping system.
  - H. Equipment Support and Attachment:
    - 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
    - 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
    - 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
    - 4. Unless otherwise indicated, mount floor-mounted equipment on properly sized 3 inch high concrete pad constructed in accordance with Section 033000.
    - 5. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
  - I. Preset Concrete Inserts: Use manufacturer-provided closure strips to inhibit concrete seepage during concrete pour.
  - J. Secure fasteners according to manufacturer's recommended torque settings.
  - K. Remove temporary supports.

### **3.03 FIELD QUALITY CONTROL**

- A. See Section 014000 - DO NOT USE BSD Quality Requirements, for additional requirements.
- B. Inspect support and attachment components for damage and defects.
- C. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- D. Correct deficiencies and replace damaged or defective support and attachment components.

**END OF SECTION 230529**

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**SECTION 230550  
WIND RESTRAINT FOR HVAC SYSTEMS**

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary General Conditions and other Division 1 Specification Sections, apply to this Section.

**1.02 SECTION INCLUDES**

- A. Support and brace mechanical and electrical systems, as called for, to resist directional wind forces (lateral, longitudinal and vertical).

**1.03 APPLICABLE CODES AND STANDARDS**

- A. Provide work in compliance with the following codes and standards:
- B. 2015 International Building Code (Section 1609).
- C. 2015 International Mechanical Code (Section 301, Item 301.15).
- D. American Society of Civil Engineers (ASCE) Minimum Design Loads for Buildings and Other Structures with Supplement No. 1 - Standard ASCE/SEI 7-10.

**1.04 QUALITY ASSURANCE**

- A. General:
  - 1. The contractor shall provide professional engineer stamped and signed calculations, and details of wind restraint systems to meet total design lateral force requirements for support and restraint of mechanical and electrical systems.
  - 2. Systems requiring wind restraint including, but not limited to:
    - a. Exhaust fans.
    - b. Roof curbs and pipe/duct/equipment supports associated with any of the equipment listed above.

**1.05 SUBMITTALS**

- A. Submit wind force level (Fp) calculations from applicable building code. Submit pre-approved restraint selections, installation details, and plans indicating locations of restraints.
- B. Calculations, plans, restraint selection, and installation details shall be stamped and signed by a professionally licensed engineer experienced in wind restraint design.
- C. Submit manufacturer's product data.
- D. For each piece of equipment that requires wind restraint as outlined in this section, include the following:
  - 1. Dimensioned Outline Drawings of Equipment Unit: Identify the center of gravity and locate and describe mounting and anchoring provisions.
  - 2. Anchorage: Provide detailed description of equipment anchorage devices on which the calculations are based and their installation requirements. Identify anchor bolts, studs and other mounting devices. Provide information on the size, type and spacing of mounting brackets, holes and other provisions.

**PART 1 PRODUCTS**

**2.01 CODE INFORMATION**

- A. This project is subject to the wind bracing requirements of the 2015 International Building Code (Section 1609) and American Society of Civil Engineers ASCE/SEI 7-10. The following criteria are applicable to this project:
    - 1. Nominal Design Wind Speed (V) (Per ASCE 7-10): 120 mph.
    - 2. Risk Category (Per ASCE 7-10): III
    - 3. Exposure Category (Per ASCE 7-10): C
    - 4. Height and Exposure Adjustment Coefficient (Per ASCE 7-10): 1.21
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## **2.02 WIND BRACING AND SUPPORT OF SYSTEMS AND COMPONENTS**

- A. General:
  - 1. Design analysis shall include calculated dead loads, wind loads, and capacity of materials utilized for the connection of the equipment or system to the structure.
  - 2. Analysis shall detail anchoring methods, bolt diameter, and embedment depth.
  - 3. All wind restraint devices shall be designed to accept without failure the forces calculated per the applicable building code and as summarized in Section 2.1.
- B. Friction from gravity loads shall not be considered resistance to wind forces.

## **PART 1 EXECUTION**

### **3.01 INSTALLATION**

- A. Wind Restraint of Ductwork and Equipment:
  - 1. All restraint systems shall be installed in strict accordance with the manufacturer's restraint guidelines and all certified submittal data.
  - 2. The interaction between mechanical and electrical equipment and the supporting structures shall be designed into the restraint systems.
  - 3. Friction clips shall not be used for anchorage attachments.
  - 4. Expansion anchors shall not be used for non-vibration isolated equipment rated over 10 HP.
  - 5. Components mounted on vibration isolation systems shall have a bumper restraint or snubber in each horizontal direction and vertical restraints shall be provided to resist overturning.
  - 6. Installation of restraints shall not cause any change in position of equipment or ductwork, resulting in stresses or misalignment.
  - 7. Exhaust fans with hinge kits shall have wind restraint fasteners installed on the hinged side, same as the three (3) non-hinged sides.
  - 8. No rigid connections between equipment and the building structure shall be made that degrade the noise and vibration-isolation system specified.
  - 9. Do not install any equipment or duct that makes rigid connections with the building unless isolation is not specified.
  - 10. Prior to installation, bring to the Architect's/Engineer's attention any discrepancies between the specifications and the field conditions, or changes required due to specific equipment selection.
  - 11. Bracing may occur from flanges of structural beams, upper truss cords of bar joists, cast in place inserts, or wedge-type concrete anchors. Consult Structural Engineer of record.
  - 12. Overstressing of the building structure shall not occur from overhead support of equipment. Bracing attached to structural members may present additional stresses. The Contractor shall submit loads to the Structural Engineer of record for approval in this event.
  - 13. Brace support rods when necessary to accept compressive loads. Welding of compressive braces to the vertical support rods is not acceptable.
  - 14. Provide reinforced clevis bolts where required.
  - 15. Do not brace a system to two independent structures such as a roof and wall.

**END OF SECTION 230550**



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**SECTION 230553**  
**IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Nameplates.
- B. Tags.
- C. Adhesive-backed duct markers.
- D. Stencils.
- E. Pipe markers.
- F. Ceiling tacks.

**1.02 RELATED REQUIREMENTS**

- A. Section 099123 - Interior Painting: Identification painting.

**1.03 REFERENCE STANDARDS**

- A. ASME A13.1 - Scheme for the Identification of Piping Systems 2020.
- B. ASTM D709 - Standard Specification for Laminated Thermosetting Materials 2017.

**1.04 SUBMITTALS**

- A. See Section 013300 - Submittal Procedures for submittal procedures.
- B. List: Submit list of wording, symbols, letter size, and color coding for mechanical identification.
- C. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.
- D. Product Data: Provide manufacturers catalog literature for each product required.
- E. Manufacturer's Installation Instructions: Indicate special procedures, and installation.
- F. Project Record Documents: Record actual locations of tagged valves.

**PART 2 PRODUCTS**

**2.01 IDENTIFICATION APPLICATIONS**

- A. Air Terminal Units: Tags.
  - B. Automatic Controls: Tags. Key to control schematic.
  - C. Control Panels: Nameplates.
  - D. Dampers: Ceiling tacks, where located above lay-in ceiling.
  - E. Ductwork: Adhesive-backed duct markers or stencils.
  - F. Instrumentation: Tags.
  - G. Major Control Components: Nameplates.
  - H. Piping: Pipe markers.
  - I. Pumps: Nameplates.
  - J. Relays: Tags.
  - K. Small-sized Equipment: Tags.
  - L. Tanks: Nameplates.
  - M. Thermostats: Nameplates.
  - N. Valves: Tags and ceiling tacks where located above lay-in ceiling.
  - O. Water Treatment Devices: Nameplates.
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**2.02 NAMEPLATES**

- A. Manufacturers:
  - 1. Advanced Graphic Engraving, LLC: [www.advancedgraphicengraving.com/#sle](http://www.advancedgraphicengraving.com/#sle).
  - 2. Brimar Industries, Inc: [www.pipemarker.com/#sle](http://www.pipemarker.com/#sle).
  - 3. Craftmark Pipe Markers: [www.craftmarkid.com/#sle](http://www.craftmarkid.com/#sle).
  - 4. Kolbi Pipe Marker Co: [www.kolbipipemarkers.com/#sle](http://www.kolbipipemarkers.com/#sle).
  - 5. Seton Identification Products, a Tricor Direct Company: [www.seton.com/#sle](http://www.seton.com/#sle).
- B. Letter Color: White.
- C. Letter Height: 1/4 inch.
- D. Background Color: Black.
- E. Plastic: Comply with ASTM D709.

**2.03 TAGS**

- A. Manufacturers:
  - 1. Advanced Graphic Engraving: [www.advancedgraphicengraving.com/#sle](http://www.advancedgraphicengraving.com/#sle).
  - 2. Brady Corporation: [www.bradycorp.com/#sle](http://www.bradycorp.com/#sle).
  - 3. Brimar Industries, Inc: [www.pipemarker.com/#sle](http://www.pipemarker.com/#sle).
  - 4. Craftmark Pipe Markers: [www.craftmarkid.com/#sle](http://www.craftmarkid.com/#sle).
  - 5. Kolbi Pipe Marker Co: [www.kolbipipemarkers.com/#sle](http://www.kolbipipemarkers.com/#sle).
  - 6. Seton Identification Products, a Tricor Company: [www.seton.com/#sle](http://www.seton.com/#sle).
- B. Plastic Tags: Laminated three-layer plastic with engraved black letters on light contrasting background color. Tag size minimum 1-1/2 inch diameter.
- C. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.
- D. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

**2.04 ADHESIVE-BACKED DUCT MARKERS**

- A. Manufacturers:
  - 1. Brimar Industries, Inc: [www.pipemarker.com/#sle](http://www.pipemarker.com/#sle).
  - 2. Craftmark Pipe Markers: [www.craftmarkid.com/#sle](http://www.craftmarkid.com/#sle).
  - 3. Seton Identification Products, a Tricor Company: [www.seton.com/#sle](http://www.seton.com/#sle).
- B. Material: High gloss acrylic adhesive-backed vinyl film 0.0032 inch; printed with UV and chemical resistant inks.
- C. Style: Individual Label.
- D. Color: Green/White Green/White.

**2.05 STENCILS**

- A. Manufacturers:
  - 1. Brady Corporation: [www.bradycorp.com/#sle](http://www.bradycorp.com/#sle).
  - 2. Craftmark Pipe Markers: [www.craftmarkid.com/#sle](http://www.craftmarkid.com/#sle).
  - 3. Insite Solutions, LLC: [www.stop-painting.com/#sle](http://www.stop-painting.com/#sle).
  - 4. Kolbi Pipe Marker Co: [www.kolbipipemarkers.com/#sle](http://www.kolbipipemarkers.com/#sle).
  - 5. Seton Identification Products, a Tricor Company: [www.seton.com/#sle](http://www.seton.com/#sle).
- B. Stencils: With clean cut symbols and letters of following size:
  - 1. 3/4 to 1-1/4 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 1/2 inch high letters.
  - 2. 1-1/2 to 2 inch Outside Diameter of Insulation or Pipe: 8 inch long color field, 3/4 inch high letters.

3. 2-1/2 to 6 inch Outside Diameter of Insulation or Pipe: 12 inch long color field, 1-1/4 inch high letters.
  4. 8 to 10 inch Outside Diameter of Insulation or Pipe: 24 inch long color field, 2-1/2 inch high letters.
  5. Over 10 inch Outside Diameter of Insulation or Pipe: 32 inch long color field, 3-1/2 inch high letters.
  6. Ductwork and Equipment: 2-1/2 inch high letters.
- C. Stencil Paint: As specified in Section 099123, semi-gloss enamel, colors complying with ASME A13.1.

## 2.06 PIPE MARKERS

- A. Manufacturers:
1. Brady Corporation: [www.bradycorp.com/#sle](http://www.bradycorp.com/#sle).
  2. Brimar Industries, Inc: [www.pipemarker.com/#sle](http://www.pipemarker.com/#sle).
  3. Craftmark Pipe Markers: [www.craftmarkid.com/#sle](http://www.craftmarkid.com/#sle).
  4. Kolbi Pipe Marker Co: [www.kolbipipemarkers.com/#sle](http://www.kolbipipemarkers.com/#sle).
  5. Seton Identification Products, a Tricor Company: [www.seton.com/#sle](http://www.seton.com/#sle).
- B. Color: Comply with ASME A13.1.
- C. Plastic Pipe Markers: Factory fabricated, flexible, semi- rigid plastic, preformed to fit around pipe or pipe covering; minimum information indicating flow direction arrow and identification of fluid being conveyed.
- D. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.
- E. Color code as follows:
1. Heating, Cooling, and Boiler Feedwater: Green with white letters.

## 2.07 CEILING TACKS

- A. Manufacturers:
1. Craftmark Pipe Markers; \_\_\_\_\_: [www.craftmarkid.com/#sle](http://www.craftmarkid.com/#sle).
- B. Description: Steel with 3/4 inch diameter color coded head.
- C. Color code as follows:
1. HVAC Equipment: Yellow.
  2. Fire Dampers and Smoke Dampers: Red.
  3. Heating/Cooling Valves: Blue.

## PART 3 EXECUTION

### 3.01 PREPARATION

- A. Degrease and clean surfaces to receive adhesive for identification materials.
- B. Prepare surfaces in accordance with Section 099123 for stencil painting.

### 3.02 INSTALLATION

- A. Install nameplates with corrosive-resistant mechanical fasteners, or adhesive. Apply with sufficient adhesive to ensure permanent adhesion and seal with clear lacquer.
- B. Install tags with corrosion resistant chain.
- C. Apply stencil painting in accordance with Section 099123.
- D. Install plastic pipe markers in accordance with manufacturer's instructions.
- E. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.
- F. Use tags on piping 3/4 inch diameter and smaller.

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1. Identify service, flow direction, and pressure.
  2. Install in clear view and align with axis of piping.
  3. Locate identification not to exceed 20 feet on straight runs including risers and drops, adjacent to each valve and Tee, at each side of penetration of structure or enclosure, and at each obstruction.
- G. Install ductwork with adhesive-backed duct markers. Identify with air handling unit identification number and area served. Locate identification at air handling unit, at each side of penetration of structure or enclosure, and at each obstruction.
- H. Locate ceiling tacks to locate dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

**END OF SECTION 230553**

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**SECTION 230593**  
**TESTING, ADJUSTING, AND BALANCING FOR HVAC****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Testing, adjustment, and balancing of air systems.
- B. Testing, adjustment, and balancing of hydronic and refrigerating systems.
- C. Measurement of final operating condition of HVAC systems.

**1.02 RELATED REQUIREMENTS**

- A. Section 019113 - General Commissioning Requirements: Commissioning requirements that apply to all types of work.
- B. Section 230800 - Commissioning of HVAC.

**1.03 REFERENCE STANDARDS**

- A. AABC (NSTSB) - AABC National Standards for Total System Balance, 7th Edition 2016.
- B. ASHRAE Std 111 - Measurement, Testing, Adjusting, and Balancing of Building HVAC Systems 2008, with Errata (2019).
- C. NEBB (TAB) - Procedural Standard for Testing Adjusting and Balancing of Environmental Systems 2019.
- D. SMACNA (TAB) - HVAC Systems Testing, Adjusting and Balancing 2002.

**1.04 SUBMITTALS**

- A. See Section 013300 - Submittal Procedures, for submittal procedures.
  - B. Installer Qualifications: Submit name of adjusting and balancing agency and TAB supervisor for approval within 30 days after award of Contract.
  - C. TAB Plan: Submit a written plan indicating the testing, adjusting, and balancing standard to be followed and the specific approach for each system and component.
    - 1. Submit to Architect/Engineer.
    - 2. Include at least the following in the plan:
      - a. List of all air flow, water flow, sound level, system capacity and efficiency measurements to be performed and a description of specific test procedures, parameters, formulas to be used.
      - b. Copy of field checkout sheets and logs to be used, listing each piece of equipment to be tested, adjusted and balanced with the data cells to be gathered for each.
      - c. Identification and types of measurement instruments to be used and their most recent calibration date.
      - d. Final test report forms to be used.
      - e. Procedures for formal deficiency reports, including scope, frequency and distribution.
  - D. Final Report: Indicate deficiencies in systems that would prevent proper testing, adjusting, and balancing of systems and equipment to achieve specified performance.
    - 1. Revise TAB plan to reflect actual procedures and submit as part of final report.
    - 2. Submit draft copies of report for review prior to final acceptance of Project. Provide final copies for Architect/Engineer and for inclusion in operating and maintenance manuals.
    - 3. Include actual instrument list, with manufacturer name, serial number, and date of calibration.
    - 4. Form of Test Reports: Where the TAB standard being followed recommends a report format use that; otherwise, follow ASHRAE Std 111.
    - 5. Units of Measure: Report data in I-P (inch-pound) units only.
    - 6. Include the following on the title page of each report:
      - a. Name of Testing, Adjusting, and Balancing Agency.
-

- b. Address of Testing, Adjusting, and Balancing Agency.
- c. Telephone number of Testing, Adjusting, and Balancing Agency.
- d. Project name.
- e. Project location.
- f. Project Architect/Engineer.
- g. Project Engineer.
- h. Project Contractor.
- i. Report date.

**PART 2 PRODUCTS - NOT USED****PART 3 EXECUTION****3.01 GENERAL REQUIREMENTS**

- A. Perform total system balance in accordance with one of the following:
  - 1. AABC (NSTSB), AABC National Standards for Total System Balance.
  - 2. ASHRAE Std 111, Practices for Measurement, Testing, Adjusting and Balancing of Building Heating, Ventilation, Air-Conditioning, and Refrigeration Systems.
  - 3. SMACNA (TAB).
- B. Begin work after completion of systems to be tested, adjusted, or balanced and complete work prior to Substantial Completion of the project.
- C. Where HVAC systems and/or components interface with life safety systems, including fire and smoke detection, alarm, and control, coordinate scheduling and testing and inspection procedures with the authorities having jurisdiction.
- D. TAB Agency Qualifications:
  - 1. Company specializing in the testing, adjusting, and balancing of systems specified in this section.
  - 2. Certified by one of the following:
    - a. AABC, Associated Air Balance Council: [www.aabc.com/#sle](http://www.aabc.com/#sle); upon completion submit AABC National Performance Guaranty.
    - b. NEBB, National Environmental Balancing Bureau: [www.nebb.org/#sle](http://www.nebb.org/#sle).
    - c. TABB, The Testing, Adjusting, and Balancing Bureau of National Energy Management Institute: [www.tabbcertified.org/#sle](http://www.tabbcertified.org/#sle).
- E. TAB Supervisor and Technician Qualifications: Certified by same organization as TAB agency.

**3.02 EXAMINATION**

- A. Verify that systems are complete and operable before commencing work. Ensure the following conditions:
  - 1. Systems are started and operating in a safe and normal condition.
  - 2. Temperature control systems are installed complete and operable.
  - 3. Final filters are clean and in place. If required, install temporary media in addition to final filters.
  - 4. Duct systems are clean of debris.
  - 5. Fans are rotating correctly.
  - 6. Fire and volume dampers are in place and open.
  - 7. Air coil fins are cleaned and combed.
  - 8. Access doors are closed and duct end caps are in place.
  - 9. Air outlets are installed and connected.
  - 10. Duct system leakage is minimized.
  - 11. Hydronic systems are flushed, filled, and vented.
  - 12. Pumps are rotating correctly.
  - 13. Service and balance valves are open.

- B. Submit field reports. Report defects and deficiencies that will or could prevent proper system balance.
- C. Beginning of work means acceptance of existing conditions.

### **3.03 PREPARATION**

- A. Provide instruments required for testing, adjusting, and balancing operations.
- B. Provide additional balancing devices as required.

### **3.04 ADJUSTMENT TOLERANCES**

- A. Air Handling Systems: Adjust to within plus or minus 5 percent of design for supply systems and plus or minus 10 percent of design for return and exhaust systems.
- B. Air Outlets and Inlets: Adjust total to within plus 10 percent and minus 5 percent of design to space. Adjust outlets and inlets in space to within plus or minus 10 percent of design.
- C. Hydronic Systems: Adjust to within plus or minus 10 percent of design.

### **3.05 RECORDING AND ADJUSTING**

- A. Field Logs: Maintain written logs including:
  - 1. Running log of events and issues.
  - 2. Discrepancies, deficient or uncompleted work by others.
  - 3. Contract interpretation requests.
  - 4. Lists of completed tests.
- B. Ensure recorded data represents actual measured or observed conditions.
- C. Permanently mark settings of valves, dampers, and other adjustment devices allowing settings to be restored. Set and lock memory stops.
- D. After adjustment, take measurements to verify balance has not been disrupted or that such disruption has been rectified.
- E. Leave systems in proper working order, replacing belt guards, closing access doors, closing doors to electrical switch boxes, and restoring thermostats to specified settings.
- F. Check and adjust systems approximately six months after final acceptance and submit report.

### **3.06 AIR SYSTEM PROCEDURE**

- A. Adjust air handling and distribution systems to provide required or design supply, return, and exhaust air quantities.
- B. Make air quantity measurements in ducts by Pitot tube traverse of entire cross sectional area of duct.
- C. Measure air quantities at air inlets and outlets.
- D. Use volume control devices to regulate air quantities only to extend that adjustments do not create objectionable air motion or sound levels. Effect volume control by duct internal devices such as dampers and splitters.
- E. Vary total system air quantities by adjustment of fan speeds. Provide drive changes required. Vary branch air quantities by damper regulation.
- F. Measure static air pressure conditions on air supply units, including filter and coil pressure drops, and total pressure across the fan. Make allowances for 50 percent loading of filters.
- G. Adjust outside air automatic dampers, outside air, return air, and exhaust dampers for design conditions.
- H. Measure temperature conditions across outside air, return air, and exhaust dampers to check leakage.

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- I. Where modulating dampers are provided, take measurements and balance at extreme conditions.

### **3.07 WATER SYSTEM PROCEDURE**

- A. Adjust water systems to provide required or design quantities.
- B. Use calibrated Venturi tubes, orifices, or other metered fittings and pressure gauges to determine flow rates for system balance. Where flow metering devices are not installed, base flow balance on temperature difference across various heat transfer elements in the system.
- C. Adjust systems to provide specified pressure drops and flows through heat transfer elements prior to thermal testing. Perform balancing by measurement of temperature differential in conjunction with air balancing.
- D. Effect system balance with automatic control valves fully open to heat transfer elements.
- E. Effect adjustment of water distribution systems by means of balancing cocks, valves, and fittings. Do not use service or shut-off valves for balancing unless indexed for balance point.
- F. Where available pump capacity is less than total flow requirements or individual system parts, full flow in one part may be simulated by temporary restriction of flow to other parts.

### **3.08 SCOPE**

- A. Test, adjust, and balance the following:
  - 1. HVAC Pumps.
  - 2. Air Coils.
  - 3. Fans.
  - 4. Air Inlets and Outlets.

### **3.09 MINIMUM DATA TO BE REPORTED**

- A. Electric Motors:
    - 1. Manufacturer.
    - 2. Model/Frame.
    - 3. HP/BHP.
    - 4. Phase, voltage, amperage; nameplate, actual, no load.
    - 5. RPM.
    - 6. Service factor.
    - 7. Starter size, rating, heater elements.
    - 8. Sheave Make/Size/Bore.
  - B. V-Belt Drives:
    - 1. Identification/location.
    - 2. Required driven RPM.
    - 3. Driven sheave, diameter and RPM.
    - 4. Belt, size and quantity.
    - 5. Motor sheave diameter and RPM.
    - 6. Center to center distance, maximum, minimum, and actual.
  - C. Pumps:
    - 1. Identification/number.
    - 2. Manufacturer.
    - 3. Size/model.
    - 4. Impeller.
    - 5. Service.
    - 6. Design flow rate, pressure drop, BHP.
    - 7. Actual flow rate, pressure drop, BHP.
    - 8. Discharge pressure.
    - 9. Suction pressure.
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10. Total operating head pressure.
  11. Shut off, discharge and suction pressures.
  12. Shut off, total head pressure.
- D. Combustion Equipment:
1. Boiler manufacturer.
  2. Model number.
  3. Serial number.
  4. Firing rate.
  5. Overfire draft.
  6. Gas meter timing dial size.
  7. Gas meter time per revolution.
  8. Gas pressure at meter outlet.
  9. Gas flow rate.
  10. Heat input.
  11. Burner manifold gas pressure.
  12. Percent carbon monoxide (CO).
  13. Percent carbon dioxide (CO<sub>2</sub>).
  14. Percent oxygen (O<sub>2</sub>).
  15. Percent excess air.
  16. Flue gas temperature at outlet.
  17. Ambient temperature.
  18. Net stack temperature.
  19. Percent stack loss.
  20. Percent combustion efficiency.
  21. Heat output.
- E. Cooling Coils:
1. Identification/number.
  2. Location.
  3. Service.
  4. Manufacturer.
  5. Air flow, design and actual.
  6. Entering air DB temperature, design and actual.
  7. Leaving air DB temperature, design and actual.
  8. Water flow, design and actual.
  9. Water pressure drop, design and actual.
  10. Entering water temperature, design and actual.
  11. Leaving water temperature, design and actual.
  12. Air pressure drop, design and actual.
- F. Heating Coils:
1. Identification/number.
  2. Location.
  3. Service.
  4. Manufacturer.
  5. Air flow, design and actual.
  6. Water flow, design and actual.
  7. Water pressure drop, design and actual.
  8. Entering water temperature, design and actual.
  9. Leaving water temperature, design and actual.
  10. Entering air temperature, design and actual.
  11. Leaving air temperature, design and actual.
  12. Air pressure drop, design and actual.
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G. Air Moving Equipment:

1. Location.
2. Manufacturer.
3. Model number.
4. Serial number.
5. Arrangement/Class/Discharge.
6. Air flow, specified and actual.
7. Return air flow, specified and actual.
8. Outside air flow, specified and actual.
9. Total static pressure (total external), specified and actual.
10. Inlet pressure.
11. Discharge pressure.
12. Sheave Make/Size/Bore.
13. Number of Belts/Make/Size.
14. Fan RPM.

H. Return Air/Outside Air:

1. Identification/location.
2. Design air flow.
3. Actual air flow.
4. Design return air flow.
5. Actual return air flow.
6. Design outside air flow.
7. Actual outside air flow.
8. Return air temperature.
9. Outside air temperature.
10. Required mixed air temperature.
11. Actual mixed air temperature.
12. Design outside/return air ratio.
13. Actual outside/return air ratio.

I. Exhaust Fans:

1. Location.
2. Manufacturer.
3. Model number.
4. Serial number.
5. Air flow, specified and actual.
6. Total static pressure (total external), specified and actual.
7. Inlet pressure.
8. Discharge pressure.
9. Sheave Make/Size/Bore.
10. Number of Belts/Make/Size.
11. Fan RPM.

J. Duct Traverses:

1. System zone/branch.
  2. Duct size.
  3. Area.
  4. Design velocity.
  5. Design air flow.
  6. Test velocity.
  7. Test air flow.
  8. Duct static pressure.
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- K. Flow Measuring Stations:
  - 1. Identification/number.
  - 2. Location.
  - 3. Size.
  - 4. Manufacturer.
  - 5. Model number.
  - 6. Serial number.
  - 7. Design Flow rate.
  - 8. Design pressure drop.
  - 9. Actual/final pressure drop.
  - 10. Actual/final flow rate.
  - 11. Station calibrated setting.
- L. Air Distribution Tests:
  - 1. Air terminal number.
  - 2. Room number/location.
  - 3. Terminal type.
  - 4. Terminal size.
  - 5. Area factor.
  - 6. Design velocity.
  - 7. Design air flow.
  - 8. Test (final) velocity.
  - 9. Test (final) air flow.
  - 10. Percent of design air flow.

**END OF SECTION 230593**

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**SECTION 230716  
HVAC EQUIPMENT INSULATION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Equipment insulation.
- B. Flexible removable and reusable blanket insulation.
- C. Covering.

**1.02 RELATED REQUIREMENTS**

- A. Section 232114 - Hydronic Specialties.

**1.03 REFERENCE STANDARDS**

- A. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2014.
- B. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric) 2014.
- C. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus 2019, with Editorial Revision (2023).
- D. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus 2021.
- E. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form 2023.
- F. ASTM C552 - Standard Specification for Cellular Glass Thermal Insulation 2022.
- G. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications 2013 (Reapproved 2019).
- H. ASTM C592 - Standard Specification for Mineral Fiber Blanket Insulation and Blanket-Type Pipe Insulation (Metal-Mesh Covered) (Industrial Type) 2022a.
- I. ASTM C612 - Standard Specification for Mineral Fiber Block and Board Thermal Insulation 2014 (Reapproved 2019).
- J. ASTM C1695 - Standard Specification for Fabrication of Flexible Removable and Reusable Blanket Insulation for Hot Service 2022.
- K. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023.
- L. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials 2022a, with Editorial Revision (2023).
- M. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

**1.04 SUBMITTALS**

- A. See Section 013300 - Submittal Procedures, for submittal procedures.
- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for equipment scheduled.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Accept materials on site in original factory packaging, labeled with manufacturer's identification, including product density and thickness.
- B. Protect insulation from weather and construction traffic, dirt, water, chemical, and mechanical damage, by storing in original wrapping.

## **1.06 FIELD CONDITIONS**

- A. Maintain ambient temperatures and conditions required by manufacturers of adhesives, mastics, and insulation cements.
- B. Maintain temperature during and after installation for minimum period of 24 hours.

## **PART 2 PRODUCTS**

### **2.01 REGULATORY REQUIREMENTS**

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

### **2.02 GLASS FIBER, FLEXIBLE**

- A. Manufacturers:
  - 1. CertainTeed Corporation: [www.certainteed.com/#sle](http://www.certainteed.com/#sle).
  - 2. Johns Manville Corporation: [www.jm.com/#sle](http://www.jm.com/#sle).
  - 3. Knauf Insulation; Atmosphere Duct Wrap: [www.knaufinsulation.com/#sle](http://www.knaufinsulation.com/#sle).
  - 4. Owens Corning Corporation: [www.ocbuildingspec.com/#sle](http://www.ocbuildingspec.com/#sle).
- B. Insulation: ASTM C553; flexible, noncombustible.
  - 1. K Value: 0.36 at 75 degrees F, when tested in accordance with ASTM C177 or ASTM C518.
  - 2. Maximum Service Temperature: 450 degrees F.
  - 3. Maximum Water Vapor Absorption: 5.0 percent by weight.
- C. Vapor Barrier Jacket: Kraft paper reinforced with glass fiber yarn and bonded to aluminized film.
  - 1. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
  - 2. Secure with self-sealing longitudinal laps and butt strips.
- D. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.
- E. Vapor Barrier Lap Adhesive: Compatible with insulation.

### **2.03 FLEXIBLE REMOVABLE AND REUSABLE BLANKET INSULATION**

- A. Insulation: ASTM C553 Type V; flexible, noncombustible.
  - 1. Comply with ASTM C1695.
  - 2. K Value: 0.37 at 100 degrees F, when tested in accordance with ASTM C177 or ASTM C518.
  - 3. Minimum Service Temperature: 32 degrees F.
  - 4. Maximum Service Temperature: 500 degrees F.
  - 5. Maximum Water Vapor Absorption: Less than 5.0 percent by weight.
  - 6. Weight: 7.65 oz per sq ft.
  - 7. Effective Thickness: 1.25 plus/minus 0.25 inch.

### **2.04 GLASS FIBER, RIGID**

- A. Manufacturer:
    - 1. CertainTeed Corporation: [www.certainteed.com/#sle](http://www.certainteed.com/#sle).
    - 2. Johns Manville Corporation: [www.jm.com/#sle](http://www.jm.com/#sle).
    - 3. Knauf Insulation; Earthwool Insulation Board: [www.knaufinsulation.com/#sle](http://www.knaufinsulation.com/#sle).
    - 4. Owens Corning Corporation: [www.ocbuildingspec.com/#sle](http://www.ocbuildingspec.com/#sle).
  - B. Insulation: ASTM C612 or ASTM C592; rigid, noncombustible.
    - 1. K Value: 0.25 at 75 degrees F, when tested in accordance with ASTM C177 or ASTM C518.
    - 2. Maximum Service Temperature: 850 degrees F.
    - 3. Maximum Water Vapor Absorption: 5.0 percent by weight.
    - 4. Maximum Density: 8.0 lb/cu ft.
-

- C. Vapor Barrier Jacket:
  - 1. Kraft paper reinforced with glass fiber yarn and bonded to aluminized film.
  - 2. Secure with self-sealing longitudinal laps and butt strips.
- D. Facing: 1 inch galvanized steel hexagonal wire mesh stitched on one face of insulation.
- E. Vapor Barrier Lap Adhesive: Compatible with insulation.

## **2.05 CELLULAR GLASS**

- A. Pipe and Tubing Insulation: ASTM C552, Type II, Grade 6.
  - 1. K Value: 0.35 at 100 degrees F.
  - 2. Service Temperature Range: From 250 degrees F to 800 degrees F.
  - 3. Water Vapor Permeability: 0.005 perm inch maximum per inch.
  - 4. Water Absorption: 0.5 percent by volume, maximum.
  - 5. Density: At least 6.12 lb/cu ft.
- B. Block Insulation: ASTM C552, Type I, Grade 6.
  - 1. K Value: 0.35 at 100 degrees F.
  - 2. Service Temperature: 800 degrees F, maximum.
  - 3. Water Vapor Permeability: 0.005 perm inch maximum per inch.
  - 4. Water Absorption: 0.5 percent by volume, maximum.
  - 5. Density: At least 6.12 lb/cu ft.

## **2.06 FLEXIBLE ELASTOMERIC CELLULAR INSULATION**

- A. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1, in sheet form.
  - 1. Minimum Service Temperature: Minus 40 degrees F.
  - 2. Maximum Service Temperature: 220 degrees F.
  - 3. Connection: Waterproof vapor barrier adhesive.
- B. Elastomeric Foam Adhesive: Air dried, contact adhesive, compatible with insulation.

## **2.07 JACKETS**

- A. PVC Plastic:
  - 1. Jacket: Sheet material, off-white color.
    - a. Minimum Service Temperature: Minus 40 degrees F.
    - b. Maximum Service Temperature: 150 degrees F.
    - c. Moisture Vapor Permeability: 0.02 perm inch, when tested in accordance with ASTM E96/E96M.
    - d. Thickness: 10 mil.
    - e. Connections: Brush on welding adhesive.
  - 2. Covering Adhesive Mastic: Compatible with insulation.
- B. Aluminum Jacket: ASTM B209 (ASTM B209M) formed aluminum sheet.
  - 1. Thickness: 0.016 inch sheet.
  - 2. Finish: Smooth.
  - 3. Joining: Longitudinal slip joints and 2 inch laps.
  - 4. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that equipment has been tested before applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

### **3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Factory Insulated Equipment: Do not insulate.

- C. Exposed Equipment: Locate insulation and cover seams in least visible locations.
- D. Apply insulation close to equipment by grooving, scoring, and beveling insulation. Fasten insulation to equipment with studs, pins, clips, adhesive, wires, or bands.
- E. Fill joints, cracks, seams, and depressions with bedding compound to form smooth surface. On cold equipment, use vapor barrier cement.
- F. Insulated equipment containing fluids below ambient temperature; insulate entire system.
- G. Fiber glass insulated equipment containing fluids below ambient temperature; provide vapor barrier jackets, factory-applied or field-applied. Finish with glass cloth and vapor barrier adhesive.
- H. For hot equipment containing fluids 140 degrees F or less, do not insulate flanges and unions, but bevel and seal ends of insulation.
- I. For hot equipment containing fluids over 140 degrees F, insulate flanges and unions with removable sections and jackets.
- J. Fiber glass insulated equipment containing fluids above ambient temperature; provide standard jackets, with or without vapor barrier, factory-applied or field-applied. Finish with glass cloth and adhesive.
- K. Inserts and Shields:
  - 1. Application: Equipment 1-1/2 inches diameter or larger.
  - 2. Shields: Galvanized steel between hangers and inserts.
  - 3. Insert Location: Between support shield and equipment and under the finish jacket.
  - 4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
  - 5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.
- L. Finish insulation at supports, protrusions, and interruptions.
- M. Equipment in Mechanical Equipment Rooms or Finished Spaces: Finish with canvas jacket sized for finish painting.
- N. Cover glass fiber insulation with metal mesh and finish with heavy coat of insulating cement.
- O. Nameplates and ASME Stamps: Bevel and seal insulation around; do not insulate over.
- P. Equipment Requiring Access for Maintenance, Repair, or Cleaning: Install insulation so it can be easily removed and replaced without damage.

### 3.03 SCHEDULE

- A. Heating Systems:
  - 1. Pump Bodies:
    - a. Flexible Removable and Reusable Blanket Insulation, 2 inches thick.
  - 2. Air Separators:
    - a. Flexible Removable and Reusable Blanket Insulation, 2 inches thick.
  - 3. Expansion Tanks:
    - a. Flexible Removable and Reusable Blanket Insulation, 2 inches thick.

**END OF SECTION 230716**



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**SECTION 230719  
HVAC PIPING INSULATION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Piping insulation.
- B. Flexible removable and reusable blanket insulation.
- C. Jackets and accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 078400 - Firestopping.
- B. Section 232113 - Hydronic Piping: Placement of hangers and hanger inserts.
- C. Section 232300 - Refrigerant Piping: Placement of inserts.

**1.03 REFERENCE STANDARDS**

- A. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2023.
- B. ASTM B117 - Standard Practice for Operating Salt Spray (Fog) Apparatus 2019.
- C. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2014.
- D. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric) 2014.
- E. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus 2019, with Editorial Revision (2023).
- F. ASTM C195 - Standard Specification for Mineral Fiber Thermal Insulating Cement 2007 (Reapproved 2019).
- G. ASTM C449 - Standard Specification for Mineral Fiber Hydraulic-Setting Thermal Insulating and Finishing Cement 2007 (Reapproved 2019).
- H. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form 2023.
- I. ASTM C547 - Standard Specification for Mineral Fiber Pipe Insulation 2022a.
- J. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation 2022.
- K. ASTM C591 - Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation 2022.
- L. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel 2008 (Reapproved 2018).
- M. ASTM C1136 - Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation 2023.
- N. ASTM D610 - Standard Practice for Evaluating Degree of Rusting on Painted Steel Surfaces 2008 (Reapproved 2019).
- O. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023.
- P. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials 2022a, with Editorial Revision (2023).

**1.04 SUBMITTALS**

- A. See Section 013300 - Submittal Procedures, for submittal procedures.

- B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

### **1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years of documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified in this section with minimum 5 years of experience.

### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Accept materials on site, labeled with manufacturer's identification, product density, and thickness.

### **1.07 FIELD CONDITIONS**

- A. Maintain ambient conditions required by manufacturers of each product.
- B. Maintain temperature before, during, and after installation for minimum of 24 hours.

## **PART 2 PRODUCTS**

### **2.01 REGULATORY REQUIREMENTS**

- A. Surface Burning Characteristics: Flame spread index/Smoke developed index of 25/50, maximum, when tested in accordance with ASTM E84 or UL 723.

### **2.02 GLASS FIBER, RIGID**

- A. Manufacturers:
  - 1. CertainTeed Corporation; \_\_\_\_\_: [www.certainteed.com/#sle](http://www.certainteed.com/#sle).
  - 2. Johns Manville Corporation; \_\_\_\_\_: [www.jm.com/#sle](http://www.jm.com/#sle).
  - 3. Knauf Insulation; Earthwool 1000 Degree Pipe Insulation: [www.knaufinsulation.com/#sle](http://www.knaufinsulation.com/#sle).
  - 4. Owens Corning Corporation; Fiberglas Pipe Insulation ASJ: [www.ocbuildingspec.com/#sle](http://www.ocbuildingspec.com/#sle).
  - 5. Owens Corning Corporation; VaporWick Pipe Insulation: [www.ocbuildingspec.com/#sle](http://www.ocbuildingspec.com/#sle).
  - 6. Substitutions: See Section 016000 - Product Requirements.
- B. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible.
  - 1. K Value: ASTM C177, 0.24 at 75 degrees F.
  - 2. Maximum Service Temperature: 850 degrees F.
  - 3. Maximum Moisture Absorption: 0.2 percent by volume.
- C. Insulation: ASTM C547 and ASTM C795; rigid molded, noncombustible, with wicking material to transport condensed water to the outside of the system for evaporation to the atmosphere.
  - 1. K Value: ASTM C177, 0.23 at 75 degrees F.
  - 2. Maximum Service Temperature: 220 degrees F.
  - 3. Maximum Moisture Absorption: 0.2 percent by volume.
- D. Insulation: ASTM C547 and ASTM C795; semi-rigid, noncombustible, end grain adhered to jacket.
  - 1. K Value: ASTM C177, 0.24 at 75 degrees F.
  - 2. Maximum Service Temperature: 650 degrees F.
  - 3. Maximum Moisture Absorption: 0.2 percent by volume.
- E. Vapor Barrier Jacket: White kraft paper with glass fiber yarn, bonded to aluminized film; moisture vapor transmission when tested in accordance with ASTM E96/E96M of 0.02 perm-inches.
- F. Tie Wire: 0.048 inch stainless steel with twisted ends on maximum 12 inch centers.
- G. Vapor Barrier Lap Adhesive: Compatible with insulation.
- H. Insulating Cement/Mastic: ASTM C195; hydraulic setting on mineral wool.

- I. Fibrous Glass Fabric:
  - 1. Cloth: Untreated; 9 oz/sq yd weight.
  - 2. Blanket: 1.0 lb/cu ft density.
  - 3. Weave: 5 by 5.
- J. Indoor Vapor Barrier Finish:
  - 1. Cloth: Untreated; 9 oz/sq yd weight.
  - 2. Vinyl emulsion type acrylic, compatible with insulation, black color.
- K. Outdoor Vapor Barrier Mastic: Vinyl emulsion type acrylic or mastic, compatible with insulation, black color.
- L. Insulating Cement: ASTM C449.

## **2.03 FLEXIBLE ELASTOMERIC CELLULAR INSULATION**

- A. Insulation: Preformed flexible elastomeric cellular rubber insulation complying with ASTM C534/C534M Grade 1; use molded tubular material wherever possible.
  - 1. Minimum Service Temperature: Minus 40 degrees F.
  - 2. Maximum Service Temperature: 180 degrees F.
  - 3. Connection: Waterproof vapor barrier adhesive.
- B. Comply with ASTM E84.
- C. Insulation: ASTM C578; rigid closed cell.
  - 1. K Value: 0.23 at 75 degrees F.
  - 2. Maximum Service Temperature: 165 degrees F.
  - 3. Maximum Water Vapor Permeance: 5.0 perms.
- D. Billet Dimensions: 7 inches by 14 inches by 108 inches.
- E. Density: Type X, 1.30 pcf (21 kg/cu m), minimum.
- F. Water Absorption: Type X, 0.3 percent by volume, maximum, by total immersion.

## **2.04 JACKETS**

- A. PVC Plastic.
  - 1. Manufacturers:
    - a. Johns Manville Corporation; \_\_\_\_\_: [www.jm.com/#sle](http://www.jm.com/#sle).
    - b. Substitutions: See Section 016000 - Product Requirements.
  - 2. Jacket: One piece molded type fitting covers and sheet material, off-white color.
    - a. Minimum Service Temperature: 0 degrees F.
    - b. Maximum Service Temperature: 150 degrees F.
    - c. Moisture Vapor Permeability: 0.002 perm inch, maximum, when tested in accordance with ASTM E96/E96M.
    - d. Thickness: 10 mil.
    - e. Connections: Brush on welding adhesive.
  - 3. Covering Adhesive Mastic: Compatible with insulation.
- B. Aluminum Jacket: ASTM B209 (ASTM B209M) formed aluminum sheet.
  - 1. Thickness: 0.016 inch sheet.
  - 2. Finish: Smooth.
  - 3. Joining: Longitudinal slip joints and 2 inch laps.
  - 4. Fittings: 0.016 inch thick die shaped fitting covers with factory attached protective liner.
  - 5. Metal Jacket Bands: 3/8 inch wide; 0.015 inch thick aluminum.
- C. Stainless Steel Jacket: ASTM A666, Type 304 stainless steel.
  - 1. Thickness: 0.010 inch.
  - 2. Finish: Smooth.
  - 3. Metal Jacket Bands: 3/8 inch wide; 0.010 inch thick stainless steel.
- D. Vapor Barrier Membranes: ASTM C1136, Type IX.

1. Multilayer Laminate Vapor Barrier:
  - a. Provide multilayer laminate with 1.0 mil foil, reversible.
  - b. Thickness: 2.4 mil.
  - c. Moisture Vapor Permeability: 0.00 perm inch, when tested in accordance with ASTM E96/E96M.
  - d. Manufacturers:
    - 1) Polyguard Products; ZERO-PERM: [www.polyguardproducts.com/#sle](http://www.polyguardproducts.com/#sle).
    - 2) Substitutions: See Section 016000 - Product Requirements.

## **2.05 ACCESSORIES**

- A. General Requirements:
  1. Provide required accessories in accordance with and subject to the recommendations of the insulation manufacturer.
  2. Furnish compatible materials which do not contribute to corrosion, soften, or otherwise attack surfaces to which applied, in either the wet or dry state.
  3. Comply with ASTM C795 requirements for materials to be used on stainless steel surfaces.
  4. Supply materials that are asbestos free.
- B. Corrosion Inhibitors:
  1. Corrosion Control Gel:
    - a. Manufacturers:
      - 1) Polyguard Products; RG2400LT: [www.polyguardproducts.com/#sle](http://www.polyguardproducts.com/#sle).
      - 2) Substitutions: See Section 016000 - Product Requirements.
    - b. Corrosion Protection: Comply with ASTM B117 and ASTM D610.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Test piping for design pressure, liquid tightness, and continuity prior to applying insulation materials.
- B. Verify that surfaces are clean and dry, with foreign material removed.

### **3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NAIMA National Insulation Standards.
- C. Exposed Piping: Locate insulation and cover seams in least visible locations.
- D. Insulated Pipes Conveying Fluids Below Ambient Temperature:
  1. Insulate entire system, including fittings, valves, unions, flanges, strainers, flexible connections, pump bodies, and expansion joints.
- E. Glass Fiber Insulated Pipes Conveying Fluids Below Ambient Temperature:
  1. Provide vapor barrier jackets, factory-applied or field-applied; secure with self-sealing longitudinal laps and butt strips with pressure sensitive adhesive. Secure with outward clinch expanding staples and vapor barrier mastic.
  2. Insulate fittings, joints, and valves with molded insulation of like material and thickness as adjacent pipe. Finish with glass cloth and vapor barrier adhesive or PVC fitting covers.
- F. For hot piping conveying fluids 140 degrees F or less, do not insulate flanges and unions at equipment, but bevel and seal ends of insulation.
- G. For hot piping conveying fluids over 140 degrees F, insulate flanges and unions at equipment.
- H. Glass Fiber Insulated Pipes Conveying Fluids Above Ambient Temperature:
  1. Provide standard jackets, with or without vapor barrier, factory-applied, or field-applied. Secure with self-sealing longitudinal laps and butt strips with pressure-sensitive adhesive. Secure with outward clinch expanding staples.

- 
2. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe. Finish with glass cloth and adhesive or PVC fitting covers.
  - I. Inserts and Shields:
    1. Application: Piping 1-1/2 inches diameter or larger.
    2. Shields: Galvanized steel between pipe hangers or pipe hanger rolls and inserts.
    3. Insert location: Between support shield and piping and under the finish jacket.
    4. Insert Configuration: Minimum 6 inches long, of same thickness and contour as adjoining insulation; may be factory fabricated.
    5. Insert Material: Hydrous calcium silicate insulation or other heavy density insulating material suitable for the planned temperature range.
  - J. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, see Section 078400.
  - K. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with PVC jacket and fitting covers.
  - L. Concealed Piping: Finish with fitting covers on flanges, fittings, valves, and specialties.
  - M. Exterior Applications: Provide vapor barrier jacket. Insulate fittings, joints, and valves with insulation of like material and thickness as adjoining pipe, and finish with glass mesh reinforced vapor barrier cement. Cover with aluminum jacket with seams located on bottom side of horizontal piping. Provide two coats of UV resistant finish for flexible elastomeric cellular insulation without jacketing.

### 3.03 SCHEDULE

- A. Heating Systems:
  1. Heating Water Supply and Return:
    - a. NPS 1-1/4 and Smaller: 1-1/2 inch thick Rigid Glass Fiber.
    - b. NPS 1-1/2 and Larger: 2 inch thick Rigid Glass Fiber.
  2. Boiler Feed Water:
    - a. NPS 1-1/4 and Smaller: 1 inch thick Rigid Glass Fiber.
    - b. NPS 1-1/2 and Larger: 1-1/2 inch thick Rigid Glass Fiber.
- B. Cooling Systems:
  1. Refrigerant Suction:
    - a. All Sizes: 1-1/2 inch thick Flexible Elastomeric Cellular with Vapor Barrier.
  2. Refrigerant Hot Gas:
    - a. All Sizes: 1-1/2 inch thick Flexible Elastomeric Cellular with Vapor Barrier.
- C. Outdoor Systems:
  1. Refrigerant Suction and Hot Gas:
    - a. All Sizes: 2 inch thick Flexible Elastomeric Cellular with Vapor Barrier and Aluminum Jacket.

**END OF SECTION 230719**

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## **SECTION 230800 COMMISSIONING OF HVAC**

### **PART 1 GENERAL**

#### **1.01 SUMMARY**

- A. See Section 019113 - General Commissioning Requirements for overall objectives; comply with the requirements of Section 019113.
- B. This section covers the Contractor's responsibilities for commissioning; each subcontractor or installer responsible for the installation of a particular system or equipment item to be commissioned is responsible for the commissioning activities relating to that system or equipment item.
- C. The Commissioning Authority (CA) directs and coordinates all commissioning activities and provides Prefunctional Checklists and Functional Test Procedures for Contractor's use.
- D. The entire HVAC system is to be commissioned, including commissioning activities for the following specific items:
  - 1. Control system.
  - 2. Major and minor equipment items.
  - 3. Piping systems and equipment.
  - 4. Ductwork and accessories.
  - 5. Terminal units.
  - 6. Other equipment and systems explicitly identified elsewhere in Contract Documents as requiring commissioning.
- E. The Prefunctional Checklist and Functional Test requirements specified in this section are in addition to, not a substitute for, inspection or testing specified in other sections.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 019113 - General Commissioning Requirements: Commissioning requirements that apply to all types of work.
- B. Section 230593 - Testing, Adjusting, and Balancing for HVAC.
- C. Section 230913 - Instrumentation and Control Devices for HVAC.
- D. Section 230923 - Direct-Digital Control System for HVAC.

#### **1.03 REFERENCE STANDARDS**

- A. ASHRAE Guideline 1.1 - HVAC&R Technical Requirements for the Commissioning Process 2007, with Errata (2012).

#### **1.04 SUBMITTALS**

- A. Updated Submittals: Keep the Commissioning Authority informed of all changes to control system documentation made during programming and setup; revise and resubmit when substantial changes are made.
- B. Startup Reports, Prefunctional Checklists, and Trend Logs: Submit for approval of Commissioning Authority.
- C. HVAC Control System O&M Manual Requirements. In addition to documentation specified elsewhere, compile and organize at minimum the following data on the control system:
  - 1. Specific step-by-step instructions on how to perform and apply all functions, features, modes, etc. mentioned in the controls training sections of this specification and other features of this system. Provide an index and clear table of contents. Include the detailed technical manual for programming and customizing control loops and algorithms.
  - 2. Full as-built set of control drawings.
  - 3. Full as-built sequence of operations for each piece of equipment.
  - 4. Full points list; in addition to the information on the original points list submittal, include a listing of all rooms with the following information for each room:

- a. Floor.
  - b. Room number.
  - c. Room name.
  - d. Air handler unit ID.
  - e. Reference drawing number.
  - f. Air terminal unit tag ID.
  - g. Heating and/or cooling valve tag ID.
  - h. Minimum air flow rate.
  - i. Maximum air flow rate.
5. Full print out of all schedules and set points after testing and acceptance of the system.
6. Full as-built print out of software program.
7. Electronic copy on disk of the entire program for this facility.
8. Marking of all system sensors and thermostats on the as-built floor plan and HVAC drawings with their control system designations.
9. Maintenance instructions, including sensor calibration requirements and methods by sensor type, etc.
10. Control equipment component submittals, parts lists, etc.
11. Warranty requirements.
12. Copies of all checkout tests and calibrations performed by the Contractor (not commissioning tests).
13. Organize and subdivide the manual with permanently labeled tabs for each of the following data in the given order:
  - a. Sequences of operation.
  - b. Control drawings.
  - c. Points lists.
  - d. Controller and/or module data.
  - e. Thermostats and timers.
  - f. Sensors and DP switches.
  - g. Valves and valve actuators.
  - h. Dampers and damper actuators.
  - i. Program setups (software program printouts).
- D. Project Record Documents: See Section 017800 for additional requirements.
  1. Submit updated version of control system documentation, for inclusion with operation and maintenance data.
  2. Show actual locations of all static and differential pressure sensors (air, water and building pressure) and air-flow stations on project record drawings.
- E. Draft Training Plan: In addition to requirements specified in Section 017900, include:
  1. Follow the recommendations of ASHRAE Guideline 1.1.
  2. Control system manufacturer's recommended training.
  3. Demonstration and instruction on function and overrides of any local packaged controls not controlled by the HVAC control system.
- F. Training Manuals: See Section 017900 for additional requirements.
  1. Provide three extra copies of the controls training manuals in a separate manual from the O&M manuals.

## **PART 2 PRODUCTS**

### **2.01 TEST EQUIPMENT**

- A. Provide all standard testing equipment required to perform startup and initial checkout and required functional performance testing; unless otherwise noted such testing equipment will NOT become the property of Owner.
  - B. Equipment-Specific Tools: Where special testing equipment, tools and instruments are specific to a piece of equipment, are only available from the vendor, and are required in order to
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accomplish startup or Functional Testing, provide such equipment, tools, and instruments as part of the work at no extra cost to Owner; such equipment, tools, and instruments are to become the property of Owner.

### **PART 3 EXECUTION**

#### **3.01 PREPARATION**

- A. Cooperate with the Commissioning Authority in development of the Prefunctional Checklists and Functional Test Procedures.
- B. Furnish additional information requested by the Commissioning Authority.
- C. Prepare a preliminary schedule for HVAC pipe and duct system testing, flushing and cleaning, equipment start-up and testing, adjusting, and balancing start and completion for use by the Commissioning Authority; update the schedule as appropriate.
- D. Notify the Commissioning Authority when pipe and duct system testing, flushing, cleaning, startup of each piece of equipment and testing, adjusting, and balancing will occur; when commissioning activities not yet performed or not yet scheduled will delay construction notify ahead of time and be proactive in seeing that the Commissioning Authority has the scheduling information needed to efficiently execute the commissioning process.
- E. Put all HVAC equipment and systems into operation and continue operation during each working day of testing, adjusting, and balancing and commissioning, as required.
- F. Provide test holes in ducts and plenums where directed to allow air measurements and air balancing; close with an approved plug.
- G. Provide temperature and pressure taps in accordance with Contract Documents.

#### **3.02 INSPECTING AND TESTING - GENERAL**

- A. Submit startup plans, startup reports, and Prefunctional Checklists for each item of equipment or other assembly to be commissioned.
- B. Perform the Functional Tests directed by the Commissioning Authority for each item of equipment or other assembly to be commissioned.
- C. Provide two-way radios for use during the testing.
- D. Valve/Damper Stroke Setup and Check:
  - 1. For all valve/damper actuator positions checked, verify the actual position against the control system readout.
  - 2. Set pump/fan to normal operating mode.
  - 3. Command valve/damper closed; visually verify that valve/damper is closed and adjust output zero signal as required.
  - 4. Command valve/damper open; verify position is full open and adjust output signal as required.
  - 5. Command valve/damper to a few intermediate positions.
  - 6. If actual valve/damper position does not reasonably correspond, replace actuator or add pilot positioner (for pneumatics).
  - 7. Closure for Heating Coil Valves - Normally Open:
    - a. Set heating setpoint 20 degrees F above room temperature.
    - b. Observe valve open.
    - c. Remove control air or power from the valve and verify that the valve stem and actuator position do not change.
    - d. Restore to normal.
    - e. Set heating setpoint to 20 degrees F below room temperature.
    - f. Observe the valve close.
    - g. Restore to normal.
- E. Coil Valve Leak Check:
  - 1. Method 1 - Water Temperature With 2-Way Valve:

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- a. Calibrate water temperature sensors on each side of coil to be within 0.2 degree F of each other.
    - b. Turn off air handler fans, close outside air dampers. Keep pump running. Make sure appropriate coil dampers are open.
    - c. Normally closed valves will close.
    - d. Override normally open valves to the closed position.
    - e. After 10 minutes observe water delta T across coil. If it is greater than 2 degrees F (, leakage is probably occurring.
    - f. Reset valve stroke to close tighter.
    - g. Repeat test until compliance is achieved.
  2. Method 2 - Air Temperature With 2 or 3-Way Valve: Water leak-by less than 10 percent will likely not be detected with this method.
    - a. Calibrate air temperature sensors on each side of coil to be within 0.2 degree F of each other.
    - b. Air handler fans should be on.
    - c. Change mixed or discharge air setpoint, override values or bleed or squeeze bulb pneumatic controller to cause the valve to close.
    - d. After 5 minutes observe air delta T across coil. If it is greater than one degree F (, leakage is probably occurring.
    - e. Reset valve stroke to close tighter.
    - f. Repeat test until compliance is achieved.
  3. Method 3 - Coil Drain Down: Not for 3-way valves.
    - a. Put systems in normal mode.
    - b. If cooling coil valve, remove all call for cooling; if heating coil valve, put system in full cooling.
    - c. Close isolation valve on supply side of coil, open air bleed cap, open drain-down cock and drain water from coil.
    - d. If water does not stop draining, there may be a leak through the control valve.
    - e. Return all to normal when done.
- F. Isolation Valve or System Valve Leak Check: For valves not by coils.
1. With full pressure in the system, command valve closed.
  2. Use an ultra-sonic flow meter to detect flow or leakage.
- G. Deficiencies: Correct deficiencies and re-inspect or re-test, as applicable, at no extra cost to Owner.

### 3.03 TAB COORDINATION

- A. TAB: Testing, adjusting, and balancing of HVAC.
- B. Coordinate commissioning schedule with TAB schedule.
- C. Review the TAB plan to determine the capabilities of the control system toward completing TAB.
- D. Provide all necessary unique instruments and instruct the TAB technicians in their use; such as handheld control system interface for setting terminal unit boxes, etc.
- E. Have all required Prefunctional Checklists, calibrations, startup and component Functional Tests of the system completed and approved by the Commissioning Authority prior to starting TAB.
- F. Provide a qualified control system technician to operate the controls to assist the TAB technicians or provide sufficient training for the TAB technicians to operate the system without assistance.

### 3.04 CONTROL SYSTEM FUNCTIONAL TESTING

- A. Prefunctional Checklists for control system components will require a signed and dated certification that all system programming is complete as required to accomplish the
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requirements of Contract Documents and the detailed Sequences of Operation documentation submittal.

- B. Do not start Functional Testing until all controlled components have themselves been successfully Functionally Tested in accordance with Contract Documents.
- C. Using a skilled technician who is familiar with this building, execute the Functional Testing of the control system as required by the Commissioning Authority.
- D. Functional Testing of the control system constitutes demonstration and trend logging of control points monitored by the control system.
  - 1. The scope of trend logging is partially specified; trend log up to 50 percent more points than specified at no extra cost to Owner.
  - 2. Perform all trend logging specified in Prefunctional Checklists and Functional Test procedures.
- E. Functionally Test integral or stand-alone controls in conjunction with the Functional Tests of the equipment they are attached to, including any interlocks with other equipment or systems; further testing during control system Functional Test is not required unless specifically indicated below.
- F. Demonstrate the following to the Commissioning Authority during testing of controlled equipment; coordinate with commissioning of equipment.
  - 1. Setpoint changing features and functions.
  - 2. Sensor calibrations.
- G. Demonstrate to the Commissioning Authority:
  - 1. That all specified functions and features are set up, debugged and fully operable.
  - 2. That scheduling features are fully functional and setup, including holidays.
  - 3. That all graphic screens and value readouts are completed.
  - 4. Correct date and time setting in central computer.
  - 5. That field panels read the same time as the central computer; sample 10 percent of field panels; if any of those fail, sample another 10 percent; if any of those fail test all remaining units at no extra cost to Owner.
  - 6. Functionality of field panels using local operator keypads and local ports (plug-ins) using portable computer/keypad; demonstrate 100 percent of panels and 10 percent of ports; if any ports fail, sample another 10 percent; if any of those fail, test all remaining units at no extra cost to Owner.
  - 7. Power failure and battery backup and power-up restart functions.
  - 8. Global commands features.
  - 9. Security and access codes.
  - 10. Occupant over-rides (manual, telephone, key, keypad, etc.).
  - 11. O&M schedules and alarms.
  - 12. Occupancy sensors and controls.
  - 13. All control strategies and sequences not tested during controlled equipment testing.
- H. If the control system, integral control components, or related equipment do not respond to changing conditions and parameters appropriately as expected, as specified and according to acceptable operating practice, under any of the conditions, sequences, or modes tested, correct all systems, equipment, components, and software required at no additional cost to Owner.

### **3.05 OPERATION AND MAINTENANCE MANUALS**

- A. See Section 017800 for additional requirements.
- B. Add design intent documentation furnished by Architect/Engineer to manuals prior to submission to Owner.
- C. Submit manuals related to items that were commissioned to Commissioning Authority for review; make changes recommended by Commissioning Authority.

- D. Commissioning Authority will add commissioning records to manuals after submission to Owner.

### **3.06 DEMONSTRATION AND TRAINING**

- A. See Section 017900 for additional requirements.
- B. Demonstrate operation and maintenance of HVAC system to Owner's personnel; if during any demonstration, the system fails to perform in accordance with the information included in the O&M manual, stop demonstration, repair or adjust, and repeat demonstration. Demonstrations may be combined with training sessions if appropriate.
- C. These demonstrations are in addition to, and not a substitute for, Prefunctional Checklists and demonstrations to the Commissioning Authority during Functional Testing.
- D. Provide classroom and hands-on training of Owner's designated personnel on operation and maintenance of the HVAC system, control system, and all equipment items indicated to be commissioned. Provide the following minimum durations of training:
- E. TAB Review: Instruct Owner's personnel for minimum \_\_\_\_ hours, after completion of TAB, on the following:
  - 1. Review final TAB report, explaining the layout and meanings of each data type.
  - 2. Discuss any outstanding deficient items in control, ducting or design that may affect the proper delivery of air or water.
  - 3. Identify and discuss any terminal units, duct runs, diffusers, coils, fans and pumps that are close to or are not meeting their design capacity.
  - 4. Discuss any temporary settings and steps to finalize them for any areas that are not finished.
  - 5. Other salient information that may be useful for facility operations, relative to TAB.
- F. HVAC Control System Training: Perform training in at least three phases:
  - 1. Phase 1 - Basic Control System: Provide minimum of \_\_\_\_ hours of actual training on the control system itself. Upon completion of training, each attendee, using appropriate documentation, should be able to perform elementary operations and describe general hardware architecture and functionality of the system.
    - a. This training may be held on-site or at the manufacturer's facility.
    - b. If held off-site, the training may occur prior to final completion of the system installation.
    - c. For off-site training, Contractor shall pay expenses of up to two attendees.
  - 2. Phase 2 - Integrating with HVAC Systems: Provide minimum of \_\_\_\_ hours of on-site, hands-on training after completion of Functional Testing. Include instruction on:
    - a. The specific hardware configuration of installed systems in this facility and specific instruction for operating the installed system, including interfaces with other systems, if any.
    - b. Security levels, alarms, system start-up, shut-down, power outage and restart routines, changing setpoints and alarms and other typical changed parameters, overrides, freeze protection, manual operation of equipment, optional control strategies that can be considered, energy savings strategies and set points that if changed will adversely affect energy consumption, energy accounting, procedures for obtaining vendor assistance, etc.
    - c. Trend logging and monitoring features (values, change of state, totalization, etc.), including setting up, executing, downloading, viewing both tabular and graphically and printing trends; provide practice in setting up trend logging and monitoring during training session.
    - d. Every display screen, allowing time for questions.
    - e. Point database entry and modifications.
  - 3. Phase 3 - Post-Occupancy: Six months after occupancy conduct minimum of \_\_\_\_ hours of training. Tailor training session to questions and topics solicited beforehand from Owner. Also be prepared to address topics brought up and answer questions concerning

operation of the system.

- G. Provide the services of manufacturer representatives to assist instructors where necessary.
- H. Provide the services of the HVAC controls instructor at other training sessions, when requested, to discuss the interaction of the controls system as it relates to the equipment being discussed.

**END OF SECTION 230800**

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**SECTION 230913**  
**INSTRUMENTATION AND CONTROL DEVICES FOR HVAC****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Control panels.
- B. Control Valves:
  - 1. Ball valves and actuators.
  - 2. Electronic operators.
- C. Dampers.
- D. Damper Operators:
  - 1. Electric operators.
- E. Input/Output Sensors:
  - 1. Temperature sensors.
  - 2. Humidity sensors.
  - 3. Static pressure (air pressure) sensors.
  - 4. Carbon dioxide sensors.
- F. Thermostats:
  - 1. Electric room thermostats.
  - 2. Low-limit temperature cutout switch (freezestat)
  - 3. Line voltage thermostats.
- G. Time clocks.
- H. Flow Sensors:
  - 1. Annular pitot tubes.

**1.02 RELATED REQUIREMENTS**

- A. Section 220519 - Meters and Gauges for Plumbing Piping: Thermometer sockets and gauge taps.
- B. Section 230923 - Direct-Digital Control System for HVAC.
- C. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

**1.03 REFERENCE STANDARDS**

- A. AMCA 500-D - Laboratory Methods of Testing Dampers for Rating 2018.
- B. ANSI C12.1 - Electric Meters - Code for Electricity Metering 2022.
- C. ANSI/FCI 70-2 - Control Valve Seat Leakage 2021.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.

**1.04 SUBMITTALS**

- A. See Section 013300 - Submittal Procedures, for submittal procedures.
  - B. Product Data: Provide description and engineering data for each control system component. Include sizing as requested. Provide data for each system component and software module.
  - C. Shop Drawings: Indicate complete operating data, system drawings, wiring diagrams, and written detailed operational description of sequences. Submit schedule of valves indicating size, flow, and pressure drop for each valve. For automatic dampers indicate arrangement, velocities, and static pressure drops for each system.
  - D. Operation and Maintenance Data: Include inspection period, cleaning methods, recommended cleaning materials, and calibration tolerances.
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- E. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

## **PART 2 PRODUCTS**

### **2.01 EQUIPMENT - GENERAL**

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc., as suitable for the purpose specified and indicated.

### **2.02 CONTROL PANELS**

- A. Unitized cabinet type for each system under automatic control with relays and controls mounted in cabinet and temperature indicators, pressure gauges, pilot lights, push buttons and switches flush on cabinet panel face.
- B. NEMA 250, general purpose utility enclosures with enameled finished face panel.
- C. Provide common keying for all panels.

### **2.03 CONTROL VALVES**

- A. Ball Valves and Actuators:
1. Manufacturers:
    - a. Belimo Aircontrols (USA), Inc: [www.belimo.com/#sle](http://www.belimo.com/#sle).
    - b. Johnson Controls International, PLC: [www.johnsoncontrols.com/#sle](http://www.johnsoncontrols.com/#sle).
    - c. Schneider Electric: [www.schneider-electric.us/#sle](http://www.schneider-electric.us/#sle).
    - d. Substitutions: See Section 016000 - Product Requirements.
  2. Service: Use for brine (30 percent glycol), chilled water, hot water, or steam at 15 to 25 psig (104.4 to 172.4).
  3. Flow Characteristic: Include 2-way and 3-way diverting operation configured to fail normally closed (NC).
  4. Replacements in Kind: Provide pressure-independent type.
  5. Rangeability: 500 to 1.
  6. ANSI Rating: Class 150.
  7. Leakage: Class IV (0.1 percent of rated capacity) per ANSI/FCI 70-2.
  8. Body Size:
    - a. Under 2-1/2 inches:
      - 1) Connection: NPT.
      - 2) Materials:
        - (a) Body: Brass.
        - (b) Flanges: Ductile iron.
        - (c) Ball: Chrome-plated brass.
        - (d) Stem: Nickel-plated brass.
        - (e) Seat: Graphite-reinforced PTFE with EPDM O-Ring backing.
        - (f) Stem Seal: EPDM O-Rings.
        - (g) Flow Control Disk: Thermoplastic synthetic-resin.
    - b. 2-1/2 inches and Above:
      - 1) Connection Type: Flanged.
      - 2) Materials:
        - (a) Body: Brass.
        - (b) Flanges: Ductile iron.
        - (c) Ball: 300 series stainless steel.
        - (d) Stem: 300 series stainless steel.
        - (e) Seat: Graphite-reinforced PTFE with EPDM O-Ring backing.
        - (f) Stem Seal: EPDM O-Rings.
        - (g) Flow Control Disk: Thermoplastic synthetic-resin.
    - c. Service Temperature:



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- 1) Fluid Side: 0 to 284 degrees F liquid or 25 psig steam.
  - 2) Ambient Side: From minus 4 to 122 degrees F.
9. Actuator Requirements:
    - a. Assembly: Factory-mounted.
    - b. Input: 0 to 5 VDC configured for proportional control.
    - c. Accessories: Provide with valve position indicator and manual override.
  - B. Electronic Operators:
    1. Manufacturers:
      - a. Schneider Electric: [www.schneider-electric.us/#sle](http://www.schneider-electric.us/#sle).
    2. Valves shall spring return to normal position as indicated on freeze, fire, or temperature protection.
    3. Select operator for full shut off at maximum pump differential pressure.

## 2.04 DAMPERS

- A. Performance: Test in accordance with AMCA 500-D.
- B. Blades: Galvanized steel, maximum blade size 8 inches wide, 48 inches long, minimum 22 gauge, 0.0299 inch, attached to minimum 1/2 inch shafts with set screws.
- C. Blade Seals: Synthetic elastomeric, inflatable, mechanically attached, field replaceable.
- D. Jamb Seals: Spring stainless steel.
- E. Shaft Bearings: Oil impregnated sintered bronze.
- F. Linkage Bearings: Oil impregnated sintered bronze.

## 2.05 DAMPER OPERATORS

- A. General: Provide smooth proportional control with sufficient power for air velocities 20 percent greater than maximum design velocity and to provide tight seal against maximum system pressures. Provide spring return for two position control and for fail safe operation.
  1. Provide sufficient number of operators to achieve unrestricted movement throughout damper range.
  2. Provide one operator for maximum 36 sq ft damper section.
- B. Electric Operators:
  1. Spring return, adjustable stroke motor having oil immersed gear train, with auxiliary end switch.

## 2.06 INPUT/OUTPUT SENSORS

- A. Temperature Sensors:
  1. Use thermistor or RTD type temperature sensing elements with characteristics resistant to moisture, vibration, and other conditions consistent with the application without affecting accuracy and life expectancy.
  2. Construct RTD of nickel or platinum with base resistance of 1000 ohms at 70 degrees F.
  3. 100 ohm platinum RTD is acceptable if used with project DDC controllers.
  4. Temperature Sensing Device: Compatible with project DDC controllers.
  5. Performance Characteristics:
    - a. RTD:
      - 1) Room Sensor Accuracy: Plus/minus 0.50 degrees F minimum.
      - 2) Duct Averaging Accuracy: Plus/minus 0.50 degrees F minimum.
      - 3) All Other Accuracy: Plus/minus 0.75 degrees F minimum.
    - b. Room Sensors: Locking cover matching the pneumatic thermostats used.
    - c. Immersion Temperature Sensors: A sensor encased in a corrosion-resistant probe with an indoor junction box service entry body.
    - d. Room Temperature Sensors:
      - 1) Provide the following:

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- (a) Setpoint reset slide switch with an adjustable temperature range.
    - (b) Momentary override request push button for activation of after-hours operation.
  - B. Carbon Dioxide Sensors, Duct and Wall:
    - 1. General: Provide non-dispersive infrared (NDIR), diffusion sampling CO2 sensors with integral transducers and linear output.
    - 2. Air Temperature: Range of 32 to 122 degrees F.
    - 3. Relative Humidity: Range of 0 to 95 percent (non-condensing).
    - 4. Power Input: Class 2; 12 to 30VDC or 24VAC 50/60 Hz; 100mA max.
    - 5. Calibration Characteristics:
      - a. Automatically compensating algorithm for sensor drift due to sensor degradation.
      - b. Maximum Drift: 2 percent.
      - c. User calibratable with a minimum calibration interval of 5 years.
    - 6. Construction:
      - a. Sensor Chamber: Non-corrosive material for neutral effect on carbon dioxide sample.

## **2.07 THERMOSTATS**

## **2.08 FLOW SENSORS**

- A. Annular Pitot Tubes:
  - 1. Fabricate the annular pitot tube from austenitic stainless steel with an accuracy of plus/minus 2 percent of full flow and a repeatability of plus/minus 0.50 percent of measured value.
  - 2. Unit to have at least one static port with no less than four total head pressure ports with an averaging manifold.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify that systems are ready to receive work.
- C. Beginning of installation means installer accepts existing conditions.
- D. Sequence work to ensure installation of components is complementary to installation of similar components in other systems.
- E. Coordinate installation of system components with installation of mechanical systems equipment such as air handling units and air terminal units.
- F. Ensure installation of components is complementary to installation of similar components.

### **3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install damper motors on outside of duct in warm areas. Do not install motors in locations at outdoor temperatures.
- C. Mount control panels adjacent to associated equipment on vibration free walls or free standing angle iron supports. One cabinet may accommodate more than one system in same equipment room. Provide engraved plastic nameplates for instruments and controls inside cabinet and engraved plastic nameplates on cabinet face.
- D. Provide conduit and electrical wiring in accordance with Section 260583. Electrical material and installation shall be in accordance with appropriate requirements of Division 26.

### **3.03 MAINTENANCE**

- A. See Section 017823 - Operations and Maintenance Data, for additional requirements relating to maintenance service.
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- B. Provide service and maintenance of control system for one year from Date of Substantial Completion.
- C. Provide complete service of controls systems, including call backs, and submit written report of each service call.

**END OF SECTION 230913**

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**SECTION 230923**  
**DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Controllers.
- B. Power supplies and line filtering.

**1.02 RELATED REQUIREMENTS**

- A. Section 230913 - Instrumentation and Control Devices for HVAC.
- B. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

**1.03 REFERENCE STANDARDS**

- A. ASHRAE Std 135 - A Data Communication Protocol for Building Automation and Control Networks 2020, with Errata and Amendments (2022).
- B. MIL-STD-810 - Environmental Engineering Considerations and Laboratory Tests 2019h.
- C. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

**1.04 SUBMITTALS**

- A. See Section 013300 Submittal Procedures for submittal procedures.
- B. Product Data: Provide data for each system component and software module.
- C. Shop Drawings:
  - 1. Indicate trunk cable schematic showing programmable control unit locations, and trunk data conductors.
  - 2. List connected data points, including connected control unit and input device.
  - 3. Indicate system graphics indicating monitored systems, data (connected and calculated) point addresses, and operator notations. Provide demonstration digital media containing graphics.
  - 4. Show system configuration with peripheral devices, batteries, power supplies, diagrams, modems, and interconnections.
  - 5. Indicate description and sequence of operation of operating, user, and application software.
- D. Project Record Documents: Record actual locations of control components, including control units, thermostats, and sensors.
- E. Operation and Maintenance Data:
  - 1. Include interconnection wiring diagrams complete field installed systems with identified and numbered, system components and devices.
  - 2. Include keyboard illustrations and step-by-step procedures indexed for each operator function.
  - 3. Include inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.
- F. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

**1.05 QUALITY ASSURANCE**

- A. Perform work in accordance with NFPA 70.
  - B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of documented experience.
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- C. Installer Qualifications: Company specializing in performing work of the type specified and with minimum three years of documented experience.

#### **1.06 WARRANTY**

- A. See Section 017700 - Closeout Procedures for additional warranty requirements.
- B. Correct defective Work within a five year period after Substantial Completion.
- C. Provide five year manufacturer's warranty for field programmable micro-processor based units.

#### **1.07 PROTECTION OF SOFTWARE RIGHTS**

- A. Prior to delivery of software, the Owner and the party providing the software will enter into a software license agreement with provisions for the following:
1. Limiting use of software to equipment provided under these specifications.
  2. Limiting copying.
  3. Preserving confidentiality.
  4. Prohibiting transfer to a third party.

### **PART 2 PRODUCTS**

#### **2.01 CONTROLLERS**

- A. Building Controllers:
1. General:
    - a. Manage global strategies by one or more, independent, standalone, microprocessor based controllers.
    - b. Provide sufficient memory to support controller's operating system, database, and programming requirements.
    - c. Share data between networked controllers.
    - d. Controller operating system manages input and output communication signals allowing distributed controllers to share real and virtual object information and allowing for central monitoring and alarms.
    - e. Utilize real-time clock for scheduling.
    - f. Continuously check processor status and memory circuits for abnormal operation.
    - g. Controller to assume predetermined failure mode and generate alarm notification upon detection of abnormal operation.
    - h. Communication with other network devices to be based on assigned protocol.
  2. Communication:
    - a. Controller to reside on a BACnet network using ISO 8802-3 (ETHERNET) Data Link/Physical layer protocol.
    - b. Perform routing when connected to a network of custom application and application specific controllers.
    - c. Provide service communication port for connection to a portable operator's terminal or hand held device with compatible protocol.
  3. Anticipated Environmental Ambient Conditions:
    - a. Outdoors and/or in Wet Ambient Conditions:
      - 1) Mount within waterproof enclosures.
      - 2) Rated for operation at 40 to 150 degrees F.
    - b. Conditioned Space:
      - 1) Mount within dustproof enclosures.
      - 2) Rated for operation at 32 to 120 degrees F.
  4. Provisions for Serviceability:
    - a. Diagnostic LEDs for power, communication, and processor.
    - b. Make all wiring connections to field removable, modular terminal strips, or to a termination card connected by a ribbon cable.
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5. Memory: In the event of a power loss, maintain all BIOS and programming information for a minimum of 72 hours.
  6. Power and Noise Immunity:
    - a. Maintain operation at 90 to 110 percent of nominal voltage rating.
    - b. Perform orderly shutdown below 80 percent of nominal voltage.
    - c. Operation protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W. at 3 feet.
- B. Application Specific Controllers:
1. General:
    - a. Not fully user programmable, microprocessor based controllers dedicated to control specific equipment.
    - b. Customized for operation within the confines of equipment served.
    - c. Communication with other network devices to be based on assigned protocol.
  2. Communication:
    - a. Controller to reside on a BACnet network using MS/TP Data Link/Physical layer protocol.
    - b. Provide service communication port for connection to a portable operator's terminal or hand held device with compatible protocol.
  3. Anticipated Environmental Ambient Conditions:
    - a. Outdoors and/or in Wet Ambient Conditions:
      - 1) Mount within waterproof enclosures.
      - 2) Rated for operation at 40 to 150 degrees F.
    - b. Conditioned Space:
      - 1) Mount within dustproof enclosures.
      - 2) Rated for operation at 32 to 120 degrees F.
  4. Provisions for Serviceability:
    - a. Diagnostic LEDs for power, communication, and processor.
    - b. Make all wiring connections to field removable, modular terminal strips, or to a termination card connected by a ribbon cable.
  5. Memory: In the event of a power loss, maintain all BIOS and programming information for a minimum of 72 hours.
  6. Power and Noise Immunity:
    - a. Maintain operation at 90 to 110 percent of nominal voltage rating.
    - b. Perform orderly shutdown below 80 percent of nominal voltage.
    - c. Operation protected against electrical noise of 5 to 120 Hz and from keyed radios up to 5 W at 3 feet.
- C. Input/Output Interface:
1. Hardwired inputs and outputs tie into the DDC system through building, custom application, or application specific controllers.
  2. All Input/Output Points:
    - a. Protect controller from damage resulting from any point short-circuiting or grounding and from voltage up to 24 volts of any duration.
    - b. Provide universal type for building and custom application controllers where input or output is software designated as either binary or analog type with appropriate properties.
  3. Binary Inputs:
    - a. Allow monitoring of On/Off signals from remote devices.
    - b. Provide wetting current of 12 mA minimum, compatible with commonly available control devices and protected against the effects of contact bounce and noise.
    - c. Sense dry contact closure with power provided only by the controller.
  4. Pulse Accumulation Input Objects: Comply with all requirements of binary input objects and accept up to 10 pulses per second.
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5. Analog Inputs:
    - a. Allow for monitoring of low voltage 0 to 10 VDC, 4 to 20 mA current, or resistance signals (thermistor, RTD).
    - b. Compatible with and field configurable to commonly available sensing devices.
  6. Binary Outputs:
    - a. Used for On/Off operation or a pulsed low-voltage signal for pulse width modulation control.
    - b. Outputs provided with three position (On/Off/Auto) override switches.
    - c. Status lights for building and custom application controllers to be selectable for normally open or normally closed operation.
  7. Analog Outputs:
    - a. Monitoring signal provides a 0 to 10 VDC or a 4 to 20 mA output signal for end device control.
    - b. Provide status lights and two position (AUTO/MANUAL) switch for building and custom application controllers with manually adjustable potentiometer for manual override on building and custom application controllers.
    - c. Drift to not exceed 0.4 percent of range per year.
  8. Tri State Outputs:
    - a. Coordinate two binary outputs to control three point, floating type, electronic actuators without feedback.
    - b. Limit the use of three point, floating devices to the following zone and terminal unit control applications:
    - c. Control algorithms run the zone actuator to one end of its stroke once every 24 hours for verification of operator tracking.
  9. System Object Capacity:
    - a. System size to be expandable to twice the number of input output objects required by providing additional controllers, including associated devices and wiring.
    - b. Hardware additions or software revisions for the installed operator interfaces are not to be required for future, system expansions.

## 2.02 POWER SUPPLIES AND LINE FILTERING

- A. Power Supplies:
    1. Provide UL listed control transformers with Class 2 current limiting type or over-current protection in both primary and secondary circuits for Class 2 service as required by the NEC.
    2. Limit connected loads to 80 percent of rated capacity.
    3. Match DC power supply to current output and voltage requirements.
    4. Unit to be full wave rectifier type with output ripple of 5.0 mV maximum peak to peak.
    5. Regulation to be 1 percent combined line and load with 100 microsecond response time for 50 percent load changes.
    6. Provide over-voltage and over-current protection to withstand a 150 percent current overload for 3 seconds minimum without trip-out or failure.
    7. Operational Ambient Conditions: 32 to 120 degrees F.
    8. EM/RF meets FCC Class B and VDE 0871 for Class B and MIL-STD-810 for shock and vibration.
    9. Line voltage units UL recognized and CSA approved.
  - B. Power Line Filtering:
    1. Provide external or internal transient voltage and surge suppression component for all workstations and controllers.
    2. Minimum surge protection attributes:
      - a. Dielectric strength of 1000 volts minimum.
      - b. Response time of 10 nanoseconds or less.
      - c. Transverse mode noise attenuation of 65 dB or greater.
-



- d. Common mode noise attenuation of 150 dB or greater at 40 to 100 Hz.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify that conditioned power supply is available to the control units and to the operator work station. Verify that field end devices, wiring, and pneumatic tubing is installed prior to installation proceeding.

### **3.02 INSTALLATION**

- A. Install control units and other hardware in position on permanent walls where not subject to excessive vibration.
- B. Install software in control units and in operator work station. Implement all features of programs to specified requirements and appropriate to sequence of operation.
- C. Provide with 120v AC, 15 amp dedicated emergency power circuit to each programmable control unit.
- D. Provide conduit and electrical wiring in accordance with Section 260583. Electrical material and installation shall be in accordance with appropriate requirements of Division 26.

### **3.03 MANUFACTURER'S FIELD SERVICES**

- A. Start and commission systems. Allow sufficient time for start-up and commissioning prior to placing control systems in permanent operation.

### **3.04 DEMONSTRATION AND INSTRUCTIONS**

- A. Demonstrate complete and operating system to Owner.

### **3.05 MAINTENANCE**

- A. See Section 017823 - Operation and Maintenance Data, for additional requirements relating to maintenance service.
- B. Provide service and maintenance of energy management and control systems for one years from Date of Substantial Completion.
- C. Provide two complete inspections, one in each season, to inspect, calibrate, and adjust controls as required, and submit written reports.
- D. Provide complete service of systems, including call backs. Make minimum of 3 complete normal inspections of approximately 4 hours duration in addition to normal service calls to inspect, calibrate, and adjust controls, and submit written reports.

**END OF SECTION 230923**

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**SECTION 230934**  
**VARIABLE-FREQUENCY MOTOR CONTROLLERS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Variable-frequency motor controllers for low-voltage (600 V and less) AC motor applications.
- B. Overcurrent protective devices for motor controllers, including overload relays.

**1.02 RELATED REQUIREMENTS**

- A. Section 230529 - Hangers and Supports for HVAC Piping and Equipment.
- B. Section 230553 - Identification for HVAC Piping and Equipment: Identification products and requirements.
- C. Section 260526 - Grounding and Bonding for Electrical Systems.
- D. Section 260573 - Power System Studies: Additional criteria for selection and adjustment of equipment and associated protective devices specified in this section.

**1.03 REFERENCE STANDARDS**

- A. IEC 60529 - Degrees of Protection Provided by Enclosures (IP Code) 1989 (Corrigendum 2019).
- B. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- C. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts 2008 (Reaffirmed 2020).
- D. NEMA ICS 5 - Industrial Control and Systems: Control Circuit and Pilot Devices 2017.
- E. NEMA ICS 6 - Industrial Control and Systems: Enclosures 1993 (Reaffirmed 2016).
- F. NEMA ICS 7 - Industrial Control and Systems: Adjustable-Speed Drives 2020.
- G. NEMA ICS 7.1 - Safety Standards for Construction and Guide for Selection, Installation, and Operation of Adjustable-Speed Drive Systems 2022.
- H. NEMA ICS 7.2 - Application Guide for AC Adjustable Speed Drive Systems 2021.
- I. NEMA ICS 61800-2 - Adjustable Speed Electrical Power Drive Systems, Part 2: General Requirements-Rating Specifications for Low Voltage Adjustable Frequency AC Power Drive Systems 2005.
- J. NEMA MG 1 - Motors and Generators 2021.
- K. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems 2021.
- L. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- M. UL 508A - Industrial Control Panels Current Edition, Including All Revisions.
- N. UL 61800-5-1 - Standard for Adjustable Speed Electrical Power Drive Systems - Part 5-1: Safety Requirements – Electrical, Thermal, and Energy (Ed. 2) Current Edition, Including All Revisions.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
    - 1. Coordinate work to provide motor controllers suitable for use with actual motors to be installed.
    - 2. Coordinate work to provide controllers and associated wiring suitable for interface with control devices to be installed.
-

3. Coordinate arrangement with dimensions and clearance requirements of actual equipment to be installed.
4. Verify with manufacturer that conductor terminations are suitable for use with conductors to be installed.
5. Notify Architect/Engineer of conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

#### **1.05 SUBMITTALS**

- A. See Section 013300 - Submittal Procedures, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for motor controllers, enclosures, overcurrent protective devices, and other installed components and accessories.
- C. Shop Drawings: Indicate dimensions, voltage, controller sizes, short circuit current ratings, conduit entry locations, conductor terminal information, and installed features and accessories.
  1. Include wiring diagrams showing factory and field connections.
- D. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
- E. Operation and Maintenance Data: Include detailed information on system operation, equipment programming and setup, replacement parts, and recommended maintenance procedures and intervals.
  1. Include contact information for entity providing contract maintenance and trouble call-back service.
- F. Executed Warranty: Submit documentation of final executed warranty completed in Owner's name and registered with manufacturer.
- G. Maintenance Materials: Furnish following for Owner's use in maintenance of project.
  1. See Section 016000 - Product Requirements, for additional provisions.
  2. Air Filters: Two of each different type.

#### **1.06 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
  1. Authorized service facilities located within 200 miles of project site.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Store in clean, dry space. Maintain factory wrapping or provide additional heavy canvas or heavy plastic cover to protect units from dirt, water, construction debris, and traffic.
- B. Handle carefully in accordance with manufacturer's written instructions to avoid damage to internal components, enclosure, and finish.

#### **1.08 FIELD CONDITIONS**

- A. Maintain field conditions within required service conditions during and after installation.

#### **1.09 WARRANTY**

- A. See Section 017700 - Closeout Procedures, for additional warranty requirements.
- B. Provide minimum 18 month manufacturer warranty covering repair or replacement due to defective materials or workmanship.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. ABB: [www.abb.com/#sle](http://www.abb.com/#sle).

- B. Square D.
- C. Yaskawa Electric Corp.
- D. Substitutions: See Section 016000 - Product Requirements.
- E. Source Limitations: Furnish variable-frequency motor controllers and associated components produced by a single manufacturer and obtained from a single supplier.

## 2.02 VARIABLE-FREQUENCY MOTOR CONTROLLERS

- A. Provide variable-frequency motor control system consisting of required controller assemblies, operator interfaces, control power transformers, instrumentation and control wiring, sensors, accessories, system programming, etc. as necessary for complete operating system.
- B. Provide products listed, classified, and labeled as suitable for purpose intended.
- C. Variable-Frequency Motor Controller:
  - 1. Configuration: Packaged controller with across-the-line bypass.
  - 2. Rectifier/Converter: Diode-based, 6-pulse type.
  - 3. Control Method: Vector; closed-loop, with feedback.
  - 4. Filtering: Provide input/line reactor and output/load reactor.
- D. Controller Assemblies: Comply with NEMA ICS 7, NEMA ICS 7.1, and NEMA ICS 61800-2; list and label as complying with UL 61800-5-1 or UL 508A as applicable.
- E. Provide controllers selected for actual installed motors and coupled mechanical loads in accordance with NEMA ICS 7.2, NEMA MG 1 Part 30, and recommendations of manufacturers of both controller and load, where not in conflict with specified requirements; considerations include, but are not limited to:
  - 1. Motor type (e.g., induction, reluctance, and permanent magnet); consider NEMA MG 1 design letter or inverter duty rating for induction motors.
  - 2. Motor load type (e.g., constant torque, variable torque, and constant horsepower); consider duty cycle, impact loads, and high inertia loads.
  - 3. Motor nameplate data.
  - 4. Requirements for speed control range, speed regulation, and braking.
  - 5. Motor suitability for bypass starting method, where applicable.
- F. Devices on Load Side of Controller: Suitable for application across full controller output frequency range.
- G. Operating Requirements:
  - 1. Input Voltage Tolerance: Plus/minus 10 percent of nominal.
  - 2. Input Frequency Tolerance: Plus/minus 5 percent of nominal.
  - 3. Efficiency: Minimum of 96 percent at full speed and load.
  - 4. Input Displacement Power Factor: Minimum of 0.96 throughout speed and load range.
  - 5. Overload Rating:
    - a. Variable Torque Loads: Minimum of 110 percent of nominal for 60 seconds.
    - b. Constant Torque Loads: Minimum of 150 percent of nominal for 60 seconds.
- H. Power Conversion System: Microprocessor-based, pulse width modulation type consisting of rectifier/converter, DC bus/link, and inverter.
  - 1. Rectifier/Converter: Diode-based, 6-pulse type unless otherwise indicated.
- I. Control System:
  - 1. Provide microprocessor-based control system for automatic control, monitoring, and protection of motors. Include sensors, wiring, and connections necessary for functions and status/alarm indications specified.
  - 2. Provide integral operator interface for controller programming, display of status/alarm indications, fault reset, and local control functions including motor run/stop, motor forward/reverse selection, motor speed increase/decrease, and local/remote control

- 
- selection.
3. Control Functions:
    - a. Control Method: Selectable vector and scalar/volts per hertz unless otherwise indicated.
      - 1) Scalar/Volts per Hertz Control: Provide IR compensation for improved low-speed torque.
      - 2) Vector Control: Provide selectable autotuning function.
    - b. Adjustable acceleration and deceleration time; linear and S-curve ramps; selectable coast to stop.
    - c. Selectable braking control; DC injection or flux braking.
    - d. Adjustable minimum/maximum speed limits.
    - e. Adjustable pulse width modulation switching carrier frequency.
    - f. Adjustable motor slip compensation.
    - g. Selectable autorestart after noncritical fault; programmable number of time delay between restart attempts.
  4. Status Indications:
    - a. Motor run/stop status.
    - b. Motor forward/reverse status.
    - c. Local/remote control status.
    - d. Output voltage.
    - e. Output current.
    - f. Output frequency.
    - g. DC bus voltage.
    - h. Motor speed.
    - i. Elapsed run time.
    - j. Discrete input/output status.
    - k. Analog input/output values.
  5. Protective Functions/Alarm Indications:
    - a. Overcurrent.
    - b. Motor overload.
    - c. Undervoltage.
    - d. Overvoltage.
    - e. Controller overtemperature.
    - f. Input/output phase loss.
    - g. Output short circuit protection.
    - h. Output ground fault protection.
  6. Inputs:
    - a. Digital Input(s): Three.
    - b. Analog Input(s): Two.
  7. Outputs:
    - a. Analog Output(s): One.
    - b. Relay Output(s): Two.
  8. Communications: Compatible with connected systems. Provide accessories necessary for proper interface.
    - a. Serial Communications: RS-485; support for Modbus RTU protocol.
    - b. Ethernet Communications: Support for Modbus TCP protocol.
  9. Features:
    - a. Password-protected security access.
    - b. Event log.
- J. Power Conditioning/Filtering:
1. Provide DC link choke or input/line reactor for each controller unless otherwise indicated or required.
-

- 
2. Reactor Impedance: 3 percent, unless otherwise indicated or required.
- K. Packaged Controllers: Controllers factory-mounted in separate enclosure with externally operable disconnect and specified accessories.
1. Disconnects: Circuit breaker or disconnect switch type.
    - a. Disconnect Switches: Fusible type or nonfusible type with separate input fuses.
    - b. Provide externally operable handle with means for locking in OFF position. Provide safety interlock to prevent opening cover with disconnect in ON position with capability of overriding interlock for testing purposes.
    - c. Provide auxiliary interlock for disconnection of external control power sources where applicable.
  2. Provide door-mounted remote operator interface.
  3. Packaged Controllers with Bypass: Provide contactors and controls to enable removal of variable-frequency controller from circuit.
    - a. Bypass Method: Manual, unless otherwise indicated.
    - b. Bypass Configuration: 3-contactor type, with contactors for bypass, drive output, and drive input.
    - c. Bypass Motor Starting Method: Full-voltage (across-the-line) with overload relay, unless otherwise indicated or required.
    - d. Overload Relays: Solid state or bimetallic thermal type.
  4. Pilot Devices Required:
    - a. Furnish local pilot devices for each unit as specified below unless otherwise indicated on drawings, except where equivalent function is provided by remote operator interface.
    - b. Packaged Controllers with Bypass:
      - 1) Bypass Mode Selector Switch: DRIVE/OFF/BYPASS.
      - 2) Motor Control Selector Switch: HAND/OFF/AUTO.
      - 3) Indicating Lights: For drive/bypass mode status, drive/bypass run status, and drive/bypass fault status.
- L. Service Conditions:
1. Provide controllers and associated components suitable for operation under following service conditions without derating:
    - a. Altitude: Less than 3,300 feet.
    - b. Ambient Temperature: Between 32 degrees F and 104 degrees F.
  2. Provide controllers and associated components suitable for operation at indicated ratings under service conditions at installed location.
- M. Short Circuit Current Rating:
1. Provide controllers with listed short circuit current rating not less than available fault current at installed location as determined by short circuit study performed in accordance with Section 260573.
  2. Provide line/input reactors where specified by manufacturer for required short circuit current rating.
- N. Conductor Terminations: Suitable for use with conductors to be installed.
- O. Enclosures:
1. Comply with NEMA ICS 6.
  2. NEMA 250 Environment Type or Equivalent IEC 60529 Rating: Unless otherwise indicated, as specified for following installation locations:
    - a. Outdoor Locations: Type 3R or Type 4.
  3. Finish: Manufacturer's standard unless otherwise indicated.
  4. Cooling: Forced air or natural convection as determined by manufacturer.
  5. Enclosure Space Heaters:
-

- a. Provide in each controller enclosure installed outdoors and in unconditioned indoor spaces.
- b. Size according to manufacturer's recommendations for worst case ambient temperature to prevent condensation.
- c. Heater Control: Thermostat.
- d. Heater Power Source: Provide connection to transformer factory-installed in enclosure or suitable external branch circuit as indicated or as required.

## **2.03 OVERCURRENT PROTECTIVE DEVICES**

- A. Overload Relays:
  1. Provide overload relays and, where applicable, associated current elements/heaters selected for actual installed motor nameplate data, in accordance with manufacturer's recommendations and NFPA 70; include consideration for motor service factor and ambient temperature correction, where applicable.
  2. Comply with NEMA ICS 2.
  3. Inverse-Time Trip Class Rating: Class 20 unless otherwise indicated or required.
  4. Trip-free operation.
  5. Visible trip indication.
  6. Resettable:
    - a. Employ manual reset unless otherwise indicated.
    - b. Do not employ automatic reset with two-wire control.

## **2.04 ACCESSORIES**

- A. Auxiliary Contacts:
  1. Comply with NEMA ICS 5.
  2. Provide number and type of contacts indicated or required to perform necessary functions, including holding (seal-in) circuit and interlocking, plus one normally open (NO) and one normally closed (NC) spare contact for each bypass motor starter, minimum.
- B. Pilot Devices:
  1. Comply with NEMA ICS 5; heavy-duty type.
  2. Pushbuttons: Unless otherwise indicated, provide momentary, nonilluminated type with flush button operator; normally open or normally closed as indicated or as required.
  3. Selector Switches: Unless otherwise indicated, provide maintained, nonilluminated type with knob operator; number of switch positions as indicated or as required.
  4. Indicating Lights: Push-to-test type unless otherwise indicated.
  5. Provide LED lamp source for indicating lights and illuminated devices.
- C. Control and Timing Relays:
  1. Comply with NEMA ICS 5.
  2. Provide number and type of relays indicated or required to perform necessary functions.
- D. Control Power Transformers:
  1. Size to accommodate burden of contactor coil(s) and connected auxiliary devices.
  2. Include primary and secondary fuses.

## **2.05 SOURCE QUALITY CONTROL**

- A. See Section 014000 - DO NOT USE BSD Quality Requirements, for additional requirements.
- B. Factory test controllers in accordance with NEMA ICS 61800-2.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that ratings of controllers are consistent with indicated requirements.
- C. Verify that mounting surfaces are ready to accept controllers.



- D. Verify that conditions are satisfactory for installation prior to starting work.

### **3.02 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Install in accordance with NEMA ICS 7.1 and manufacturer's instructions.
- C. Do not exceed manufacturer's recommended maximum cable length between controller and motor.
- D. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
- E. Provide required support and attachment in accordance with Section 230529.
- F. Install controllers plumb and level.
- G. Provide grounding and bonding in accordance with Section 260526.
- H. Install field-installed devices, components, and accessories.
- I. Where accessories are not self-powered, provide control power source as indicated or as required to complete installation.
- J. Set field-adjustable settings of controllers and associated components according to installed motor requirements, in accordance with recommendations of manufacturers of controller and load.

### **3.03 FIELD QUALITY CONTROL**

- A. See Section 014000 - DO NOT USE BSD Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.17. Insulation-resistance test on control wiring listed as optional is not required.
- D. Packaged Controllers with Bypass: Test for proper operation in both drive and bypass modes.
- E. Test for proper interface with other systems.
- F. Correct deficiencies and replace damaged or defective controllers or associated components.

### **3.04 ADJUSTING**

- A. Adjust tightness of mechanical and electrical connections to manufacturer's recommended torque settings.

### **3.05 CLEANING**

- A. Clean dirt and debris from controller enclosures and components according to manufacturer's instructions.
- B. Repair scratched or marred exterior surfaces to match original factory finish.

### **3.06 CLOSEOUT ACTIVITIES**

- A. See Section 017700 - Closeout Procedures, for closeout submittals.
- B. See Section 017900 - Demonstration and Training, for additional requirements.
- C. Demonstration: Demonstrate proper operation of controllers to Owner, and correct deficiencies or make adjustments as directed.
- D. Training: Train Owner's personnel on operation, adjustment, and maintenance of controllers and associated devices.
  - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
  - 2. Provide minimum of two hours of training.
  - 3. Location: At project site.

**3.07 PROTECTION**

- A. Protect installed controllers from subsequent construction operations.

**3.08 MAINTENANCE**

- A. See Section 017823 - Operation and Maintenance Data, for additional requirements relating to maintenance service.

**END OF SECTION 230934**

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**SECTION 231123  
FACILITY NATURAL-GAS PIPING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Pipe, pipe fittings, valves, and connections for natural gas piping systems.

**1.02 RELATED REQUIREMENTS**

- A. Section 078400 - Firestopping.
- B. Section 099123 - Interior Painting.
- C. Section 230553 - Identification for HVAC Piping and Equipment.

**1.03 REFERENCE STANDARDS**

- A. ANSI LC 1/CSA 6.26 - Fuel Gas Piping Systems Using Corrugated Stainless Steel Tubing 2019.
- B. ANSI Z21.18/CSA 6.3 - Gas Appliance Pressure Regulators 2019.
- C. ANSI Z21.80/CSA 6.22 - Line Pressure Regulators 2019.
- D. ANSI Z223.1 - National Fuel Gas Code 2021.
- E. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300 2021.
- F. ASME B31.1 - Power Piping 2022.
- G. ASME B31.9 - Building Services Piping 2020.
- H. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings 1999, with Editorial Revision (2022).
- I. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless 2022.
- J. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service 2023a.
- K. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube 2016.
- L. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings 2016.
- M. AWWA C606 - Grooved and Shouldered Joints 2022.
- N. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements 2018, with Editorial Revision (2020).
- O. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry 2018, with Editorial Revision (2020).
- P. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements 2017, with Editorial Revision (2020).
- Q. ICC-ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements 2023.
- R. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends 2010, with Errata .

**1.04 SUBMITTALS**

- A. See Section 013300 - Submittal Procedures, for submittal procedures.
- B. Product Data: Provide data on pipe materials, pipe fittings, valves, and accessories. Provide manufacturers catalog information. Indicate valve data and ratings.

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### 1.05 QUALITY ASSURANCE

- A. Perform work in accordance with applicable codes.
- B. Valves: Manufacturer's name and pressure rating marked on valve body.
- C. Identify pipe with marking including size, ASTM material classification, and ASTM specification.

### 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

### 1.07 FIELD CONDITIONS

- A. Do not install underground piping when bedding is wet or frozen.

## PART 2 PRODUCTS

### 2.01 NATURAL GAS PIPING, ABOVE GRADE

- A. Steel Pipe: ASTM A53/A53M, Schedule 40 black.
  - 1. Fittings: ASME B16.3, malleable iron, or ASTM A234/A234M, wrought steel welding type.
  - 2. Joints: Threaded or welded to ASME B31.1.
  - 3. Mechanical Press Sealed Fittings: Double pressed type and approved or certified, utilizing EPDM, non toxic synthetic rubber sealing elements.
    - a. Manufacturers:
      - 1) Apollo Valves; \_\_\_\_\_: [www.apollovalves.com/#sle](http://www.apollovalves.com/#sle).

### 2.02 FLANGES, UNIONS, AND COUPLINGS

- A. Unions for Pipe Sizes 3 Inches and Under:
  - 1. Ferrous Pipe: Class 150 malleable iron threaded unions.
- B. Flanges for Pipe Size Over 1 Inch:
  - 1. Ferrous Pipe: Class 150 malleable iron threaded or forged steel slip-on flanges; preformed neoprene gaskets.
- C. Mechanical Couplings for Grooved and Shouldered Joints: Two or more curved housing segments with continuous key to engage pipe groove, circular C-profile gasket, and bolts to secure and compress gasket.
  - 1. Dimensions and Testing: In accordance with AWWA C606.
  - 2. Housing Material: Provide ASTM A47/A47M malleable iron, ductile iron, or \_\_\_\_\_, galvanized.
  - 3. Gasket Material: EPDM suitable for operating temperature range from minus 30 degrees F to 230 degrees F.
  - 4. Bolts and Nuts: Hot dipped galvanized or zinc-electroplated steel.
  - 5. When pipe is field grooved, provide coupling manufacturer's grooving tools.
  - 6. Manufacturers:
    - a. Apollo Valves: [www.apollovalves.com/#sle](http://www.apollovalves.com/#sle).
    - b. Grinnell Products: [www.grinnell.com/#sle](http://www.grinnell.com/#sle).
- D. Dielectric Connections: Union with galvanized or plated steel threaded end, copper solder end, water impervious isolation barrier.

### 2.03 PIPE HANGERS AND SUPPORTS

- A. Provide hangers and supports that comply with MSS SP-58.
  - 1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
  - 2. Overhead Supports: Individual steel rod hangers attached to structure or to trapeze hangers.
    - a. Cold and Hot Pipe Sizes 6 Inches and Over: Double hangers.
  - 3. Trapeze Hangers: Welded steel channel frames attached to structure.
  - 4. Vertical Pipe Support: Steel riser clamp.

- B. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
  - 1. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
  - 2. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.
  - 3. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
  - 4. Masonry Screw Type Anchors: Complying with ICC-ES AC106.
  - 5. Concrete Adhesive Type Anchors: Complying with ICC-ES AC308.
  - 6. Other Types: As required.
  - 7. Manufacturers:
    - a. Powers Fasteners, Inc; \_\_\_\_\_: [www.powers.com/#sle](http://www.powers.com/#sle).

## 2.04 BALL VALVES

- A. Manufacturers:
  - 1. Apollo Valves; \_\_\_\_\_: [www.apollovalves.com/#sle](http://www.apollovalves.com/#sle).
  - 2. Grinnell Products; \_\_\_\_\_: [www.grinnell.com/#sle](http://www.grinnell.com/#sle).
  - 3. Milwaukee Valve Company; \_\_\_\_\_: [www.milwaukeevalve.com/#sle](http://www.milwaukeevalve.com/#sle).
  - 4. Nibco, Inc; \_\_\_\_\_: [www.nibco.com/#sle](http://www.nibco.com/#sle).
  - 5. Viega LLC; \_\_\_\_\_: [www.viega.us/#sle](http://www.viega.us/#sle).
  - 6. Uponor, Inc; \_\_\_\_\_: [www.uponorpro.com/#sle](http://www.uponorpro.com/#sle).
- B. Construction, 4 Inches and Smaller: MSS SP-110, Class 150, 400 psi CWP, bronze or ductile iron body, 304 stainless steel or chrome plated brass ball, regular port, Teflon seats and stuffing box ring, blow-out proof stem, lever handle with balancing stops, threaded or grooved ends with union.

## 2.05 PLUG VALVES

## 2.06 STRAINERS

- A. Manufacturers:
  - 1. Armstrong International, Inc: [www.armstronginternational.com/#sle](http://www.armstronginternational.com/#sle).
  - 2. Green Country Filter Manufacturing: [www.greencountryfilter.com/#sle](http://www.greencountryfilter.com/#sle).
  - 3. WEAMCO: [www.weamco.com/#sle](http://www.weamco.com/#sle).
- B. Size 2 inch and Under:
  - 1. Threaded brass body for 175 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.
  - 2. Class 150, threaded bronze body 300 psi CWP, Y pattern with 1/32 inch stainless steel perforated screen.
- C. Size 1-1/2 inch to 4 inch:
  - 1. Class 125, flanged iron body, Y pattern with 1/16 inch stainless steel perforated screen.
- D. Size 5 inch and Larger:
  - 1. Class 125, flanged iron body, basket pattern with 1/8 inch stainless steel perforated screen.

## 2.07 LINE PRESSURE REGULATORS AND APPLIANCE REGULATORS INDICATORS

- A. Manufacturers:
  - 1. Actaris Metering Systems (A brand of ITT Controls); \_\_\_\_\_: [www.actaris-metering-systems.com/#sle](http://www.actaris-metering-systems.com/#sle).
  - 2. Dungs Combustion Controls; \_\_\_\_\_: [www.dungs.com/#sle](http://www.dungs.com/#sle).
  - 3. Maxitrol Company; \_\_\_\_\_: [www.maxitrol.com/#sle](http://www.maxitrol.com/#sle).
- B. Compliance Requirements:
  - 1. Appliance Regulator: ANSI Z21.18/CSA 6.3.
  - 2. Line Pressure Regulator: ANSI Z21.80/CSA 6.22.
- C. Materials in Contact With Gas:
  - 1. Housing: Aluminum, steel (free of non-ferrous metals).
  - 2. Seals and Diaphragms: NBR-based rubber.

- D. Maximum Inlet Operating Pressure: 10 psi.
  - 1. Appliance Regulator: 10 psi.
  - 2. Line Pressure Regulator: 10 psi.
- E. Maximum Body Pressure: 10 psi.
- F. Output Pressure Range: 1 inch wc to 80 inch wc.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that excavations are to required grade, dry, and not over-excavated.

### **3.02 PREPARATION**

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt, on inside and outside, before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

### **3.03 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Provide non-conducting dielectric connections wherever jointing dissimilar metals.
- C. Route piping in orderly manner and maintain gradient. Route parallel and perpendicular to walls.
- D. Install piping to maintain headroom, conserve space, and not interfere with use of space.
- E. Group piping whenever practical at common elevations.
- F. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. Refer to Section 230516.
- G. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings.
- H. Provide access where valves and fittings are not exposed.
  - 1. Coordinate size and location of access doors with Section 083100.
- I. Install vent piping penetrating roofed areas to maintain integrity of roof assembly.
- J. Where pipe support members are welded to structural building framing, scrape, brush clean, and apply one coat of zinc rich primer to welding.
- K. Prepare exposed, unfinished pipe, fittings, supports, and accessories ready for finish painting.
  - 1. Painting of interior piping systems and components is specified in Section 099123.
- L. Install valves with stems upright or horizontal, not inverted.
- M. Pipe vents from gas pressure reducing valves to outdoors and terminate in weather proof hood.
- N. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813.
- O. Sleeve pipes passing through partitions, walls and floors.
- P. Inserts:
  - 1. Provide inserts for placement in concrete formwork.
  - 2. Provide inserts for suspending hangers from reinforced concrete slabs and sides of reinforced concrete beams.
  - 3. Provide hooked rod to concrete reinforcement section for inserts carrying pipe over 4 inches.
  - 4. Where concrete slabs form finished ceiling, locate inserts flush with slab surface.
  - 5. Where inserts are omitted, drill through concrete slab from below and provide through-bolt with recessed square steel plate and nut above slab.
- Q. Pipe Hangers and Supports:

1. Install in accordance with ASME B31.9.
2. Support horizontal piping as indicated.
3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
4. Place hangers within 12 inches of each horizontal elbow.
5. Use hangers with 1-1/2 inch minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
6. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
7. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
8. Provide copper plated hangers and supports for copper piping.
9. Prime coat exposed steel hangers and supports. Hangers and supports located in crawl spaces, pipe shafts, and suspended ceiling spaces are not considered exposed.
  - a. Painting of interior piping systems and components is specified in Section 099123.
  - b. Painting of exterior piping systems and components is specified in Section 099113.
10. Provide hangers adjacent to motor driven equipment with vibration isolation.

### **3.04 APPLICATION**

- A. Install unions downstream of valves and at equipment or apparatus connections.
- B. Install brass male adapters each side of valves in copper piped system. Solder adapters to pipe.
- C. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.
- D. Install ball valves for throttling, bypass, or manual flow control services.

### **3.05 SCHEDULES**

- A. Pipe Hanger Spacing:
  1. Metal Piping:
    - a. Pipe Size: 1/2 inches to 1-1/4 inches:
      - 1) Maximum Hanger Spacing: 6.5 ft.
      - 2) Hanger Rod Diameter: 3/8 inches.
    - b. Pipe Size: 1-1/2 inches to 2 inches:
      - 1) Maximum Hanger Spacing: 10 ft.
      - 2) Hanger Rod Diameter: 3/8 inch.
    - c. Pipe Size: 2-1/2 inches to 3 inches:
      - 1) Maximum Hanger Spacing: 10 ft.
      - 2) Hanger Rod Diameter: 1/2 inch.

**END OF SECTION 231123**

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## **SECTION 232113 HYDRONIC PIPING**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Hydronic system requirements.
- B. Heating water piping, above grade.
- C. Equipment drains and overflows.
- D. Pipe hangers and supports.
- E. Unions, flanges, mechanical couplings, and dielectric connections.
- F. Valves:
  - 1. Ball valves.
  - 2. Butterfly valves.
  - 3. Check valves.
  - 4. Pressure independent temperature control valves and balancing valves.
- G. Flow controls.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 078400 - Firestopping.
- B. Section 083100 - Access Doors and Panels.
- C. Section 220719 - Plumbing Piping Insulation.
- D. Section 230523 - General-Duty Valves for HVAC Piping.
- E. Section 230553 - Identification for HVAC Piping and Equipment.
- F. Section 230719 - HVAC Piping Insulation.
- G. Section 232500 - HVAC Water Treatment: Pipe cleaning.

#### **1.03 REFERENCE STANDARDS**

- A. ASME BPVC-IX - Boiler and Pressure Vessel Code, Section IX - Qualification Standard for Welding, Brazing, and Fusing Procedures; Welders; Brazers; and Welding, Brazing, and Fusing Operators 2023.
  - B. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300 2021.
  - C. ASME B16.15 - Cast Copper Alloy Threaded Fittings: Classes 125 and 250 2018.
  - D. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings 2021.
  - E. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings 2021.
  - F. ASME B16.34 - Valves — Flanged, Threaded, and Welding End 2020.
  - G. ASME B31.9 - Building Services Piping 2020.
  - H. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless 2022.
  - I. ASTM A106/A106M - Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service 2019a.
  - J. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service 2023a.
  - K. ASTM A536 - Standard Specification for Ductile Iron Castings 1984, with Editorial Revision (2019).
  - L. ASTM B32 - Standard Specification for Solder Metal 2020.
  - M. ASTM B88 - Standard Specification for Seamless Copper Water Tube 2022.
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- N. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric) 2020.
- O. ASTM D2855 - Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets 2020.
- P. ASTM F708 - Standard Practice for Design and Installation of Rigid Pipe Hangers 1992 (Reapproved 2022).
- Q. ASTM F1476 - Standard Specification for Performance of Gasketed Mechanical Couplings for Use in Piping Applications 2007 (Reapproved 2019).
- R. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding 2019.
- S. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020, with Errata (2022).
- T. AWWA C606 - Grooved and Shouldered Joints 2022.
- U. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation 2018, with Amendment (2019).

#### **1.04 SUBMITTALS**

- A. See Section 013300 - Submittal Procedures, for submittal procedures.
- B. Welders Certificate: Include welders certification of compliance with ASME BPVC-IX.
- C. Product Data:
  - 1. Include data on pipe materials, pipe fittings, valves, and accessories.
  - 2. Provide manufacturers catalog information.
  - 3. Indicate valve data and ratings.
  - 4. Show grooved joint couplings, fittings, valves, and specialties on drawings and product submittals, specifically identified with the manufacturer's style or series designation.
- D. Manufacturer's Installation Instructions: Indicate hanging and support methods, joining procedures.

#### **1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with minimum three years of documented experience.
- B. Provide all grooved joint couplings, fittings, valves, specialties, and grooving tools from a single manufacturer.

#### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.

### **PART 2 PRODUCTS**

#### **2.01 HYDRONIC SYSTEM REQUIREMENTS**

- A. Comply with ASME B31.9 and applicable federal, state, and local regulations.
- B. Piping: Provide piping, fittings, hangers, and supports as required, as indicated, and as follows:
  - 1. Where more than one piping system material is specified, provide joining fittings that are compatible with piping materials and ensure that the integrity of the system is not jeopardized.
  - 2. Use non-conducting dielectric connections whenever jointing dissimilar metals.
  - 3. Grooved mechanical joints may be used in accessible locations only.
    - a. Accessible locations include those exposed on interior of building, in pipe chases, and in mechanical rooms, aboveground outdoors, and as approved by Architect/Engineer.
    - b. Grooved mechanical connections and joints comply with AWWA C606.
      - 1) Steel: Comply with ASTM A106/A106M, Grade B or ASTM A53/A53M.
    - c. Use rigid joints unless otherwise indicated.

4. Provide pipe hangers and supports in accordance with ASME B31.9 or MSS SP-58 unless indicated otherwise.
- C. Pipe-to-Valve and Pipe-to-Equipment Connections: Use flanges, unions, or grooved couplings to allow disconnection of components for servicing; do not use direct welded, soldered, or threaded connections.
- D. Valves: Provide valves where indicated:
  1. Provide drain valves where indicated, and if not indicated, provide at least at main shut-off, low points of piping, bases of vertical risers, and at equipment. Use 3/4 inch gate valves with cap; pipe to nearest floor drain.
  2. Isolate equipment using butterfly valves with lug end flanges or grooved mechanical couplings.
  3. For throttling, bypass, or manual flow control services, use globe, ball, or butterfly valves.
  4. For throttling and isolation service in chilled and condenser water systems, use only butterfly valves.
- E. Welding Materials and Procedures: Comply with ASME BPVC-IX.

## **2.02 HEATING WATER PIPING, ABOVE GRADE**

- A. Steel Pipe: ASTM A53/A53M, Schedule 40, black, using one of the following joint types:
  1. Welded Joints: ASTM A234/A234M, wrought steel welding type fittings; AWS D1.1/D1.1M welded.
  2. Threaded Joints: ASME B16.3, malleable iron fittings.
  3. Grooved Joints: AWWA C606 grooved pipe, fittings of same material, and mechanical couplings.
- B. Copper Tube: ASTM B88 (ASTM B88M), Type K (A), drawn, using one of the following joint types:
  1. Solder Joints: ASME B16.18 cast brass/bronze or ASME B16.22 solder wrought copper fittings.
    - a. Solder: ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.
    - b. Braze: AWS A5.8M/A5.8 BCuP copper/silver alloy.
  2. Grooved Joints: AWWA C606 grooved tube, fittings of same material, and copper-tube-dimension mechanical couplings.
  3. Tee Connections: Mechanically extracted collars with notched and dimpled branch tube.
  4. Mechanical Press Sealed Fittings: Double pressed type complying with ASME B16.22, utilizing EPDM, nontoxic synthetic rubber sealing elements.
    - a. Manufacturers:
      - 1) Apollo Valves: [www.apollovalves.com/#sle](http://www.apollovalves.com/#sle).
      - 2) Grinnell Products: [www.grinnell.com/#sle](http://www.grinnell.com/#sle).
      - 3) Viega LLC: [www.viega.us/#sle](http://www.viega.us/#sle).

## **2.03 EQUIPMENT DRAINS AND OVERFLOWS**

- A. Steel Pipe: ASTM A53/A53M, Schedule 40 galvanized; using one of the following joint types:
  1. Threaded Joints: Galvanized cast iron, or ASME B16.3 malleable iron fittings.
  2. Grooved Joints: AWWA C606 grooved pipe, fittings of same material, and mechanical couplings.
- B. Copper Tube: ASTM B88 (ASTM B88M), Type K (A), drawn; using one of the following joint types:
  1. Solder Joints: ASME B16.18 cast brass/bronze or ASME B16.22 solder wrought copper fittings; ASTM B32 lead-free solder, HB alloy (95-5 tin-antimony) or tin and silver.
  2. Grooved Joints: AWWA C606 grooved pipe, fittings of same material, and mechanical couplings.

## **2.04 PIPE HANGERS AND SUPPORTS**

- A. Provide hangers and supports that comply with MSS SP-58.

1. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
  2. Hangers for Pipe Sizes 1/2 to 1-1/2 Inches: Malleable iron, adjustable swivel, split ring.
  3. Hangers for Cold Pipe Sizes 2 Inches and Greater: Carbon steel, adjustable, clevis.
  4. Hangers for Hot Pipe Sizes 2 to 4 Inches: Carbon steel, adjustable, clevis.
  5. Hangers for Hot Pipe Sizes 6 Inches and Greater: Adjustable steel yoke, cast iron roll, double hanger.
  6. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
  7. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
  8. Wall Support for Pipe Sizes 4 Inches and Greater: Welded steel bracket and wrought steel clamp.
  9. Wall Support for Hot Pipe Sizes 6 Inches and Greater: Welded steel bracket and wrought steel clamp with adjustable steel yoke and cast iron roll.
- B. In grooved installations, use rigid couplings with offsetting angle-pattern bolt pads or with wedge-shaped grooves in header piping to permit support and hanging in accordance with ASME B31.9.

## **2.05 UNIONS, FLANGES, MECHANICAL COUPLINGS, AND DIELECTRIC CONNECTIONS**

- A. Unions for Pipe 2 Inches and Less:
1. Ferrous Piping: 150 psig malleable iron, threaded.
  2. Copper Pipe: Bronze, soldered joints.
- B. Flanges for Pipe 2 Inches and Greater:
1. Ferrous Piping: 150 psig forged steel, slip-on.
  2. Copper Piping: Bronze.
  3. Gaskets: 1/16 inch thick, preformed neoprene.
- C. Mechanical Couplings for Grooved and Shouldered Joints: Two or more curved housing segments with continuous key to engage pipe groove, circular C-profile gasket, and bolts to secure and compress gasket.
1. Dimensions and Testing: In accordance with AWWA C606.
  2. Mechanical Couplings: Comply with ASTM F1476.
  3. Bolts and Nuts: Hot dipped galvanized or zinc-electroplated steel.
  4. When pipe is field grooved, provide coupling manufacturer's grooving tools.
- D. Dielectric Connections:
1. Flanges:
    - a. Dielectric flanges with same pressure ratings as standard flanges.
    - b. Water impervious insulation barrier capable of limiting galvanic current to 1 percent of short circuit current in a corresponding bimetallic joint.
    - c. Dry insulation barrier able to withstand 600-volt breakdown test.
    - d. Construct of galvanized steel with threaded end connections to match connecting piping.
    - e. Suitable for the required operating pressures and temperatures.
  2. Unions:
    - a. 1/2 to 1 Inches: Brass solder to galvanized FPT.
    - b. 1/2 to 2 Inches: Brass solder to galvanized FPT.
    - c. 1/2 to 1 Inches: Brass to galvanized FPT or FIP (Female Iron Pipe).
    - d. 3/4 to 1/2 Inch Reducer: Brass solder to galvanized FPT.
    - e. Service: 250 psi, minus 20 to 180 deg F.

## **2.06 BALL VALVES**

- A. Manufacturers:
1. Apollo Valves: [www.apollovalves.com/#sle](http://www.apollovalves.com/#sle).
  2. Grinnell Products: [www.grinnell.com/#sle](http://www.grinnell.com/#sle).
  3. Victaulic Company: [www.victaulic.com/#sle](http://www.victaulic.com/#sle).

- 4. Substitutions: See Section 016000 - Product Requirements.
- B. Up To and Including 2 Inches:
  - 1. Bronze one piece body, chrome plated brass ball, teflon seats and stuffing box ring, lever handle with balancing stops, solder ends with union.
- C. Over 2 Inches:
  - 1. Ductile iron body, chrome plated stainless steel ball, teflon or Virgin TFE seat and stuffing box seals, lever handle or gear operated, flanged ends, rated to 800 psi.

## **2.07 BUTTERFLY VALVES**

- A. Body: Cast or ductile iron with resilient replaceable EPDM seat, wafer, lug, or grooved ends, extended neck.
- B. Disc: Construct of aluminum bronze, chrome plated ductile iron, stainless steel, ductile iron with EPDM encapsulation, or Buna-N encapsulation.
- C. Operator: 10 position lever handle.

## **2.08 SWING CHECK VALVES**

- A. Manufacturers:
  - 1. Apollo Valves: [www.apollovalves.com/#sle](http://www.apollovalves.com/#sle).
  - 2. Grinnell Products: [www.grinnell.com/#sle](http://www.grinnell.com/#sle).
  - 3. Victaulic Company: [www.victaulic.com/#sle](http://www.victaulic.com/#sle).
- B. Up To and Including 2 Inches:
  - 1. Bronze body, bronze trim, bronze rotating swing disc, with composition disc, solder ends.
- C. Over 2 Inches:
  - 1. Iron body, bronze trim, stainless steel, bronze, or bronze faced rotating swing disc, renewable disc and seat, flanged or grooved ends.

## **2.09 PRESSURE INDEPENDENT TEMPERATURE CONTROL VALVES AND BALANCING VALVES**

- A. Manufacturers:
  - 1. Danfoss; AB-QM Valve: [www.danfoss.com/#sle](http://www.danfoss.com/#sle).
  - 2. Schneider Electric: [www.schneider-electric.us/#sle](http://www.schneider-electric.us/#sle).
- B. Control Valves: Factory-fabricated pressure independent with internal differential pressure regulator (DPRV), which automatically adjusts to normal changes in system pressure and provides 100 percent control valve authority at all positions of the valve.
  - 1. Maintain proportional and linear flow coil characteristics.
  - 2. PICV to accurately control the flow from 0 to 100 percent full rated flow with an operating pressure differential range of 3 to 60 psig.
  - 3. Provide control valve to incorporate control, balancing, and flow limiting. Hydronic system pressure independent control valve bodies to comply with ASME B16.34 or ASME B16.15 pressure and temperature class ratings based on the design operating temperature and 150 percent of the system design operating pressure and have the following characteristics:
    - a. 2 NPS and Smaller: Class 150 bronze or brass body with union connections, stainless steel trim, stainless steel rising stem, stainless steel disc or ball, and screwed ends with backseating capacity repackable under pressure.
    - b. 2-1/2 NPS and Larger: Class 125 iron or ductile iron body, stainless steel trim, stainless steel rising stem, stainless steel disc or ball, flanged ends with backseating capacity repackable under pressure.
    - c. Sizing: Line-size.
    - d. Fittings and Components: All fittings and components to meet ANSI standards and be compatible with readily available components. 8-inch valves and above to be provided with proper companion flanges.

- C. Electronic Actuators: Direct-mounted, self-calibrating type designed for minimum 60,000 full-stroke cycles at rated force.
- D. Provide actuator with visible position indication. Fail positions on power failure to include in-place, open or closed as indicated in the controls specifications.
  - 1. Valves: Sized for maximum circuit flow rate and nominally, line-sized.
  - 2. Overload Protection: Electronic overload or digital rotation-sensing circuitry.
  - 3. Fail-Safe Operation: Mechanical, spring-return mechanism or capacitance return.
  - 4. Power Requirements (Two-Position Spring Return): 24 VAC.
  - 5. Power Requirements (Modulating): Maximum 10 VA at 24 VAC or 8 watts at 24 VDC.
  - 6. Proportional Signal: 0 to 10 VDC or 2 to 10 VDC or 4 to 20 mA, and 2 to 10 VDC position feedback signal.
  - 7. Provide plenum-rated actuators for service above ceilings to possess UL listings and approvals.
  - 8. Temperature Rating: 40 to 104 degrees F.

## **2.10 FLOW CONTROLS**

- A. Manufacturers:
  - 1. Anvil International: [www.anvilintl.com/#sle](http://www.anvilintl.com/#sle).
  - 2. Griswold Controls: [www.griswoldcontrols.com/#sle](http://www.griswoldcontrols.com/#sle).
  - 3. Hays Fluid Controls: [www.haysfluidcontrols.com/#sle](http://www.haysfluidcontrols.com/#sle).
  - 4. ITT Bell & Gossett: [www.bellgossett.com/#sle](http://www.bellgossett.com/#sle).
  - 5. Shurjoint Piping Products, Inc: [www.shurjoint.com/#sle](http://www.shurjoint.com/#sle).
  - 6. Taco, Inc: [www.taco-hvac.com/#sle](http://www.taco-hvac.com/#sle).
  - 7. Victaulic Company: [www.victaulic.com/#sle](http://www.victaulic.com/#sle).
- B. Construction: Class 125, Brass or bronze body with union on inlet and outlet, temperature and pressure test plug on inlet and outlet, blowdown/backflush drain.
- C. Calibration: Control flow within 10 percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, minimum pressure 2 psi.

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Prepare pipe for grooved mechanical joints as required by coupling manufacturer.
- C. Remove scale and dirt on inside and outside before assembly.
- D. Prepare piping connections to equipment using jointing system specified.
- E. Keep open ends of pipe free from scale and dirt. Protect open ends with temporary plugs or caps.
- F. After completion, fill, clean, and treat systems. See Section 232500 for additional requirements.

### **3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.
- C. Route piping in orderly manner, parallel to building structure, and maintain gradient.
- D. Install piping to conserve building space and to avoid interference with use of space.
- E. Group piping whenever practical at common elevations.
- F. Sleeve pipe passing through partitions, walls, and floors.
- G. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified \_\_\_\_\_.

- H. Slope piping and arrange to drain at low points.
- I. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. See Section 220516.
- J. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment. See Section 230516.
- K. Grooved Joints:
  - 1. Install in accordance with the manufacturer's latest published installation instructions.
  - 2. Gaskets to be suitable for the intended service, molded, and produced by the coupling manufacturer.
- L. Pipe Hangers and Supports:
  - 1. Install in accordance with ASME B31.9, ASTM F708, or MSS SP-58.
  - 2. Install hangers to provide minimum 1/2-inch space between finished covering and adjacent work.
  - 3. Place hangers within 12 inches of each horizontal elbow.
  - 4. Use hangers with 1-1/2 inches minimum vertical adjustment. Design hangers for pipe movement without disengagement of supported pipe.
  - 5. Support vertical piping at every other floor. Support riser piping independently of connected horizontal piping.
  - 6. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.
  - 7. Provide copper plated hangers and supports for copper piping.
- M. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. See Section 220719.
- N. Provide clearance in hangers and from structure and other equipment for installation of insulation and access to valves and fittings. See Section 230719.
- O. Provide access where valves and fittings are not exposed. Coordinate size and location of access doors with Section 083100 .

### 3.03 SCHEDULES

- A. Hanger Spacing for Copper Tubing.
  - 1. 1/2 Inch and 3/4 inch: Maximum span, 5 feet; minimum rod size, 1/4 inch.
  - 2. 1 Inch: Maximum span, 6 feet; minimum rod size, 1/4 inch.
  - 3. 1-1/2 Inches and 2 Inches: Maximum span, 8 feet; minimum rod size, 3/8 inch.
  - 4. 2-1/2 Inches: Maximum span, 9 feet; minimum rod size, 3/8 inch.
  - 5. 3 Inches: Maximum span, 10 feet; minimum rod size, 3/8 inch.
  - 6. 4 Inches: Maximum span, 12 feet; minimum rod size, 1/2 inch.
  - 7. 6 Inches: Maximum span, 14 feet; minimum rod size, 1/2 inch.
- B. Hanger Spacing for Steel Piping.
  - 1. 1/2 Inch, 3/4 Inch, and 1 Inch: Maximum span, 7 feet; minimum rod size, 1/4 inch.
  - 2. 1-1/4 Inches: Maximum span, 8 feet; minimum rod size, 3/8 inch.
  - 3. 1-1/2 Inches: Maximum span, 9 feet; minimum rod size, 3/8 inch.
  - 4. 2 Inches: Maximum span, 10 feet; minimum rod size, 3/8 inch.
  - 5. 2-1/2 Inches: Maximum span, 11 feet; minimum rod size, 3/8 inch.
  - 6. 3 Inches: Maximum span, 12 feet; minimum rod size, 3/8 inch.
  - 7. 4 Inches: Maximum span, 14 feet; minimum rod size, 1/2 inch.
  - 8. 6 Inches: Maximum span, 17 feet; minimum rod size, 1/2 inch.

**END OF SECTION 232113**

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**SECTION 232114  
HYDRONIC SPECIALTIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Expansion tanks.
- B. Air vents.
- C. Air separators.
- D. Strainers.
- E. Suction diffusers.
- F. Pump connectors.
- G. Balancing valves.
- H. Relief valves.
- I. Pressure reducing valves.

**1.02 RELATED REQUIREMENTS**

- A. Section 232113 - Hydronic Piping.

**1.03 REFERENCE STANDARDS**

- A. ASME B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard 2020.
- B. ASME BPVC-VIII-1 - Boiler and Pressure Vessel Code, Section VIII, Division 1: Rules for Construction of Pressure Vessels 2023.

**1.04 SUBMITTALS**

- A. See Section 013300 - Submittal Procedures, for submittal procedures.
- B. Product Data: Provide product data for manufactured products and assemblies required for this project. Include component sizes, rough-in requirements, service sizes, and finishes. Include product description and model.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Accept valves on site in shipping containers with labeling in place. Inspect for damage.
- B. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.
- C. Protect piping systems from entry of foreign materials by temporary covers, completing sections of the work, and isolating parts of completed system.

**PART 2 PRODUCTS**

**2.01 EXPANSION TANKS**

- A. Manufacturers:
  - 1. Amtrol Inc: [www.amtrol.com/#sle](http://www.amtrol.com/#sle).
  - 2. ITT Bell & Gossett: [www.bellgossett.com/#sle](http://www.bellgossett.com/#sle).
  - 3. Taco, Inc: [www.taco-hvac.com/#sle](http://www.taco-hvac.com/#sle).
  - 4. Substitutions: See Section 016000 - Product Requirements.
- B. Construction: Welded steel, tested and stamped in accordance with ASME BPVC-VIII-1; supplied with National Board Form U-1, rated for working pressure of 125 psi, with flexible EPDM diaphragm or bladder sealed into tank, and steel support stand.

- C. Accessories: Pressure gauge and air-charging fitting, tank drain; precharge to 12 psi.
- D. Automatic Cold Water Fill Assembly: Pressure reducing valve, reduced pressure double check backflow preventer, test cocks, strainer, vacuum breaker, and valved by-pass.

## **2.02 AIR VENTS**

- A. Manufacturers:
  - 1. Armstrong International, Inc: [www.armstronginternational.com/#sle](http://www.armstronginternational.com/#sle).
  - 2. ITT Bell & Gossett: [www.bellgossett.com/#sle](http://www.bellgossett.com/#sle).
  - 3. Taco, Inc: [www.taco-hvac.com/#sle](http://www.taco-hvac.com/#sle).
- B. Manual Type: Short vertical sections of 2-inch diameter pipe to form air chamber, with 1/8 inch brass needle valve at top of chamber.
- C. Float Type:
  - 1. Brass or semi-steel body, copper, polypropylene, or solid non-metallic float, stainless steel valve and valve seat; suitable for system operating temperature and pressure; with isolating valve.
  - 2. Cast iron body and cover, float, bronze pilot valve mechanism suitable for system operating temperature and pressure; with isolating valve.

## **2.03 AIR SEPARATORS**

- A. Dip Tube Fitting (Where Not Provided By Boiler Manufacturer):
  - 1. Manufacturers:
    - a. ITT Bell & Gossett: [www.bellgossett.com/#sle](http://www.bellgossett.com/#sle).
    - b. Substitutions: See Section 016000 - Product Requirements.
  - 2. For 125 psi operating pressure; to prevent free air collected in boiler from rising into system.
- B. In-line Air Separators:
  - 1. Manufacturers:
    - a. Armstrong International, Inc: [www.armstronginternational.com/#sle](http://www.armstronginternational.com/#sle).
    - b. ITT Bell & Gossett: [www.bellgossett.com/#sle](http://www.bellgossett.com/#sle).
    - c. Taco, Inc: [www.taco-hvac.com/#sle](http://www.taco-hvac.com/#sle).
    - d. Substitutions: See Section 016000 - Product Requirements.
  - 2. Cast iron for sizes 1-1/2 inch and smaller, or steel for sizes 2 inch and larger; tested and stamped in accordance with ASME BPVC-VIII-1; for 125 psi operating pressure.

## **2.04 STRAINERS**

- A. Manufacturers:
  - 1. Armstrong International, Inc: [www.armstronginternational.com/#sle](http://www.armstronginternational.com/#sle).
  - 2. Flexicraft Industries: [www.flexicraft.com/#sle](http://www.flexicraft.com/#sle).
  - 3. Grinnell Products: [www.grinnell.com/#sle](http://www.grinnell.com/#sle).
  - 4. The Metraflex Company; LPD Y Strainer: [www.metralflex.com/#sle](http://www.metralflex.com/#sle).
- B. Size 2 inch and Under:
  - 1. Screwed brass or iron body for 175 psi working pressure, Y pattern with 1/32 inch stainless steel perforated screen.
- C. Size 2-1/2 inch to 4 inch:
  - 1. Provide flanged or grooved iron body for 175 psi working pressure, Y pattern with 1/16 inch or 3/64 inch stainless steel perforated screen.

## **2.05 SUCTION DIFFUSERS**

- A. Manufacturers:
  - 1. Anvil International: [www.anvilintl.com/#sle](http://www.anvilintl.com/#sle).
  - 2. Grinnell Products: [www.grinnell.com/#sle](http://www.grinnell.com/#sle).
  - 3. ITT Bell & Gossett: [www.bellgossett.com/#sle](http://www.bellgossett.com/#sle).
  - 4. Shurjoint Piping Products, Inc: [www.shurjoint.com/#sle](http://www.shurjoint.com/#sle).

5. Victaulic Company of America: [www.victaulic.com/#sle](http://www.victaulic.com/#sle).
- B. Fitting: Angle pattern, cast-iron body, threaded for 2 inch and smaller, flanged for 2-1/2 inch and larger, rated for 175 psi working pressure, with inlet vanes, cylinder strainer with 3/16 inch diameter openings, disposable 5/32 inch mesh strainer to fit over cylinder strainer, 20 mesh startup screen, and permanent magnet located in flow stream and removable for cleaning.
- C. Accessories: Adjustable foot support, blowdown tapping in bottom, gauge tapping in side.

## **2.06 PUMP CONNECTORS**

- A. Manufacturers:
  1. Anvil International; AnviFlex: [www.anvilintl.com/#sle](http://www.anvilintl.com/#sle).
  2. The Metraflex Company; Vane Flex: [www.metraflex.com/#sle](http://www.metraflex.com/#sle).
- B. Flexible Connectors: Flanged, braided type with wetted components of stainless steel, sized to match piping.
  1. Maximum Allowable Working Pressure: 150 psig at 120 degrees F.
  2. Accommodate the Following:
    - a. Axial Deflection in Compression and Expansion: \_\_\_\_\_ inch.
    - b. Lateral Movement: \_\_\_\_\_ inch.
    - c. Angular Rotation: 15 degrees.
    - d. Force developed by 1.5 times specified maximum allowable operating pressure.
  3. End Connections: Same as specified for pipe jointing.
  4. Provide pump connector with integral vanes to reduce turbulent flow.
  5. Provide necessary accessories including, but not limited to, swivel joints.

## **2.07 BALANCING VALVES**

- A. Manufacturers:
  1. Armstrong International, Inc: [www.armstronginternational.com/#sle](http://www.armstronginternational.com/#sle).
  2. Ferguson Enterprises Inc: [www.fnw.com/#sle](http://www.fnw.com/#sle).
  3. Hays Fluid Controls: [www.haysfluidcontrols.com/#sle](http://www.haysfluidcontrols.com/#sle).
  4. ITT Bell & Gossett: [www.bellgossett.com/#sle](http://www.bellgossett.com/#sle).
  5. Oventrop Corporation; Hydrocontrol F: [www.ventrop.com/#sle](http://www.ventrop.com/#sle).
  6. Taco, Inc: [www.taco-hvac.com/#sle](http://www.taco-hvac.com/#sle).
- B. Size 2 inch and Smaller:
  1. Provide ball or globe style with flow balancing, flow measurement, and shut-off capabilities, memory stops, minimum of two metering ports and NPT threaded or soldered connections.
  2. Metal construction materials consist of bronze or brass.
  3. Non-metal construction materials consist of Teflon, EPDM, or engineered resin.
- C. Size 2.5 inch and Larger:
  1. Provide ball, globe, or butterfly style with flow balancing, flow measurement, and shut-off capabilities, memory stops, minimum of two metering ports and flanged or grooved connections.
  2. Valve body construction materials consist of cast iron, carbon steel, or ductile iron.
  3. Internal components construction materials consist of brass, aluminum bronze, bronze, Teflon, EPDM, NORYL, or engineered resin.

## **2.08 RELIEF VALVES**

- A. Manufacturers:
  1. Apollo Valves: [www.apollovalves.com/#sle](http://www.apollovalves.com/#sle).
  2. Armstrong International, Inc: [www.armstronginternational.com/#sle](http://www.armstronginternational.com/#sle).
  3. ITT Bell & Gossett: [www.bellgossett.com/#sle](http://www.bellgossett.com/#sle).
- B. Bronze body, teflon seat, stainless steel stem and springs, automatic, direct pressure actuated, capacities ASME certified and labelled.

## **2.09 PRESSURE REDUCING VALVES**

- A. Manufacturers:
  - 1. Apollo Valves: [www.apollovalves.com/#sle](http://www.apollovalves.com/#sle).
  - 2. Armstrong International, Inc: [www.armstronginternational.com/#sle](http://www.armstronginternational.com/#sle).
  - 3. ITT Bell & Gossett: [www.bellgossett.com/#sle](http://www.bellgossett.com/#sle).
  - 4. Taco, Inc: [www.taco-hvac.com/#sle](http://www.taco-hvac.com/#sle).
- B. Operation: Automatically feeds make-up water to the hydronic system whenever pressure in the system drops below the pressure setting of the valve. Refer to Section 232113.
- C. Materials of Construction:
  - 1. Valve Body: Constructed of bronze, cast iron, brass, or iron.
  - 2. Internal Components: Construct of stainless steel or brass and engineered plastics or composition material.
- D. Connections:
  - 1. NPT threaded: 0.50 inch or 0.75 inch.
  - 2. Soldered: 0.50 inch.
- E. Provide integral check valve and strainer.
- F. Maximum Inlet Pressure: 100 psi.
- G. Maximum Fluid Temperature: 180 degrees F.
- H. Operating Pressure Range: Between 10 psi and 25 psi.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install specialties in accordance with manufacturer's instructions.
- B. Where large air quantities can accumulate, provide enlarged air collection standpipes.
- C. Provide manual air vents at system high points and as indicated.
- D. For automatic air vents in ceiling spaces or other concealed locations, provide vent tubing to nearest drain.
- E. Provide air separator on suction side of system circulation pump and connect to expansion tank.
- F. Provide valved drain and hose connection on strainer blowdown connection.
- G. Provide pump suction fitting on suction side of base-mounted centrifugal pumps where indicated. Remove temporary strainers after cleaning systems.
- H. Provide relief valves on pressure tanks, low-pressure side of reducing valves, heat exchangers, and expansion tanks.
- I. Select system relief valve capacity so that it is greater than make-up pressure reducing valve capacity. Select equipment relief valve capacity to exceed rating of connected equipment.
- J. Pipe relief valve outlet to nearest floor drain.

### **3.02 MAINTENANCE**

- A. See Section 017000 - Execution Requirements, for additional requirements relating to maintenance service.
- B. Explain corrective actions to Owner's maintenance personnel in person.

**END OF SECTION 232114**

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**SECTION 232123  
HYDRONIC PUMPS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. In-line circulators.
- B. Base-mounted pumps.

**1.02 RELATED REQUIREMENTS**

- A. Section 033000 - Cast-in-Place Concrete.
- B. Section 230719 - HVAC Piping Insulation.
- C. Section 232113 - Hydronic Piping.
- D. Section 232114 - Hydronic Specialties.

**1.03 REFERENCE STANDARDS**

- A. UL 778 - Standard for Motor-Operated Water Pumps Current Edition, Including All Revisions.

**1.04 SUBMITTALS**

- A. See Section 013300 Submittal Procedures, for submittal procedures.
- B. Product Data: Provide certified pump curves showing performance characteristics with pump and system operating point plotted. Include NPSH curve when applicable. Include electrical characteristics and connection requirements.
- C. Millwright's Certificate: Certify that base mounted pumps have been aligned.
- D. Manufacturer's Installation Instructions: Indicate hanging and support requirements and recommendations.
- E. Operation and Maintenance Data: Include installation instructions, assembly views, lubrication instructions, and replacement parts list.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Armstrong Fluid Technology, Inc: [www.armstrongfluidtechnology.com/#sle](http://www.armstrongfluidtechnology.com/#sle).
- B. Bell & Gossett, a Xylem Inc. brand: [www.bellgossett.com/#sle](http://www.bellgossett.com/#sle).
- C. Substitutions: See Section 016000 - Product Requirements.

**2.02 HVAC PUMPS - GENERAL**

- A. Provide pumps that operate at specified system fluid temperatures without vapor binding and cavitation, are non-overloading in parallel or individual operation, and operate within 25 percent of midpoint of published maximum efficiency curve.
- B. Minimum Quality Standard: UL 778.
- C. Base Mounted Pumps: Aligned by qualified millwright.
- D. Products Requiring Electrical Connection: Listed and classified by UL or testing agency acceptable to Authority Having Jurisdiction as suitable for the purpose specified and indicated.

**2.03 IN-LINE CIRCULATORS**

- A. Type: Horizontal shaft, single stage, direct connected, with resiliently mounted motor for in-line mounting, oil lubricated, for 125 psi maximum working pressure.
  - B. Casing: Cast iron, with flanged pump connections.
  - C. Impeller: Non-ferrous keyed to shaft.
  - D. Bearings: Oil-lubricated bronze sleeve.
  - E. Shaft: Alloy steel with bronze sleeve, integral thrust collar.
-

- F. Seal: Mechanical seal, 225 degrees F maximum continuous operating temperature.
- G. Drive: Flexible coupling.

#### **2.04 BASE-MOUNTED PUMPS**

- A. Type: Horizontal shaft, single stage, direct connected, radially or horizontally split casing, for 125 psi maximum working pressure.
- B. Casing: Cast iron, or ductile iron with suction and discharge gauge ports, renewable bronze casing wearing rings, seal flush connection, drain plug, flanged suction and discharge.
- C. Impeller: Bronze, fully enclosed, keyed to shaft.
- D. Bearings: Oil lubricated roller or ball bearings.
- E. Shaft: Alloy steel with copper, bronze, or stainless steel shaft sleeve.
- F. Seal: Mechanical seal, 225 degrees F maximum continuous operating temperature.
- G. Drive: Flexible coupling with coupling guard.
- H. Baseplate: Cast iron or fabricated steel with integral drain rim.

### **PART 3 EXECUTION**

#### **3.01 PREPARATION**

- A. Verify that electric power is available and of the correct characteristics.

#### **3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Provide access space around pumps for service. Provide no less than minimum space recommended by manufacturer.
- C. Decrease from line size with long radius reducing elbows or reducers. Support piping adjacent to pump such that no weight is carried on pump casings. For close-coupled or base-mounted pumps, provide supports under elbows on pump suction and discharge line sizes 4 inches and over.
- D. Provide line sized shut-off valve and strainer on pump suction, and line sized soft seat check valve and balancing valve on pump discharge.
- E. Provide air cock and drain connection on horizontal pump casings.
- F. Provide drains for bases and seals, piped to and discharging into floor drains.
- G. Check, align, and certify alignment of base-mounted pumps prior to start-up.
- H. Install close-coupled and base-mounted pumps on concrete housekeeping base, with anchor bolts, set and level, and grout in place. Refer to Section 033000.
- I. Lubricate pumps before start-up.
- J. Provide side-stream filtration system for closed loop systems. Install across pump with flow from pump discharge to pump suction from pump tapings.

#### **3.03 SCHEDULES**

- A. Pumps:
  - 1. Drawing Code:
  - 2. Manufacturer:
  - 3. Model:
  - 4. Seal Type:
  - 5. Head Pressure:

**END OF SECTION 232123**

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**SECTION 232300  
REFRIGERANT PIPING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Piping.
- B. Refrigerant.
- C. Moisture and liquid indicators.
- D. Valves.
- E. Strainers.
- F. Check valves.
- G. Filter-driers.
- H. Solenoid valves.
- I. Expansion valves.
- J. Flexible connections.

**1.02 RELATED REQUIREMENTS**

- A. Section 078400 - Firestopping.
- B. Section 230719 - HVAC Piping Insulation.
- C. Section 236213 - Packaged Air-Cooled Refrigerant Compressor and Condenser Units.
- D. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

**1.03 REFERENCE STANDARDS**

- A. AHRI 710 - Performance Rating of Liquid-Line Driers 2009.
- B. AHRI 730 (I-P) - Flow Capacity Rating of Suction Line Filters and Suction Line Filter Driers 2013 (Reapproved 2014).
- C. AHRI 750 - Thermostatic Refrigerant Expansion Valves 2007.
- D. AHRI 760 - Performance Rating of Solenoid Valves for Use With Volatile Refrigerants 2007.
- E. ASHRAE Std 15 - Safety Standard for Refrigeration Systems 2019, with All Amendments and Errata.
- F. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings 2021.
- G. ASME B31.5 - Refrigeration Piping and Heat Transfer Components 2022.
- H. ASME B31.9 - Building Services Piping 2020.
- I. ASTM B280 - Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service 2020.
- J. AWS A5.8M/A5.8 - Specification for Filler Metals for Brazing and Braze Welding 2019.
- K. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation 2018, with Amendment (2019).

**1.04 SYSTEM DESCRIPTION**

- A. Where more than one piping system material is specified ensure system components are compatible and joined to ensure the integrity of the system is not jeopardized. Provide necessary joining fittings. Ensure flanges, union, and couplings for servicing are consistently provided.
  - B. Provide pipe hangers and supports in accordance with ASME B31.5 unless indicated otherwise.
  - C. Liquid Indicators:
-

1. Use line size liquid indicators in main liquid line leaving condenser.
  2. If receiver is provided, install in liquid line leaving receiver.
  3. Use line size on leaving side of liquid solenoid valves.
- D. Valves:
1. Use service valves on suction and discharge of compressors.
  2. Use gauge taps at compressor inlet and outlet.
  3. Use check valves on compressor discharge.
  4. Use check valves on condenser liquid lines on multiple condenser systems.
- E. Refrigerant Charging (Packed Angle) Valve: Use in liquid line between receiver shut-off valve and expansion valve.
- F. Strainers:
1. Use line size strainer upstream of each automatic valve.
  2. Use shut-off valve on each side of strainer.
- G. Filter-Driers:
1. Use a filter-drier immediately ahead of liquid-line controls, such as thermostatic expansion valves, solenoid valves, and moisture indicators.
- H. Flexible Connectors: Utilize at or near compressors where piping configuration does not absorb vibration.

#### **1.05 SUBMITTALS**

- A. See Section 013300 - Submittal Procedures for submittal procedures.
- B. Product Data: Provide general assembly of specialties, including manufacturers catalogue information. Provide manufacturers catalog data including load capacity.
- C. Manufacturer's Installation Instructions: Indicate support, connection requirements, and isolation for servicing.
- D. Maintenance Data: Include instructions for changing cartridges, assembly views, spare parts lists.

#### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver and store piping and specialties in shipping containers with labeling in place.
- B. Protect piping and specialties from entry of contaminating material by leaving end caps and plugs in place until installation.
- C. Dehydrate and charge components such as piping and receivers, seal prior to shipment, until connected into system.

### **PART 2 PRODUCTS**

#### **2.01 REGULATORY REQUIREMENTS**

- A. Comply with ASME B31.9 for installation of piping system.

#### **2.02 PIPING**

- A. Copper Tube: ASTM B280, H58 hard drawn or O60 soft annealed.
  1. Fittings: ASME B16.22 wrought copper.
  2. Joints: Braze, AWS A5.8M/A5.8 BCuP silver/phosphorus/copper alloy.
- B. Pipe Supports and Anchors:
  1. Provide hangers and supports that comply with MSS SP-58.
    - a. If type of hanger or support for a particular situation is not indicated, select appropriate type using MSS SP-58 recommendations.
  2. Hangers for Pipe Sizes 2 Inches and Over: Carbon steel, adjustable, clevis.
  3. Multiple or Trapeze Hangers: Steel channels with welded spacers and hanger rods.
  4. Wall Support for Pipe Sizes to 3 Inches: Cast iron hook.
  5. Vertical Support: Steel riser clamp.



6. Copper Pipe Support: Carbon steel ring, adjustable, copper plated.
7. Hanger Rods: Mild steel threaded both ends, threaded one end, or continuous threaded.
8. Inserts: Malleable iron case of galvanized steel shell and expander plug for threaded connection with lateral adjustment, top slot for reinforcing rods, lugs for attaching to forms; size inserts to suit threaded hanger rods.

### **2.03 REFRIGERANT**

- A. Refrigerant: Use only refrigerants that have ozone depletion potential (ODP) of zero and global warming potential (GWP) of less than 50.

### **2.04 MOISTURE AND LIQUID INDICATORS**

- A. Indicators: Single port type, UL listed, with copper or brass body, flared or solder ends, sight glass, color coded paper moisture indicator with removable element cartridge and plastic cap; for maximum temperature of 200 degrees F and maximum working pressure of 500 psi.

### **2.05 VALVES**

- A. Diaphragm Packless Valves:
  1. UL listed, globe or angle pattern, forged brass body and bonnet, phosphor bronze and stainless steel diaphragms, rising stem and handwheel, stainless steel spring, nylon seat disc, solder or flared ends, with positive backseating; for maximum working pressure of 500 psi and maximum temperature of 275 degrees F.
- B. Packed Angle Valves:
  1. Forged brass or nickel plated forged steel, forged brass seal caps with copper gasket, rising stem and seat with backseating, molded stem packing, solder or flared ends; for maximum working pressure of 500 psi and maximum temperature of 275 degrees F.
- C. Ball Valves:
  1. Two piece bolted forged brass body with teflon ball seals and copper tube extensions, brass bonnet and seal cap, chrome plated ball, stem with neoprene ring stem seals; for maximum working pressure of 500 psi and maximum temperature of 300 degrees F.
- D. Service Valves:
  1. Forged brass body with copper stubs, brass caps, removable valve core, integral ball check valve, flared or solder ends, for maximum pressure of 500 psi.

### **2.06 STRAINERS**

- A. Straight Line or Angle Line Type:
  1. Brass or steel shell, steel cap and flange, and replaceable cartridge, with screen of stainless steel wire or monel reinforced with brass; for maximum working pressure of 430 psi.

### **2.07 CHECK VALVES**

- A. Globe Type:
  1. Cast bronze or forged brass body, forged brass cap with neoprene seal, brass guide and disc holder, phosphor-bronze or stainless steel spring, teflon seat disc; for maximum temperature of 300 degrees F and maximum working pressure of 425 psi.
- B. Straight Through Type:
  1. Brass body and disc, phosphor-bronze or stainless steel spring, neoprene seat; for maximum working pressure of 500 psi and maximum temperature of 200 degrees F.

### **2.08 FILTER-DRIERS**

- A. Performance:
  1. Flow Capacity - Liquid Line: 5 ton, minimum, rated in accordance with AHRI 710.
  2. Flow Capacity - Suction Line: 5 ton, minimum, rated in accordance with AHRI 730 (I-P).
  3. Pressure Drop: 2 psi, maximum, when operating at full connected evaporator capacity.
  4. Design Working Pressure: 350 psi, minimum.

- B. Cores: Molded or loose-fill molecular sieve desiccant compatible with refrigerant, activated alumina, activated charcoal, and filtration to 40 microns, with secondary filtration to 20 microns; of construction that will not pass into refrigerant lines.
- C. Construction: UL listed.
  - 1. Connections: As specified for applicable pipe type.

## **2.09 SOLENOID VALVES**

- A. Valve: AHRI 760 I-P, pilot operated, copper, brass or steel body and internal parts, synthetic seat, stainless steel stem and plunger assembly (permitting manual operation in case of coil failure), integral strainer, with flared, solder, or threaded ends; for maximum working pressure of 500 psi.
- B. Coil Assembly: UL 429 UL listed, replaceable with molded electromagnetic coil, moisture and fungus proof, with surge protector and color coded lead wires, integral junction box with pilot light.

## **2.10 EXPANSION VALVES**

- A. Angle or Straight Through Type: AHRI 750; design suitable for refrigerant, brass body, internal or external equalizer, bleed hole, adjustable superheat setting, replaceable inlet strainer, with non-replaceable capillary tube and remote sensing bulb and remote bulb well.
- B. Selection: Evaluate refrigerant pressure drop through system to determine available pressure drop across valve. Select valve for maximum load at design operating pressure and minimum 10 degrees F superheat. Select to avoid being undersized at full load and excessively oversized at part load.

## **2.11 FLEXIBLE CONNECTORS**

- A. Corrugated stainless steel hose with single layer of stainless steel exterior braiding, minimum 9 inches long with copper tube ends; for maximum working pressure of 500 psi.

# **PART 3 EXECUTION**

## **3.01 PREPARATION**

- A. Ream pipe and tube ends. Remove burrs. Bevel plain end ferrous pipe.
- B. Remove scale and dirt on inside and outside before assembly.
- C. Prepare piping connections to equipment with flanges or unions.

## **3.02 INSTALLATION**

- A. Install refrigeration specialties in accordance with manufacturer's instructions.
- B. Route piping in orderly manner, with plumbing parallel to building structure, and maintain gradient.
- C. Install piping to conserve building space and avoid interference with use of space.
- D. Group piping whenever practical at common elevations and locations. Slope piping one percent in direction of oil return.
- E. Install piping to allow for expansion and contraction without stressing pipe, joints, or connected equipment.
- F. Pipe Hangers and Supports:
  - 1. Install in accordance with ASME B31.5.
  - 2. Support horizontal piping as indicated.
  - 3. Install hangers to provide minimum 1/2 inch space between finished covering and adjacent work.
  - 4. Place hangers within 12 inches of each horizontal elbow.
  - 5. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

- G. Arrange piping to return oil to compressor. Provide traps and loops in piping, and provide double risers as required. Slope horizontal piping 0.40 percent in direction of flow.
- H. Provide clearance for installation of insulation and access to valves and fittings.
- I. Insulate piping and equipment; see Section 230716.
- J. Follow ASHRAE Std 15 procedures for charging and purging of systems and for disposal of refrigerant.
- K. Provide replaceable cartridge filter-driers, with isolation valves and valved bypass.
- L. Locate expansion valve sensing bulb immediately downstream of evaporator on suction line.
- M. Fully charge completed system with refrigerant after testing.

### **3.03 FIELD QUALITY CONTROL**

- A. See Section 014000 - DO NOT USE BSD Quality Requirements, for additional requirements.
- B. Test refrigeration system in accordance with ASME B31.5.
- C. Pressure test system with dry nitrogen to 200 psi. Perform final tests at 27 inches vacuum and 200 psi using halide torch. Test to no leakage.

### **3.04 SCHEDULES**

- A. Hanger Spacing for Copper Tubing.
  - 1. 1/2 inch, 5/8 inch, and 7/8 inch OD: Maximum span, 5 feet; minimum rod size, 1/4 inch.

**END OF SECTION 232300**

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**SECTION 232500  
HVAC WATER TREATMENT**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Materials.
  - 1. System cleaner.
  - 2. Closed system treatment (water).
- B. By-pass (pot) feeder.

**1.02 RELATED REQUIREMENTS**

- A. Section 016000 - Product Requirements: Owner furnished treatment equipment.
- B. Section 232113 - Hydronic Piping.
- C. Section 232114 - Hydronic Specialties.

**1.03 REFERENCE STANDARDS**

- A. FM (AG) - FM Approval Guide Current Edition.
- B. UL (DIR) - Online Certifications Directory Current Edition.

**1.04 SUBMITTALS**

- A. See Section 013300 - Submittal Procedures, for submittal procedures.
- B. Product Data: Provide chemical treatment materials, chemicals, and equipment including electrical characteristics and connection requirements.
- C. Manufacturer's Field Reports: Indicate start-up of treatment systems when completed and operating properly. Indicate analysis of system water after cleaning and after treatment.
- D. Project Record Documents: Record actual locations of equipment and piping, including sampling points and location of chemical injectors.
- E. Operation and Maintenance Data: Include data on chemical feed pumps, agitators, and other equipment including spare parts lists, procedures, and treatment programs. Include step by step instructions on test procedures including target concentrations.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 016000 - Product Requirements, for additional provisions.
  - 2. Sufficient chemicals for treatment and testing during required maintenance period.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience. Company shall have local representatives with water analysis laboratories and full time service personnel.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. AmSolv-Amrep, Inc: [www.amsolv.com/#sle](http://www.amsolv.com/#sle).
- B. GE Water & Process Technologies: [www.gewater.com/#sle](http://www.gewater.com/#sle).
- C. Nalco, an Ecolab Company: [www.nalco.com/#sle](http://www.nalco.com/#sle).
- D. MIS of America.

**2.02 REGULATORY REQUIREMENTS**

- A. Comply with applicable codes for addition of non-potable chemicals to building mechanical systems and to public sewage systems.
- B. Perform work in accordance with local health department regulations.

## **2.03 MATERIALS**

- A. System Cleaner:
  - 1. Liquid alkaline compound with emulsifying agents and detergents to remove grease and petroleum products; sodiumtripoly phosphate and sodium molybdate.
  - 2. Biocide chlorine release agents such as sodium hypochlorite or calcium hypochlorite or microbiocides such as quarternary ammonia compounds, tributyltin oxide, methylene bis (thiocyanate).
- B. Closed System Treatment (Water):
  - 1. Sequestering agent to reduce deposits and adjust pH; polyphosphate.
  - 2. Corrosion inhibitors; boron-nitrite, sodium nitrite and borax, sodium totyltriazole, low molecular weight polymers, phosphonates, sodium molybdate, or sulphites.
  - 3. Conductivity enhancers; phosphates or phosphonates.

## **2.04 BY-PASS (POT) FEEDER**

- A. Manufacturers:
  - 1. Griswold Controls: [www.griswoldcontrols.com/#sle](http://www.griswoldcontrols.com/#sle).
  - 2. J. L. Wingert Company: [www.jlwingert.com/#sle](http://www.jlwingert.com/#sle).
  - 3. Neptune, a brand of the Dover Company: [www.neptune1.com/#sle](http://www.neptune1.com/#sle).

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Systems shall be operational, filled, started, and vented prior to cleaning. Use water meter to record capacity in each system.
- B. Place terminal control valves in open position during cleaning.
- C. Verify that electric power is available and of the correct characteristics.

### **3.02 CLEANING SEQUENCE**

- A. Concentration:
  - 1. As recommended by manufacturer.
- B. Hot Water Heating Systems:
  - 1. Apply heat while circulating, slowly raising temperature to 160 degrees F and maintain for 12 hours minimum.
  - 2. Remove heat and circulate to 100 degrees F or less; drain systems as quickly as possible and refill with clean water.
  - 3. Circulate for 6 hours at design temperatures, then drain.
  - 4. Refill with clean water and repeat until system cleaner is removed.
- C. Use neutralizer agents on recommendation of system cleaner supplier.
- D. Flush open systems with clean water for one hour minimum. Drain completely and refill.
- E. Remove, clean, and replace strainer screens.
- F. Inspect, remove sludge, and flush low points with clean water after cleaning process is completed. Include disassembly of components as required.

### **3.03 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.

### **3.04 CLOSED SYSTEM TREATMENT**

- A. Provide one bypass feeder on each system. Install isolating and drain valves and necessary piping. Install around balancing valve downstream of circulating pumps unless indicated otherwise.
  - B. Introduce closed system treatment through bypass feeder when required or indicated by test.
  - C. Provide 3/4 inch water coupon rack around circulating pumps with space for 4 test specimens.
-

### **3.05 CLOSEOUT ACTIVITIES**

- A. Training: Train Owner's personnel on operation and maintenance of chemical treatment system.
  - 1. Provide minimum of two hours of instruction for two people.
  - 2. Have operation and maintenance data prepared and available for review during training.
  - 3. Conduct training using actual equipment after treated system has been put into full operation.

### **3.06 MAINTENANCE**

- A. Perform maintenance work using competent and qualified personnel under the supervision and in the direct employ of the equipment manufacturer or original installer.
- B. Provide service and maintenance of treatment systems for one year from Date of Substantial Completion.
- C. Provide monthly technical service visits to perform field inspections and make water analysis on-site. Detail findings in writing on proper practices, chemical treating requirements, and corrective actions needed. Submit two copies of field service report after each visit.
- D. Provide laboratory and technical assistance services during this maintenance period.
- E. Provide on-site inspections of equipment during scheduled or emergency shutdown to properly evaluate success of water treatment program, and make recommendations in writing based upon these inspections.

**END OF SECTION 232500**

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**SECTION 233100  
HVAC DUCTS AND CASINGS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Metal ductwork.
- B. Duct cleaning.

**1.02 RELATED REQUIREMENTS**

- A. Section 078400 - Firestopping.
- B. Section 230593 - Testing, Adjusting, and Balancing for HVAC.
- C. Section 233300 - Air Duct Accessories.
- D. Section 233700 - Air Outlets and Inlets.

**1.03 REFERENCE STANDARDS**

- A. ASHRAE (FUND) - ASHRAE Handbook - Fundamentals Most Recent Edition Cited by Referring Code or Reference Standard.
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2019.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2023.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023.
- E. ICC-ES AC01 - Acceptance Criteria for Expansion Anchors in Masonry Elements 2018, with Editorial Revision (2020).
- F. ICC-ES AC106 - Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry 2018, with Editorial Revision (2020).
- G. ICC-ES AC193 - Acceptance Criteria for Mechanical Anchors in Concrete Elements 2017, with Editorial Revision (2020).
- H. ICC-ES AC308 - Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements 2023.
- I. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems 2021.
- J. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible 2021.
- K. SMACNA (LEAK) - HVAC Air Duct Leakage Test Manual 2012.

**1.04 SUBMITTALS**

- A. See Section 013300 Submittal Procedures, for submittal procedures.
- B. Product Data: Provide data for duct materials.
- C. Shop Drawings: Indicate duct fittings, particulars such as gauges, sizes, welds, and configuration prior to start of work for \_\_\_\_\_ pressure class and higher systems.
- D. Test Reports: Indicate pressure tests performed. Include date, section tested, test pressure, and leakage rate, following SMACNA (LEAK).

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience, and approved by manufacturer.

**1.06 FIELD CONDITIONS**

- A. Do not install duct sealants when temperatures are less than those recommended by sealant manufacturers.

- B. Maintain temperatures within acceptable range during and after installation of duct sealants.

## **PART 2 PRODUCTS**

### **2.01 DUCT ASSEMBLIES**

- A. Regulatory Requirements: Construct ductwork to comply with NFPA 90A standards.
- B. Ducts: Galvanized steel, unless otherwise indicated.
- C. General Exhaust: 1 inch wg pressure class, galvanized steel.
- D. Combustion Air: 1/2 inch wg pressure class, galvanized steel.
- E. Transfer Air and Sound Boots: 1/2 inch wg pressure class, galvanized steel.

### **2.02 MATERIALS**

- A. Galvanized Steel for Ducts: Hot-dipped galvanized steel sheet, ASTM A653/A653M FS Type B, with G60/Z180 coating.
- B. Joint Sealers and Sealants: Non-hardening, water resistant, mildew and mold resistant.
  - 1. Type: Heavy mastic or liquid used alone or with tape, suitable for joint configuration and compatible with substrates, and recommended by manufacturer for pressure class of ducts.
  - 2. VOC Content: Not more than 250 g/L, excluding water.
  - 3. Surface Burning Characteristics: Flame spread index of zero and smoke developed index of zero, when tested in accordance with ASTM E84.
  - 4. Manufacturers:
    - a. Carlisle HVAC Products; Hardcast Versa-Grip 181 Water Based Fiber Reinforced Duct Sealant: [www.carlislehvac.com/#sle](http://www.carlislehvac.com/#sle).
    - b. Design Polymerics; DP 1010 Water Based Smooth Duct Sealant, Zero VOC, Premium Quality: [www.designpoly.com/#sle](http://www.designpoly.com/#sle).
    - c. Ductmate Industries, Inc, a DMI Company; \_\_\_\_\_: [www.ductmate.com/#sle](http://www.ductmate.com/#sle).
- C. Gasket Tape: Provide butyl rubber gasket tape for a flexible seal between transfer duct connector (TDC), transverse duct flange (TDF), applied flange connections, and angle rings connections.
- D. Hanger Rod: ASTM A36/A36M; steel, galvanized; threaded both ends, threaded one end, or continuously threaded.
- E. Hanger Fasteners: Attach hangers to structure using appropriate fasteners, as follows:
  - 1. Concrete Wedge Expansion Anchors: Complying with ICC-ES AC193.
  - 2. Masonry Wedge Expansion Anchors: Complying with ICC-ES AC01.
  - 3. Concrete Screw Type Anchors: Complying with ICC-ES AC193.
  - 4. Masonry Screw Type Anchors: Complying with ICC-ES AC106.
  - 5. Concrete Adhesive Type Anchors: Complying with ICC-ES AC308.
  - 6. Other Types: As required.

### **2.03 DUCTWORK FABRICATION**

- A. Fabricate and support in accordance with SMACNA (DCS) and as indicated.
- B. No variation of duct configuration or size permitted except by written permission. Size round duct installed in place of rectangular ducts in accordance with ASHRAE (FUND) Handbook - Fundamentals.
- C. Provide duct material, gauges, reinforcing, and sealing for operating pressures indicated.
- D. Construct T's, bends, and elbows with radius of not less than 1-1/2 times width of duct on centerline. Where not possible and where rectangular elbows must be used, provide air foil turning vanes of perforated metal with glass fiber insulation.
- E. Provide turning vanes of perforated metal with glass fiber insulation when acoustical lining is indicated.

- F. Increase duct sizes gradually, not exceeding 15 degrees divergence wherever possible; maximum 30 degrees divergence upstream of equipment and 45 degrees convergence downstream.
- G. Fabricate continuously welded round and oval duct fittings in accordance with SMACNA (DCS).

#### **2.04 MANUFACTURED DUCTWORK AND FITTINGS**

- A. Double Wall Insulated Rectangular Ducts: Rectangular spiral lockseam duct with galvanized steel outer wall, perforated galvanized steel inner wall; fitting with solid inner wall.
  - 1. Manufacture in accordance with SMACNA (DCS).
  - 2. Insulation:
    - a. Thickness: 1 inch.
    - b. Material: Air.

### **PART 3 EXECUTION**

#### **3.01 INSTALLATION**

- A. Install, support, and seal ducts in accordance with SMACNA (DCS).
- B. Install in accordance with manufacturer's instructions.
- C. During construction provide temporary closures of metal or taped polyethylene on open ductwork to prevent construction dust from entering ductwork system.
- D. Duct sizes indicated are inside clear dimensions. For lined ducts, maintain sizes inside lining.
- E. Provide openings in ductwork where required to accommodate thermometers and controllers. Provide pilot tube openings where required for testing of systems, complete with metal can with spring device or screw to ensure against air leakage. Where openings are provided in insulated ductwork, install insulation material inside a metal ring.
- F. Locate ducts with sufficient space around equipment to allow normal operating and maintenance activities.
- G. Use crimp joints with or without bead for joining round duct sizes 8 inch and smaller with crimp in direction of air flow.
- H. Use double nuts and lock washers on threaded rod supports.
- I. Connect terminal units to supply ducts directly or with one foot maximum length of flexible duct. Do not use flexible duct to change direction.
- J. Connect diffusers or light troffer boots to low pressure ducts directly or with 5 feet maximum length of flexible duct held in place with strap or clamp.

#### **3.02 CLEANING**

- A. Clean duct system and force air at high velocity through duct to remove accumulated dust. To obtain sufficient air, clean half the system at a time. Protect equipment that could be harmed by excessive dirt with temporary filters, or bypass during cleaning.

**END OF SECTION 233100**

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**SECTION 233300  
AIR DUCT ACCESSORIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Air turning devices/extractors.
- B. Backdraft dampers - metal.
- C. Backdraft dampers - fabric.
- D. Duct access doors.
- E. Duct test holes.
- F. Fire dampers.
- G. Flexible duct connectors.
- H. Volume control dampers.

**1.02 RELATED REQUIREMENTS**

- A. Section 078400 - Firestopping.
- B. Section 233100 - HVAC Ducts and Casings.

**1.03 REFERENCE STANDARDS**

- A. NFPA 90A - Standard for the Installation of Air-Conditioning and Ventilating Systems 2021.
- B. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible 2021.
- C. UL 33 - Safety Heat Responsive Links for Fire-Protection Service Current Edition, Including All Revisions.
- D. UL 555 - Standard for Fire Dampers Current Edition, Including All Revisions.

**1.04 SUBMITTALS**

- A. See Section 013300 - Submittal Procedures, for submittal procedures.
- B. Product Data: Provide for shop fabricated assemblies including volume control dampers, duct access doors, duct test holes, and hardware used. Include electrical characteristics and connection requirements.
- C. Shop Drawings: Indicate for shop fabricated assemblies including volume control dampers.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 016000 - Product Requirements, for additional provisions.
  - 2. Extra Fusible Links: One of each type and size.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Protect dampers from damage to operating linkages and blades.

**PART 2 PRODUCTS**

**2.01 AIR TURNING DEVICES/EXTRACTORS**

- A. Manufacturers:
    - 1. Carlisle HVAC Products; Dynair Hollow Vane and Rail (Double Wall Vane): [www.carlislehvac.com/#sle](http://www.carlislehvac.com/#sle).
    - 2. Elgen Manufacturing Company, Inc: [www.elgenmfg.com/#sle](http://www.elgenmfg.com/#sle).
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3. Krueger-HVAC, Division of Air System Components: [www.krueger-hvac.com/#sle](http://www.krueger-hvac.com/#sle).
  4. Ruskin Company: [www.ruskin.com/#sle](http://www.ruskin.com/#sle).
  5. Titus HVAC, a brand of Johnson Controls: [www.titus-hvac.com/#sle](http://www.titus-hvac.com/#sle).
  6. Ward Industries, a brand of Hart and Cooley, Inc: [www.wardind.com/#sle](http://www.wardind.com/#sle).
- B. Multi-blade device with blades aligned in short dimension; steel construction; with individually adjustable blades, mounting straps.

## **2.02 BACKDRAFT DAMPERS - METAL**

- A. Manufacturers:
1. Louvers & Dampers, Inc, a brand of Mestek, Inc: [www.louvers-dampers.com/#sle](http://www.louvers-dampers.com/#sle).
  2. Nailor Industries, Inc: [www.nailor.com/#sle](http://www.nailor.com/#sle).
  3. Ruskin Company: [www.ruskin.com/#sle](http://www.ruskin.com/#sle).
  4. United Enertech: [www.unitedenertech.com/#sle](http://www.unitedenertech.com/#sle).
- B. Gravity Backdraft Dampers, Size 18 by 18 inches or Smaller, Furnished with Air Moving Equipment: Air moving equipment manufacturer's standard construction.
- C. Multi-Blade, Parallel Action Gravity Balanced Backdraft Dampers: Galvanized steel, with center pivoted blades of maximum 6 inch width, with felt or flexible vinyl sealed edges, linked together in rattle-free manner with 90 degree stop, steel ball bearings, and plated steel pivot pin; adjustment device to permit setting for varying differential static pressure.

## **2.03 BACKDRAFT DAMPERS - FABRIC**

- A. Fabric Backdraft Dampers: Factory-fabricated.
1. Blades: Neoprene coated fabric material.
  2. Birdscreen: 1/2 inch nominal mesh of galvanized steel or aluminum.
  3. Maximum Velocity: 1000 fpm (5 mps) face velocity.

## **2.04 DUCT ACCESS DOORS**

- A. Manufacturers:
1. Ductmate Industries, Inc, a DMI Company: [www.ductmate.com/#sle](http://www.ductmate.com/#sle).
  2. Elgen Manufacturing Company, Inc: [www.elgenmfg.com/#sle](http://www.elgenmfg.com/#sle).
  3. Nailor Industries, Inc: [www.nailor.com/#sle](http://www.nailor.com/#sle).
  4. Ruskin Company: [www.ruskin.com/#sle](http://www.ruskin.com/#sle).
  5. Substitutions: See Section 016000 - Product Requirements.
- B. Fabricate in accordance with SMACNA (DCS) and as indicated.
- C. Access doors with sheet metal screw fasteners are not acceptable.

## **2.05 DUCT TEST HOLES**

- A. Temporary Test Holes: Cut or drill in ducts as required. Cap with neat patches, neoprene plugs, threaded plugs, or threaded or twist-on metal caps.

## **2.06 FIRE DAMPERS**

- A. Manufacturers:
1. Lloyd Industries, Inc: [www.firedamper.com/#sle](http://www.firedamper.com/#sle).
  2. Nailor Industries, Inc: [www.nailor.com/#sle](http://www.nailor.com/#sle).
  3. Ruskin Company: [www.ruskin.com/#sle](http://www.ruskin.com/#sle).
  4. United Enertech: [www.unitedenertech.com/#sle](http://www.unitedenertech.com/#sle).
  5. Ward Industries, a brand of Hart and Cooley, Inc; \_\_\_\_: [www.wardind.com/#sle](http://www.wardind.com/#sle).
  6. Substitutions: See Section 016000 - Product Requirements.
- B. Fabricate in accordance with NFPA 90A and UL 555, and as indicated.
- C. Horizontal Dampers: Galvanized steel, 22 gauge, 0.0299 inch frame, stainless steel closure spring, and lightweight, heat retardant non-asbestos fabric blanket.
- D. Fusible Links: UL 33, separate at 160 degrees F with adjustable link straps for combination fire/balancing dampers.

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## 2.07 FLEXIBLE DUCT CONNECTORS

- A. Manufacturers:
  - 1. Carlisle HVAC Products; Dynair Connector Plus G90 Steel Offset Seam Neoprene Fabric: [www.carlislehvac.com/#sle](http://www.carlislehvac.com/#sle).
  - 2. Ductmate Industries, Inc, a DMI Company: [www.ductmate.com/#sle](http://www.ductmate.com/#sle).
  - 3. Elgen Manufacturing Company, Inc: [www.elgenmfg.com/#sle](http://www.elgenmfg.com/#sle).
- B. Fabricate in accordance with SMACNA (DCS) and as indicated.
- C. Flexible Duct Connections: Fabric crimped into metal edging strip.
- D. Maximum Installed Length: 14 inch.

## 2.08 VOLUME CONTROL DAMPERS

- A. Manufacturers:
  - 1. Louvers & Dampers, Inc, a brand of Mestek, Inc: [www.louvers-dampers.com/#sle](http://www.louvers-dampers.com/#sle).
  - 2. Nailor Industries, Inc: [www.nailor.com/#sle](http://www.nailor.com/#sle).
  - 3. Ruskin Company: [www.ruskin.com/#sle](http://www.ruskin.com/#sle).
  - 4. United Enertech: [www.unitedenertech.com/#sle](http://www.unitedenertech.com/#sle).
  - 5. Substitutions: See Section 016000 - Product Requirements.
- B. Fabricate in accordance with SMACNA (DCS) and as indicated.
- C. Splitter Dampers:
- D. Single Blade Dampers:
  - 1. Fabricate for duct sizes up to 6 by 30 inch.
  - 2. Blade: 24 gauge, 0.0239 inch, minimum.
- E. Multi-Blade Damper: Fabricate of opposed blade pattern with maximum blade sizes 8 by 72 inch. Assemble center and edge crimped blades in prime coated or galvanized channel frame with suitable hardware.
  - 1. Blade: 18 gauge, 0.0478 inch, minimum.
- F. End Bearings: Except in round ducts 12 inches and smaller, provide end bearings. On multiple blade dampers, provide oil-impregnated nylon, thermoplastic elastomer, or sintered bronze bearings.

## PART 3 EXECUTION

### 3.01 PREPARATION

- A. Verify that electric power is available and of the correct characteristics.

### 3.02 INSTALLATION

- A. Install accessories in accordance with manufacturer's instructions, NFPA 90A, and follow SMACNA (DCS). Refer to Section 233100 for duct construction and pressure class.
  - B. Provide backdraft dampers on exhaust fans or exhaust ducts nearest to outside and where indicated.
  - C. Provide duct access doors for inspection and cleaning before and after filters, coils, fans, automatic dampers, at fire dampers, combination fire and smoke dampers, and elsewhere as indicated. Provide minimum 8 by 8 inch size for hand access, size for shoulder access, and as indicated. Provide 4 by 4 inch for balancing dampers only. Review locations prior to fabrication.
  - D. Provide duct test holes where indicated and required for testing and balancing purposes.
  - E. Provide fire dampers and smoke dampers at locations indicated, where ducts and outlets pass through fire rated components, and where required by Authorities Having Jurisdiction. Install with required perimeter mounting angles, sleeves, breakaway duct connections, corrosion resistant springs, bearings, bushings and hinges.
  - F. Demonstrate re-setting of fire dampers to Owner's representative.
-

- G. At equipment supported by vibration isolators, provide flexible duct connections immediately adjacent to the equipment.
- H. Provide balancing dampers at points on supply, return, and exhaust systems where branches are taken from larger ducts as required for air balancing. Install minimum 2 duct widths from duct take-off.
- I. Use splitter dampers only where indicated.
- J. Provide balancing dampers on duct take-off to diffusers, grilles, and registers, regardless of whether dampers are specified as part of the diffuser, grille, or register assembly.

**END OF SECTION 233300**



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**SECTION 233423  
HVAC POWER VENTILATORS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Roof exhausters.

**1.02 RELATED REQUIREMENTS**

- A. Section 230513 - Common Motor Requirements for HVAC Equipment.
- B. Section 233300 - Air Duct Accessories: Backdraft dampers.
- C. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

**1.03 REFERENCE STANDARDS**

- A. AMCA (DIR) - (Directory of) Products Licensed Under AMCA International Certified Ratings Program 2015.
- B. AMCA 99 - Standards Handbook 2016.
- C. AMCA 204 - Balance Quality and Vibration Levels for Fans 2020.
- D. AMCA 210 - Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating 2016.
- E. AMCA 300 - Reverberant Room Method for Sound Testing of Fans 2014.
- F. AMCA 301 - Methods for Calculating Fan Sound Ratings from Laboratory Test Data 2022.

**1.04 SUBMITTALS**

- A. See Section 013300 - Submittal Procedures, for submittal procedures.
- B. Product Data: Provide data on fans and accessories including fan curves with specified operating point clearly plotted, power, RPM, sound power levels at rated capacity, and electrical characteristics and connection requirements.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Carnes, a division of Carnes Company Inc: [www.carnes.com/#sle](http://www.carnes.com/#sle).
- B. Greenheck Fan Corporation: [www.greenheck.com/#sle](http://www.greenheck.com/#sle).
- C. Loren Cook Company: [www.lorencook.com/#sle](http://www.lorencook.com/#sle).
- D. PennBarry, Division of Air System Components: [www.pennbarry.com/#sle](http://www.pennbarry.com/#sle).
- E. Twin City Fan & Blower: [www.tcf.com/#sle](http://www.tcf.com/#sle).

**2.02 POWER VENTILATORS - GENERAL**

- A. Static and Dynamically Balanced: AMCA 204 - Balance Quality and Vibration Levels for Fans.
- B. Performance Ratings: Determined in accordance with AMCA 210 and bearing the AMCA Certified Rating Seal.
- C. Sound Ratings: AMCA 301, tested to AMCA 300 and bearing AMCA Certified Sound Rating Seal.
- D. Fabrication: Comply with AMCA 99.
- E. Electrical Components: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

## **2.03 ROOF VENTILATORS**

- A. Basis of Design: Carnes, a division of Carnes Company Inc: [www.carnes.com/#sle](http://www.carnes.com/#sle).
  - 1. Belt Drive, Down-Blast Discharge: VEBK.
  - 2. Direct Drive, Down-Blast Discharge: VEDK.
- B. Fan Unit: V-belt or direct driven as indicated, with spun aluminum housing; resilient mounted motor; 1/2 inch mesh, 0.62 inch thick aluminum wire birdscreen; square base to suit roof curb with continuous curb gaskets.
- C. Roof Curb: 8 inch high self-flashing of galvanized steel with continuously welded seams, built-in cant strips.
- D. Disconnect Switch: Factory wired, non-fusible, in housing for thermal overload protected motor and wall mounted multiple speed switch.
- E. Backdraft Damper: Gravity actuated, aluminum multiple blade construction, felt edged with offset hinge pin, nylon bearings, blades linked, and line voltage motor drive, power open, spring return.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Secure roof exhausters with cadmium plated steel lag screws to roof curb.
- C. Extend ducts to roof exhausters into roof curb. Counterflash duct to roof opening.

### **3.02 SCHEDULES**

- A. Drawing Code:
- B. Manufacturer:
- C. Model:
- D. Fan Type:
- E. Hood/Housing:
- F. Air Flow Capacity:
- G. Static Pressure:
- H. Drive:
- I. Fan RPM:
- J. Motor hp:
  - 1. Electrical Characteristics:
- K. Sound (Sones):
- L. Sound Power:
  - 1. 1st Octave:
  - 2. 2nd Octave:
  - 3. 3rd Octave:
  - 4. 4th Octave:
  - 5. 5th Octave:
  - 6. 6th Octave:
  - 7. 7th Octave:
  - 8. 8th Octave:
- M. Accessories:
  - 1. Curb Size:
  - 2. Damper Size:

**END OF SECTION 233423**

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**SECTION 233700  
AIR OUTLETS AND INLETS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Registers/grilles:
  - 1. Ceiling-mounted, exhaust and return register/grilles.
- B. Goosenecks.

**1.02 REFERENCE STANDARDS**

- A. AHRI 880 (I-P) - Performance Rating of Air Terminals 2017.
- B. AMCA 500-L - Laboratory Methods of Testing Louvers for Rating 2012, with Editorial Revision (2015).
- C. ASHRAE Std 70 - Method of Testing the Performance of Air Outlets and Air Inlets 2006 (Reaffirmed 2021).
- D. SMACNA (ASMM) - Architectural Sheet Metal Manual 2012.
- E. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible 2021.

**1.03 SUBMITTALS**

- A. See Section 013300 - Submittal Procedures, for submittal procedures.
- B. Product Data: Provide data for equipment required for this project. Review outlets and inlets as to size, finish, and type of mounting prior to submission. Submit schedule of outlets and inlets showing type, size, location, application, and noise level.

**1.04 QUALITY ASSURANCE**

- A. Test and rate air outlet and inlet performance in accordance with ASHRAE Std 70.
- B. Test and rate louver performance in accordance with AMCA 500-L.
- C. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Krueger-HVAC: [www.krueger-hvac.com/#sle](http://www.krueger-hvac.com/#sle).
- B. Price Industries: [www.price-hvac.com/#sle](http://www.price-hvac.com/#sle).
- C. Ruskin Company: [www.ruskin.com/#sle](http://www.ruskin.com/#sle).
- D. Substitutions: See Section 016000 - Product Requirements.

**2.02 CEILING EXHAUST AND RETURN REGISTERS/GRILLES**

- A. Manufacturers:
    - 1. Krueger-HVAC: [www.krueger-hvac.com/#sle](http://www.krueger-hvac.com/#sle).
  - B. Type: Streamlined blades, 3/4 inch minimum depth, 3/4 inch maximum spacing, with blades set at 45 degrees, vertical face.
  - C. Frame: 1-1/4 inch margin with countersunk screw mounting.
  - D. Fabrication: Steel with 20 gauge, 0.0359 inch minimum frames and 22 gauge, 0.0299 inch minimum blades, steel and aluminum with 20 gauge, 0.0359 inch minimum frame, or aluminum extrusions, with factory baked enamel finish.
  - E. Fabrication: Stainless steel with 20 gauge, 0.0359 inch minimum frames and 22 gauge, 0.0299 inch minimum blades, steel and aluminum with 20 gauge, 0.0359 inch minimum frame.
  - F. Color: As indicated.
-

- G. Damper: Integral, gang-operated, opposed blade type with removable key operator, operable from face where not individually connected to exhaust fans.

### **2.03 GOOSENECKS**

- A. Fabricate in accordance with of minimum 18 gauge, 0.0598 inch galvanized steel.
- B. Mount on minimum 12 inch high curb base where size exceeds 9 by 9 inch.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Comply with SMACNA (ASMM) for flashing/counter-flashing of roof penetrations and supports for roof curbs and roof mounted equipment.
- C. Check location of outlets and inlets and make necessary adjustments in position to comply with architectural features, symmetry, and lighting arrangement.
- D. Install diffusers to ductwork with air tight connection.
- E. Provide balancing dampers on duct take-off to diffusers, and grilles and registers, despite whether dampers are specified as part of the diffuser, or grille and register assembly.
- F. Paint ductwork visible behind air outlets and inlets matte black. Refer to Section 099123.

### **3.02 AIR OUTLET AND INLET SCHEDULE**

- A. Drawing Code:
- B. Manufacturer:
- C. Model:
- D. Description:
- E. Finish:
- F. Service:
- G. Mounting:
- H. Accessories:

**END OF SECTION 233700**

**SECTION 235100  
BREECHINGS, CHIMNEYS, AND STACKS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Manufactured breechings.
- B. Refractory lined metal stacks.
- C. Double wall metal stacks.

**1.02 RELATED REQUIREMENTS**

- A. Section 078400 - Firestopping.
- B. Section 230716 - HVAC Equipment Insulation.

**1.03 REFERENCE STANDARDS**

- A. ASTM C401 - Standard Classification of Alumina and Alumina-Silicate Castable Refractories 2012 (Reapproved 2022).
- B. NFPA 31 - Standard for the Installation of Oil-Burning Equipment 2020.
- C. NFPA 54 - National Fuel Gas Code 2021.
- D. NFPA 82 - Standard on Incinerators and Waste and Linen Handling Systems and Equipment 2019.
- E. NFPA 211 - Standard for Chimneys, Fireplaces, Vents, and Solid Fuel-Burning Appliances 2019.
- F. SMACNA (DCS) - HVAC Duct Construction Standards Metal and Flexible 2021.
- G. UL 103 - Factory-Built Chimneys for Residential Type and Building Heating Appliances Current Edition, Including All Revisions.
- H. UL 959 - Medium Heat Appliance Factory Built Chimneys Current Edition, Including All Revisions.

**1.04 DEFINITIONS**

- A. Breeching: Vent connector.
- B. Chimney: Primarily vertical shaft enclosing at least one vent for conducting flue gases outdoors.
- C. Smoke Pipe: Round, single wall vent connector.
- D. Vent: That portion of a venting system designed to convey flue gases directly outdoors from a vent connector or from an appliance when a vent connector is not used.
- E. Vent Connector: That part of a venting system that conducts the flue gases from the flue collar of an appliance to a chimney or vent, and may include a draft control device.

**1.05 SUBMITTALS**

- A. See Section 013300 - Submittal Procedures, for submittal procedures.
- B. Product Data: Provide data indicating factory built chimneys, including dimensional details of components and flue caps, dimensions and weights, electrical characteristics and connection requirements.
- C. Shop Drawings: Indicate general construction, dimensions, weights, support and layout of breechings. Submit layout drawings indicating plan view and elevations where factory built units are used.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Breechings, Chimneys, and Stacks:
-

1. AMPCO by Hart & Cooley, Inc; Model VSI: [www.ampcostacks.com/#sle](http://www.ampcostacks.com/#sle).
2. DuraVent; DuraStack Pro (DIS2): [www.duravent.com/#sle](http://www.duravent.com/#sle).
3. Metal-Fab, Inc: [www.mtlfab.com/#sle](http://www.mtlfab.com/#sle).
4. Security Chimneys International; Secure Stack Pro (CIX2):  
[www.securitychimneys.com/#sle](http://www.securitychimneys.com/#sle).

## **2.02 BREECHINGS, CHIMNEYS, AND STACKS - GENERAL REQUIREMENTS**

- A. Regulatory Requirements:
  1. Comply with applicable codes for installation of natural gas burning appliances and equipment.
  2. Comply with NFPA 31 for installation of oil burning appliances and equipment.
  3. Factory-built vents and chimneys used for venting natural draft appliances to comply with NFPA 211 and UL listed and labeled.
  4. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

## **2.03 MANUFACTURED BREECHINGS**

- A. Provide factory-built, modular connector and manifold system, tested to UL 103 with positive pressure rating.
- B. Assembly to be UL listed for use with building equipment in compliance with NFPA 211.
- C. Fabricate with 1 inch minimum air space between walls and construct inner liner of 304 stainless steel and outer jacket of 304 stainless steel.
  1. Protect aluminized steel surfaces exposed to the elements with a minimum of one base coat of primer and one finish coat of corrosion resistant paint suitable for outer jacket skin temperatures of the application.
- D. Design, fabricate, and install gas-tight preventing products of combustion leaking into the building.
  1. Securely connect inner joints and seal with factory supplied overlapping V-bands and appropriate sealant in accordance with manufacturer's instructions.
  2. System design to compensate for all flue gas induced thermal expansion.

## **2.04 REFRACTORY LINED METAL STACKS**

- A. Fabricate jacket for size 36 inches and smaller of 24 gauge, 0.0239 inch galvanized steel with grooved seam joint, or 26 gauge, 0.0179 inch aluminized steel with riveted seams. For sizes 39 inches and larger fabricate of 11 gauge, 0.1196 inch galvanized steel with welded seam joint.
- B. Weld heavy gauge stack sections together in factory. Factory apply heat resistant paint to each stack section and accessory with primer and finish paint. Touch-up or refinish in field.
- C. Refractory lining to be a minimum 2 inch thick, proprietary material ASTM C401 Class \_\_\_ tested to UL 959 and UL listed to withstand 2000 degrees F without fusion, have maximum acid extraction of 0.2 percent, have minimum of 3200 psi cold crush strength, and be positively bonded to steel jacket, jointed with mortar.
- D. Accessories, UL Labeled:
  1. Anchor Lugs: Acid resistant coated cast iron.
  2. Clean Out Section: Welded to base of stack, with gasket, and bolt tightened inspection plate.
  3. Roof Penetration: Factory fabricated thimble, flashing and storm collar.

## **2.05 DOUBLE WALL METAL STACKS**

- A. Manufacturers:
  1. Z-Flex U.S. Inc; Z-VENT Double Wall: [www.z-flex.com/#sle](http://www.z-flex.com/#sle).
- B. Provide double wall metal stacks, tested to UL 103 and UL listed with positive pressure rating, for use with building heating equipment, in compliance with NFPA 211.

- C. Fabricate with 1 inch minimum air space between walls and construct inner liner of 304 stainless steel and outer jacket of AL29-4C stainless steel.
  - 1. Protect aluminized steel surfaces exposed to the elements with a minimum of one base coat of primer and one finish coat of corrosion resistant paint suitable for outer jacket skin temperatures of the application.
- D. Accessories, UL Labeled:
  - 1. Ventilated Roof Thimble: Consists of roof penetration, vent flashing with spacers and storm collar.
  - 2. Stack Cap: Consists of conical rainshield with inverted cone for partial rain protection with low flow resistance.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install in accordance with NFPA 54
- C. Install breechings with minimum of joints. Align accurately at connections, with internal surfaces smooth.
- D. Support breechings from building structure, rigidly with suitable ties, braces, hangers and anchors to hold to shape and prevent buckling. Support vertical breechings, chimneys, and stacks at 12 foot spacing, to adjacent structural surfaces, or at floor penetrations. Refer to SMACNA (DCS) for equivalent duct support configuration and size.
- E. Pitch breechings with positive slope up from fuel-fired equipment to chimney or stack.
- F. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.
- G. Insulate breechings in accordance with Section 230716.
- H. Assemble and install stack sections in accordance with NFPA 82, industry practices, and in compliance with UL listing. Join sections with acid-resistant joint cement. Connect base section to foundation using anchor lugs.
- I. Level and plumb chimney and stacks.
- J. Clean breechings, chimneys, and stacks during installation, removing dust and debris.

### **3.02 SCHEDULES**

- A. Breechings, Chimneys and Stacks.
  - 1. Boiler: Manufactured Breeching, Stainless Steel, Category IV Vent.

**END OF SECTION 235100**

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**SECTION 235216  
CONDENSING BOILERS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Manufactured units.
- B. Boiler construction.
- C. Boiler trim.
- D. Fuel burning system.
- E. Factory installed controls.
- F. Combustion make-up air system.

**1.02 RELATED REQUIREMENTS**

- A. Section 033000 - Cast-in-Place Concrete.
- B. Section 230913 - Instrumentation and Control Devices for HVAC.
- C. Section 232114 - Hydronic Specialties.
- D. Section 232123 - Hydronic Pumps.
- E. Section 232500 - HVAC Water Treatment.
- F. Section 235100 - Breechings, Chimneys, and Stacks.
- G. Section 260583 - Wiring Connections: Electrical characteristics and wiring connections.

**1.03 REFERENCE STANDARDS**

- A. AHRI Directory of Certified Product Performance - Air-Conditioning, Heating, and Refrigeration Institute (AHRI) Current Edition.
- B. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. ASME BPVC-IV - Boiler and Pressure Vessel Code, Section IV - Rules for Construction of Heating Boilers 2023.
- D. NBBI Manufacturer and Repair Directory - The National Board of Boiler and Pressure Vessel Inspectors (NBBI) Current Edition.
- E. NFPA 31 - Standard for the Installation of Oil-Burning Equipment 2020.
- F. NFPA 54 - National Fuel Gas Code 2021.
- G. NFPA 58 - Liquefied Petroleum Gas Code 2020, with Amendment.
- H. SCAQMD 1146.1 - Emissions of Oxides of Nitrogen from Small Industrial, Institutional, and Commercial Boilers, Steam Generators, and Process Heaters 1990, with Amendment (2018).

**1.04 SUBMITTALS**

- A. See Section 013300 - Submittal Procedures, for submittals procedures.
- B. Product Data: Provide data indicating general assembly, components, controls, safety controls, and wiring diagrams with electrical characteristics and connection requirements, and service connections.
- C. Manufacturer's Installation Instructions: Indicate assembly, support details, connection requirements, and include start up instructions.
- D. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

### **1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.

### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Protect boilers from damage by leaving factory inspection openings and shipping packaging in place until final installation.

### **1.07 WARRANTY**

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Provide a five year warranty to include coverage for heat exchanger.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Natural Gas, Propane, or Combination Natural Gas/Propane for Indoor Applications:
  - 1. Aerco International.

### **2.02 MANUFACTURED UNITS**

- A. Factory assembled, factory fire-tested, self-contained, readily transported unit ready for automatic operation except for connection of water, fuel, electrical, and vent services.
- B. Unit: Metal membrane wall, water or fire tube, condensing boiler on integral structural steel frame base with integral fuel burning system, firing controls, boiler trim, insulation, and removable jacket, suitable for indoor application.

### **2.03 BOILER CONSTRUCTION**

- A. Comply with the minimum requirements of ASME BPVC-IV and ANSI Z21.13 for construction of boilers.
- B. Assembly to bear the ASME "H" stamp and comply with the efficiency requirements of the latest edition of ASHRAE Std 90.1 I-P.
- C. Required Directory Listings:
  - 1. AHRI Directory of Certified Product Performance - Air-Conditioning, Heating, and Refrigeration Institute (AHRI); current edition at [www.ahrinet.org](http://www.ahrinet.org).
  - 2. NBBI Manufacturer and Repair Directory - The National Board of Boiler and Pressure Vessel Inspectors (NBBI); current edition at [www.nationalboard.org](http://www.nationalboard.org).
- D. Heat Exchanger: Construct with materials that are impervious to corrosion where subject to contact with corrosive condensables.
- E. Provide adequate tappings, observation ports, removable panels, and access doors for entry, cleaning, and inspection.
- F. Insulate casing with insulation material, protected and covered by heavy-gauge metal jacket.
- G. Factory apply boiler base and other components, that are subject to corrosion, with durable, acrylic, powder coated, painted, or weather-proofed finish.

### **2.04 BOILER TRIM**

- A. ASME rated pressure relief valve.
  - B. Flow switch.
  - C. Electronic Low Water Cut-off: Complete with test light and manual reset button to automatically prevent firing operation whenever boiler water falls below safe level.
  - D. Temperature and pressure gauge.
  - E. Pressure Switches:
    - 1. High gas pressure.
    - 2. Low gas pressure.
-

- 3. Air pressure.
- F. Manual reset high limit.
- G. Boiler Pump (where required by boiler design):
  - 1. Primary pump, factory supplied and sized for field installation to ensure minimum, continuous circulation through boiler.
  - 2. Where pump is not provided by boiler manufacturer, provide pump in accordance with boiler manufacturer's recommendations.
  - 3. Pump time delay.

## **2.05 FUEL BURNING SYSTEM**

- A. Provide forced draft automatic burner, integral to boiler, designed to burn natural gas, and maintain fuel-air ratios automatically.
  - 1. Blower Design: Statically and dynamically balanced to supply combustion air; direct connected to motor.
  - 2. Forced Draft Design: Mixes combustion air and gas to achieve 90 percent combustion efficiency.
  - 3. Pulse Combustion Design: Self-aspirating, not requiring blower for combustion.
  - 4. Combustion Air Filter: Protects fuel burning system from debris.
- B. Gas Train: Plug valve, safety gas valve, gas-air ratio control valve, and pressure regulator controls air and gas mixture.
- C. Emission of Oxides of Nitrogen Requirements: Comply with SCAQMD 1146.1 for natural gas fired system, as applicable.
- D. Intakes: Combustion air intake capable of accepting free mechanical room air or direct outside air through a sealed intake pipe.

## **2.06 FACTORY INSTALLED CONTROLS**

- A. Option for internal or external (0-10) VDC control.
- B. Temperature Controls:
  - 1. Automatic reset type to control fuel burning system on-off and firing rate to maintain temperature.
  - 2. Manual reset type to control fuel burning system to prevent boiler water temperature from exceeding safe system water temperature.
  - 3. Low-fire start time delay relay.
- C. Electronic PI setpoint/modulation control system.
- D. Microprocessor-based, fuel/air mixing controls.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install boiler and provide connection of natural gas service in accordance with requirements of NFPA 54 and applicable codes.
- C. Install boiler and provide connection of liquified petroleum gas service in accordance with requirements of NFPA 58 and applicable codes.
- D. Install boiler and provide connection of No. fuel oil service in accordance with requirements of NFPA 31 and applicable codes.
- E. Install boiler on concrete housekeeping base, sized minimum of 4 inches larger than boiler base in accordance with Section 033000.
- F. Coordinate factory installed controls with Section 230913.
- G. Coordinate provisions for water treatment in accordance with Section 232500.
- H. Pipe relief valves to nearest floor drain.

- I. Pipe cooled condensate produced by the combustion process from the boiler condensate connection and/or flue stack with suitable piping material to neutralizer prior to discharging into nearest floor drain.
- J. Install primary boiler pump in accordance with Section 232123.
- K. Provide piping connection and accessories in accordance with Section 232114.
- L. Provide for connection to electrical service in accordance with Section 260583.
- M. Vent combustion fumes in accordance with manufacturer's recommendations. Refer to Section 235100.

### **3.02 CLOSEOUT ACTIVITIES**

- A. See Section 017800 - Closeout Submittals, for closeout submittals.
- B. See Section 017900 - Demonstration and Training, for additional requirements.
- C. Demonstrate proper operation of equipment to Owner's designated representative.
- D. Demonstration: Demonstrate operation of system to Owner's personnel.
  - 1. Use operation and maintenance data as reference during demonstration.
  - 2. Conduct walking tour of project.
  - 3. Briefly describe function, operation, and maintenance of each component.
- E. Training: Train Owner's personnel on operation and maintenance of system.
  - 1. Use operation and maintenance manual as training reference, supplemented with additional training materials as required.
  - 2. Provide minimum of two hours of training.

### **3.03 SCHEDULES**

- A. Condensing Boilers:
  - 1. Drawing Code:
  - 2. Location:
  - 3. Manufacturer:
  - 4. Model:
  - 5. Fuel:
  - 6. Input at Sea Level:
  - 7. Output at Sea Level:
  - 8. Working Pressure:
  - 9. Blower Motor Horsepower (Where applicable):
  - 10. Oil Pump Motor Horsepower (Where applicable):
  - 11. Primary Boiler Pump (Where applicable):

**END OF SECTION 235216**

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**SECTION 236213****PACKAGED AIR-COOLED REFRIGERANT COMPRESSOR AND CONDENSER UNITS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Condensing unit package.
- B. Charge of refrigerant and oil.
- C. Controls and control connections.
- D. Refrigerant piping connections.
- E. Motor starters.
- F. Electrical power connections.

**1.02 RELATED REQUIREMENTS**

- A. Section 230513 - Common Motor Requirements for HVAC Equipment.
- B. Section 232300 - Refrigerant Piping.

**1.03 REFERENCE STANDARDS**

- A. AHRI 210/240 - Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment 2023.
- B. ASHRAE Std 23.1 - Methods for Performance Testing Positive Displacement Refrigerant Compressors and Condensing Units that Operate at Subcritical Pressures of the Refrigerant 2019.
- C. ASHRAE Std 90.1 I-P - Energy Standard for Buildings Except Low-Rise Residential Buildings Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- D. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.

**1.04 SUBMITTALS**

- A. See Section 013300 - Submittal Procedures, for submittal procedures.
- B. Product Data: Provide rated capacities, weights specialties and accessories, electrical nameplate data, and wiring diagrams. Include equipment served by condensing units in submittal, or submit at same time, to ensure capacities are complementary.
- C. Shop Drawings: Indicate components, assembly, dimensions, weights and loadings, required clearances, and location and size of field connections. Include schematic layouts showing condensing units, cooling coils, refrigerant piping, and accessories required for complete system.
- D. Design Data: Indicate pipe and equipment sizing.
- E. Manufacturer's Instructions: Submit manufacturer's complete installation instructions.
- F. Operation and Maintenance Data: Include start-up instructions, maintenance instructions, parts lists, controls, and accessories.
- G. Warranty: Submit manufacturer's warranty and ensure forms have been filled out in Owner's name and registered with manufacturer.

**1.05 QUALITY ASSURANCE**

- A. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with manufacturer's installation instructions for rigging, unloading, and transporting units.
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**1.07 WARRANTY**

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Provide a five year warranty to include coverage for refrigerant compressors.

**PART 2 PRODUCTS****2.01 MANUFACTURERS**

- A. Aeon.
- B. Trane, a brand of Ingersoll Rand.
- C. York International Corporation/Johnson Controls, Inc.

**2.02 PERFORMANCE REQUIREMENTS****2.03 MANUFACTURED UNITS**

- A. Units: Self-contained, packaged, factory assembled and pre-wired units suitable for outdoor use consisting of cabinet, compressors, condensing coil and fans, integral sub-cooling coil, controls, liquid receiver, wind deflector, and screens.
- B. Construction and Ratings: In accordance with AHRI 210/240. Test in accordance with ASHRAE Std 23.1.
- C. Performance Ratings: Energy Efficiency Rating (EER) and Coefficient of Performance (COP) not less than prescribed by ASHRAE Std 90.1.

**2.04 CASING**

- A. House components in welded steel frame with galvanized steel panels with weather resistant, baked enamel finish.
- B. Mount starters, disconnects, and controls in weatherproof panel provided with full opening access doors. Provide mechanical interlock to disconnect power when door is opened.
- C. Provide removable access doors or panels with quick fasteners and piano hinges.

**2.05 CONDENSER COILS**

- A. Coils: Aluminum fins mechanically bonded to seamless copper tubing. Provide sub-cooling circuits. Air test under water to 425 psig, and vacuum dehydrate. Seal with holding charge of nitrogen.

**2.06 FAN REQUIREMENTS**

- A. Vertical discharge direct driven propeller type condenser fans with fan guard on discharge. Equip with roller or ball bearings with grease fittings extended to outside of casing.
- B. Motors as indicated, in compliance with Section 230513.

**2.07 COMPRESSORS**

- A. Compressor: Semi-hermetic reciprocating type.
  - B. Mounting: Statically and dynamically balance rotating parts and mount on spring vibration isolators.
  - C. Lubrication System: Reversible, positive displacement oil pump with oil charging valve, oil level sight glass, and magnetic plug or strainer.
  - D. Motor: Constant speed 1800 rpm suction gas cooled with electronic sensor and winding over temperature protection, designed for across-the-line starting.
    - 1. Furnish with starter, see Section 230513.
    - 2. Furnish with starter, see Section 230513.
  - E. Capacity Reduction Equipment: Suction valve unloaders, with lifting mechanism operated by electrically actuated solenoid valve, with unloaded compressor start; controlled from suction pressure.
-

- F. Sump Oil Heater: Evaporates refrigerant returning to sump during shut down. Energize heater continuously when compressor is not operating.

## **2.08 REFRIGERANT CIRCUIT**

- A. Provide each unit with one refrigerant circuit, factory supplied and piped. See Section 232300.
- B. For each refrigerant circuit, provide:
1. Filter dryer replaceable core type.
  2. Liquid line sight glass and moisture indicator.
  3. Thermal expansion valve for maximum operating pressure.
  4. Insulated suction line.
  5. Suction and liquid line service valves and gauge ports.
  6. Liquid line solenoid valve.
  7. Discharge line check valve.
  8. Compressor discharge service valve.
  9. Condenser pressure relief valve.
- C. For heat pump units, provide reversing valve, suction line accumulator, discharge muffler, flow control check valve, and solid-state defrost control utilizing thermistors.

## **2.09 CONTROLS**

- A. On unit, mount weatherproof steel control panel, NEMA 250, containing power and control wiring, molded case disconnect switch, factory wired with single point power connection.
- B. For each compressor, provide across-the-line starter, non-recycling compressor overload, starter relay, and control power transformer or terminal for controls power. Provide manual reset current overload protection. For each condenser fan, provide across-the-line starter with starter relay.
- C. Provide safety controls arranged so any one will shut down machine:
1. High discharge pressure switch (manual reset) for each compressor.
  2. Low suction pressure switch (automatic reset) for each compressor.
  3. Oil Pressure switch (manual reset).
- D. Provide the following operating controls:
1. One minute off timer prevents compressor from short cycling.
- E. Gauges: Piped for suction and discharge refrigerant pressures and oil pressure for each compressor.

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Install in accordance with manufacturer's installation instructions.
- B. Complete structural, mechanical, and electrical connections in accordance with manufacturer's installation instructions.

### **3.02 SYSTEM STARTUP**

- A. Supply initial charge of refrigerant and oil for each refrigeration system. Replace losses of oil or refrigerant prior to end of correction period.
- B. Charge system with refrigerant and test entire system for leaks after completion of installation. Repair leaks, put system into operation, and test equipment performance.
- C. Shut-down system if initial start-up and testing takes place in winter and machines are to remain inoperative. Repeat start-up and testing operation at beginning of first cooling season.

**END OF SECTION 236213**

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**SECTION 238200**  
**CONVECTION HEATING AND COOLING UNITS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Finned tube radiation.
- B. Convectors.
- C. Cabinet unit heaters.

**1.02 RELATED REQUIREMENTS**

- A. Section 230716 - HVAC Equipment Insulation.
- B. Section 230719 - HVAC Piping Insulation.
- C. Section 230913 - Instrumentation and Control Devices for HVAC.
- D. Section 232113 - Hydronic Piping.
- E. Section 232114 - Hydronic Specialties.

**1.03 REFERENCE STANDARDS**

- A. AHRI Directory of Certified Product Performance - Air-Conditioning, Heating, and Refrigeration Institute (AHRI) Current Edition.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Preinstallation Meeting: Conduct a preinstallation meeting one week prior to the start of the work of this section; require attendance by all affected installers.
- B. Sequencing: Ensure that utility connections are achieved in an orderly and expeditious manner.

**1.05 SUBMITTALS**

- A. See Section 013300 - Submittal Procedures, for submittal procedures.
- B. Product Data: Provide typical catalog of information including arrangements.
- C. Shop Drawings:
  - 1. Indicate cross sections of cabinets, grilles, bracing and reinforcing, and typical elevations.
  - 2. Indicate air coil and frame configurations, dimensions, materials, rows, connections, and rough-in dimensions.
  - 3. Submit schedules of equipment and enclosures typically indicating length and number of pieces of element and enclosure, corner pieces, end caps, cap strips, access doors, pilaster covers, and comparison of specified heat required to actual heat output provided.
- D. Selection Samples: For each finish product specified, color chart representing manufacturer's full range of available colors.
- E. Manufacturer's Instructions: Indicate installation instructions and recommendations.
- F. Project Record Documents: Record actual locations of components and locations of access doors in radiation cabinets required for access or valving.
- G. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listings.
- H. Warranty: Submit manufacturer's warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

**1.06 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
-

- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

### 1.07 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Provide 5 year manufacturer's warranty for \_\_\_\_\_.

## PART 2 PRODUCTS

### 2.01 HYDRONIC FINNED TUBE RADIATION

- A. Manufacturers:
1. Modine Manufacturing Company: [www.modineHVAC.com/#sle](http://www.modineHVAC.com/#sle).
  2. Slant/Fin Corporation: [www.slantfin.com/#sle](http://www.slantfin.com/#sle).
  3. Zehnder Rittling: [www.rittling.com/#sle](http://www.rittling.com/#sle).
  4. \_\_\_\_\_.
  5. Substitutions: See Section 016000 - Product Requirements.
- B. Required Directory Listing: AHRI Directory of Certified Product Performance - Air-Conditioning, Heating, and Refrigeration Institute (AHRI); current edition at [www.ahrinet.org](http://www.ahrinet.org).
- C. Element Hangers: Quiet operating, ball bearing cradle type providing unrestricted longitudinal movement, on enclosure brackets.
- D. Enclosures: 18 gauge, 0.0478 inch sheet steel up to 18 inches in height, 16 gauge, 0.0598 inch sheet steel over 18 inches in height or aluminum as detailed, with easily jointed components for wall to wall installation.
1. Support rigidly, on wall or floor mounted brackets.
  2. Support rigidly, on wall or floor mounted brackets at least 3 feet on center maximum.
- E. Finish: Factory applied baked primer coat.
- F. Damper: Where not thermostatically controlled, provide knob-operated internal damper at enclosure air outlet.
- G. Access Doors: For otherwise inaccessible valves, provide factory-made permanently hinged access doors, 6 by 7 inch minimum size, integral with cabinet.

### 2.02 HYDRONIC CONVECTORS

- A. Manufacturers:
1. Modine Manufacturing Company: [www.modineHVAC.com/#sle](http://www.modineHVAC.com/#sle).
  2. Sterling Hydronics, a Mestek Company: [www.sterlingheat.com/#sle](http://www.sterlingheat.com/#sle).
  3. Vulcan Radiator, a Mestek Company: [www.vulcanrad.com/#sle](http://www.vulcanrad.com/#sle).
  4. \_\_\_\_\_.
  5. Substitutions: See Section 016000 - Product Requirements.
- B. Perform factory run test under normal operating conditions, water, and steam flow rates.
- C. Heating Elements: Seamless copper tubing mechanically expanded into evenly spaced aluminum fins and cast iron headers, steel side plates and supports, factory air pressure tested at 100 psi under water, with means of adjusting pitch of element.
- D. Cabinet: 16 gauge, 0.0598 inch sheet steel front and top, 18 gauge, 0.0478 inch sheet steel back and ends; exposed corners rounded; easily secured removable front panels, adequately braced and reinforced for stiffness.
- E. Finish: Factory applied baked primer coat.
- F. Damper: Where not thermostatically controlled, provide knob-operated internal damper at enclosure air outlet.
- G. Access Doors: For otherwise inaccessible valves, provide factory-made permanently hinged access doors, 6 by 7 inch minimum size, integral with cabinet.

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## 2.03 HYDRONIC CABINET UNIT HEATERS

- A. Manufacturers:
  - 1. Modine Manufacturing Company: [www.modineHVAC.com/#sle](http://www.modineHVAC.com/#sle).
  - 2. Sterling Hydronics a Mestek Company: [www.sterlingheat.com/#sle](http://www.sterlingheat.com/#sle).
  - 3. Trane, a brand of Ingersoll Rand: [www.trane.com/#sle](http://www.trane.com/#sle).
  - 4. Substitutions: See Section 016000 - Product Requirements.
- B. Provide products listed, classified, and labeled by Underwriters Laboratories Inc. (UL), Intertek (ETL), or testing firm acceptable to Authority Having Jurisdiction as suitable for the purpose indicated.
- C. Coils:
  - 1. Evenly spaced aluminum fins mechanically bonded to copper tubes.
  - 2. Heating Hot Water: Suitable for working temperatures up to a maximum not less than 200 degrees F.
- D. Cabinet: Minimum 16 gauge, 0.0598 inch thick sheet steel front panel with exposed corners and edges rounded, easily removed panels, glass fiber insulation, integral air outlet, and inlet grilles.
- E. Finish: Factory applied baked primer coat on visible surfaces of enclosure or cabinet.
- F. Fans: Centrifugal forward-curved double-width wheels, statically and dynamically balanced, direct driven.
- G. Motor: Tap wound multiple speed permanent split capacitor with sleeve bearings, resiliently mounted.
- H. Control: Factory wired, solid state, infinite speed control, located in cabinet.
- I. Filter: Easily removed, 1 inch thick glass fiber throw-away type, located to filter air before coil.
- J. Fresh Air Dampers: Where indicated, manual type, set to allow maximum of 25 percent fresh air to enter space. Refer to Section 230993 for automatic type operating sequence and Section 230913 for controls.
- K. Electrical Characteristics:

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that surfaces are suitable for installation.
- B. Verify that field measurements are as indicated on drawings.

### 3.02 INSTALLATION

- A. Install in accordance with manufacturer's recommendations.
  - B. Install equipment exposed to finished areas after walls and ceilings are finished and painted.
  - C. Do not damage equipment or finishes.
  - D. Finned Tube Radiation:
    - 1. Locate on outside walls and run cover continuously wall-to-wall unless otherwise indicated.
    - 2. Center elements under window with elements of equal length centered under each window for multiple windows.
    - 3. Install wall angles and end caps where units butt against walls.
    - 4. Align cabinet joints with window mullions.
    - 5. Install wall angles where units butt against walls and align cabinet joints with window mullions.
  - E. Convectors:
    - 1. Install where indicated.
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- 2. Coordinate to ensure correct recess size for recessed convectors.
  - F. Cabinet Unit Heaters:
    - 1. Install as indicated.
    - 2. Coordinate to ensure correct recess size for recessed units.

**3.03 FIELD QUALITY CONTROL**

- A. See Section 014000 - DO NOT USE BSD Quality Requirements, for additional requirements.
- B. Coordination of Other Tests and Inspections: Owner will employ independent testing agency to test and/or inspect \_\_\_\_\_; to provide access, and \_\_\_\_\_ as required to accommodate timely performance.

**3.04 CLEANING**

- A. After construction and painting is completed, clean exposed surfaces of units.
- B. Vacuum clean coils and inside of units.
- C. Touch-up marred or scratched surfaces of factory-finished cabinets using finish materials furnished by the manufacturer.
- D. Install new filters.

**3.05 CLOSEOUT ACTIVITIES**

- A. See Section 017800 - Closeout Submittals, for closeout submittals.
- B. See Section 017900 - Demonstration and Training, for additional requirements.

**3.06 PROTECTION**

- A. Provide finished cabinet units with protective covers during the balance of construction.
- B. Protect installed \_\_\_\_\_ from subsequent construction operations.

**END OF SECTION 238200**

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**SECTION 238223  
UNIT VENTILATORS**

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

**1.02 SUMMARY**

- A. Section includes unit ventilators and accessories with the following heating and cooling features:
  - 1. Hydronic heating coil.
  - 2. Direct-expansion refrigerant cooling coil.

**1.03 ACTION SUBMITTALS**

- A. Product Data: For each type of product
  - 1. Include rated capacities, operating characteristics, and furnished specialties and accessories for each unit type and configuration.
- B. Shop Drawings:
  - 1. Include plans, elevations, sections, and details.
  - 2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  - 3. Detail anchorages and attachments to structure and to supported equipment.
  - 4. Include diagrams for power, signal, and control wiring.

**1.04 INFORMATIONAL SUBMITTALS**

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:
- B. Field quality-control reports.
- C. Sample Warranty: For special warranty.

**1.05 CLOSEOUT SUBMITTALS**

- A. Operation and Maintenance Data: For unit ventilators to include in emergency, operation, and maintenance manuals.
  - 1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:
    - a. Maintenance schedules and repair part lists for motors, coils, integral controls, and filters.

**1.06 MAINTENANCE MATERIAL SUBMITTALS**

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Unit Ventilator Filters: Furnish 2 spare filters for each filter installed.

**1.07 QUALITY ASSURANCE**

- A. Comply with NFPA 70.
  - B. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1, Section 5 - "Systems and Equipment" and Section 7 - "Construction and Startup."
  - C. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1, Section 6 - "Heating, Ventilating, and Air-Conditioning."
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## 1.08 COORDINATION

- A. Coordinate size and location of wall sleeves for outdoor-air intake.

## PART 2 PRODUCTS

### 2.01 SYSTEM DESCRIPTION

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Factory-packaged and -tested units rated according to AHRI 840, ASHRAE 33, and UL 1995.

### 2.02 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Carrier Corporation.
  - 2. McQuay International.
  - 3. Trane (basis of design).
  - 4. Approved Equal

### 2.03 MANUFACTURED UNITS

- A. Description: Unit ventilators consisting of finished cabinet, filter, cooling coil, drain pan, supply-air fan and motor in draw-through configuration, and hydronic cooling coil.

### 2.04 CABINETS

- A. Insulation: Minimum 1/2-inch-thick, coated glass fiber complying with ASTM C 1071 and attached with adhesive complying with ASTM C 916.
    - 1. Surface-Burning Characteristics: Insulation and adhesive shall have a combined maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM E 84 by a qualified testing agency.
  - B. Main and Auxiliary Drain Pans: Insulated galvanized steel with plastic liner, formed as required by ASHRAE 62.1. Heating-only units shall also be provided with drain pans for future installation of a cooling coil.
  - C. Cabinet end pockets shall be a minimum of 12 inches wide to facilitate piping and service. If the standard end pocket is less than 12 inches wide an extended cabinet unit shall be provided.
  - D. Cabinet Frame and Access Panels: Welded-steel frame with removable panels fastened with hex-head tamperproof fasteners and key-operated control and valve access doors.
    - 1. Steel components exposed to moisture shall be hot-dip galvanized after fabrication.
    - 2. Ceiling-mounted units:
      - a. Ceiling units shall be constructed with two hinged bottom panels for ease of maintenance. Access to filters, controls and piping shall be easily available through the two bottom panels. Retainer chains shall be factory installed to prevent sudden release of bottom panels
  - E. Cabinet Finish: Electrostatically painted with an oven-baked thermosetting urethane powder finish, color as selected by Architect.
  - F. Indoor-Supply-Air Grille: Steel linear bar welded in-place as an integral part of the unit structure.
  - G. Return-Air Inlet: Front toe space.
  - H. End Panels: Matching material and finish of unit ventilator.
  - I. Outdoor-Air Wall Box (Floor-mounted units): Minimum 0.1265-inch-thick, aluminum, rain-resistant louver and box with integral eliminators and bird screen.
    - 1. Louver Configuration: Vertical, rain-resistant louver.
    - 2. Louver Material: Aluminum.
    - 3. Bird Screen: 1/2-inch mesh screen on interior side of louver.
    - 4. Decorative Grille: On outside of intake.
-

- 5. Finish: Anodized aluminum.
- J. Floor-mounted units shall have an integral pipe tunnel for convenient installation of through-piping.

## 2.05 COILS

- A. Test and rate unit ventilator coils according to ASHRAE 33.
- B. Hydronic Coils: Copper tube, with mechanically bonded aluminum fins spaced no closer than 0.1 inch, rated for a minimum working pressure of 200 psig and a maximum entering-water temperature of 220 deg F. Include manual air vent and drain valve.
- C. Indoor Refrigerant Coils: Copper tube, with mechanically bonded aluminum fins spaced no closer than 0.1 inch, and brazed joints at fittings. Comply with AHRI 210/240, and leak test to minimum 450 psig for a minimum 300-psig working pressure. Include thermal expansion valve.

## 2.06 INDOOR FAN

- A. Fan and Motor Board: Removable.
  - 1. Fan: Forward curved, double width, double inlet, centrifugal; directly connected to motor. Thermoplastic or painted-steel wheels, and aluminum, painted-steel, or galvanized-steel fan scrolls, with offset aerodynamic blades.
  - 2. Fan Shaft and Bearings: 1-1/4" dia. hollow-steel shaft with permanently lubricated, resiliently mounted bearings.
  - 3. Motor: Permanently lubricated, multispeed, resiliently mounted on motor board. Comply with requirements in Section 230513 "Common Motor Requirements for HVAC Equipment." Motor speed shall be controlled by factory mounted multi-tap transformer through a High-Medium-Low-Off switch. Motors shall be 115/60/1 NEMA permanent split capacitor (PSC), plug-in type designed specifically for unit ventilator operation. Motors shall be located out of the airstream and have an internal thermal overload device (auto reset). Fan motors and controls shall have each hot line protected by factory installed cartridge type fuse(s). Motors shall have sleeve type bearings and require oiling no more than once annually. Units shall have shaft bearing located out of the air stream. Bearings in the airstream are not acceptable
  - 4. Wiring Termination: Connect motor to chassis wiring with plug connection.
  - 5. The fan and motor assembly shall be rated at low or medium speed to meet the design criteria.
  - 6. For Ceiling-mounted units, provide high-static fan motor.

## 2.07 FILTERS

- A. Filter shall be one-piece design located to provide filtration of the outdoor air/return air mixture to assure even dust loading and balanced airflow in lieu of separate filters for outdoor air and return, and shall be factory furnished initially installed in all units.

## 2.08 DAMPERS

- A. Outside and Room Air Dampers: The room air damper shall be constructed of aluminum using metal-forming techniques to resist twisting and shall be counterbalanced against backpressure. Outdoor air damper shall be two-piece double-wall construction with 1/2" thick, 1.5 lbs. density fiberglass insulation encapsulated between welded 20 ga. galvanized steel blades for rigidity and to inhibit corrosion, and have additional insulation on the exterior surfaces of the damper blade and on the ends of the outdoor air chamber. Provide with factory-mounted electric actuator.
- B. Dampers shall be fitted with mohair seals along all sealing edges. Dampers shall use turned-metal principle on long closing ends with no metal-to-metal contact. No plastic or rubber gaskets shall be acceptable. Damper bearings shall be made of nylon or other material which does not require lubrication.
- C. Face and Bypass Dampers: Galvanized-steel damper blades with edge and end seals and nylon bearings; with factory-mounted electric actuator.

## **2.09 ACCESSORIES**

- A. Subbase: Sheet metal floor-mounting base with leveling screws and black enamel finish.
- B. Insulated false back with gasket seals on wall and outdoor-air plenum.
  - 1. Insulation: Minimum 1/2-inch- thick, coated glass fiber complying with ASTM C 1071 and attached with adhesive complying with ASTM C 916.
    - a. Surface-Burning Characteristics: Insulation and adhesive shall have a combined maximum flame-spread index of 25 and smoke-developed index of 50 when tested according to ASTM E 84 by a qualified testing agency.
- C. Radiation Grille: Grille with finish to match discharge-air grille.

## **2.10 BASIC UNIT CONTROLS**

- A. Building Automation System (BAS) Interface Requirements:
  - 1. Interface relay for scheduled operation.
  - 2. Interface relay to provide indication of fault at the central workstation.
  - 3. Provide interface for central BAS workstation for the following functions:
    - a. Adjust set points.
    - b. Unit ventilator start, stop, and operating status.
    - c. Data inquiry to include supply- and room-air temperature
    - d. Occupied and unoccupied schedules.
- B. Electrical Connection: Factory wire motors and controls for a single electrical connection.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Examine areas, with Installer present, to receive unit ventilators for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for piping and electrical connections to verify actual locations before unit ventilator installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.02 INSTALLATION**

- A. Install unit ventilators to comply with NFPA 90A.

### **3.03 CONNECTIONS**

- A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties. Specific connection requirements are as follows:
  - 1. Install piping adjacent to machine to allow service and maintenance.
  - 2. Connect condensate drain to indirect waste.
- B. Install refrigerant piping as required by Section 232300 "Refrigerant Piping," and add refrigerant as required to compensate for length of piping.
- C. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
- D. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

### **3.04 FIELD QUALITY CONTROL**

- A. Perform the following tests and inspections:
    - 1. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
    - 2. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.
  - B. Remove and replace malfunctioning units and retest as specified above.
-



- C. Prepare test and inspection reports.

**3.05 ADJUSTING**

- A. Adjust initial temperature and humidity set points.

**3.06 DEMONSTRATION**

- A. Train Owner's maintenance personnel to adjust, operate, and maintain unit ventilators.

**END OF SECTION 238223**

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**SECTION 238236**  
**FINNED-TUBE RADIATION HEATERS****PART 1 GENERAL****1.01 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

**1.02 SUMMARY**

- A. Section includes hydronic, baseboard and finned-tube radiation heaters.

**1.03 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
  - 1. Include rated capacities, operating characteristics, furnished specialties, and accessories.
- B. Shop Drawings:
  - 1. Include plans, elevations, sections, and details.
  - 2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  - 3. Include details and dimensions of custom-fabricated enclosures.
  - 4. Indicate location and size of each field connection.
  - 5. Indicate location and arrangement of piping valves and specialties.
  - 6. Include enclosure joints, corner pieces, access doors, and other accessories.
- C. Color Samples for Initial Selection: For finned-tube radiation heaters with factory-applied color finishes.
- D. Color Samples for Verification: For each type of exposed finish.

**PART 2 PRODUCTS****2.01 HOT-WATER BASEBOARD RADIATION HEATERS**

- A. Manufacturers
    - 1. Slant/Fin
    - 2. Sterling – Basis of design
    - 3. Trane
  - B. Performance Ratings: Rate baseboard radiation heaters according to Hydronics Institute's "I=B=R Testing and Rating Standard for Baseboard Radiation."
  - C. Heating Elements: Copper tubing mechanically expanded into flanged collars of evenly spaced aluminum fins resting on polypropylene element glides. One end of tube shall be belled.
  - D. Enclosures: Minimum 0.0329-inch thick steel, removable front cover.
    - 1. Full-height back.
    - 2. Full-length damper.
    - 3. End panel.
    - 4. End caps.
    - 5. Inside and outside corners.
    - 6. Valve access door.
    - 7. Joiner pieces to snap together.
    - 8. Finish: Baked-enamel finish in manufacturer's standard color as selected by Architect.
    - 9. Element Brackets: Primed and painted steel to support front panel and element.
  - E. Rust-Resistant Enclosures: Minimum 0.040-inch thick ASTM A653/A653M, G60 (Z180) galvanized-steel, removable front cover.
    - 1. Full-height back.
-

- 
2. Full-length damper.
  3. End panel.
  4. End caps.
  5. Inside and outside corners.
  6. Valve access door.
  7. Joiner pieces to snap together.
  8. Finish: Baked-enamel finish in manufacturer's standard color as selected by Architect.
  9. Element Brackets: Primed and painted steel to support front panel and element.

## **2.02 HOT-WATER FINNED-TUBE RADIATION HEATERS**

- A. Manufacturers
    1. Slant/Fin
    2. Sterling – Basis of design
    3. Trane
  - B. Performance Ratings: Rate finned-tube radiation heaters according to Hydronics Institute's "I=B=R Testing and Rating Standard for Finned-Tube (Commercial) Radiation."
  - C. Heating Elements: Copper tubing mechanically expanded into flanged collars of evenly spaced aluminum fins resting on element supports. One end of tube shall be belled.
  - D. Element Supports: Ball-bearing cradle type to permit longitudinal movement on enclosure brackets.
  - E. Front Panel: Minimum 0.0428-inch thick steel.
  - F. Rust-Resistant Front Panel: Minimum 0.052-inch thick, ASTM A653/A653M, G60 (Z180) galvanized steel.
  - G. Wall-Mounted Back Panel: Minimum 0.0329-inch thick steel, full height, with full-length channel support for front panel without exposed fasteners.
  - H. Floor-Mounted Pedestals: Conceal insulated piping at maximum 36-inch spacing. Pedestal-mounted back panel shall be solid panel matching front panel. Provide stainless-steel escutcheon for floor openings at pedestals.
  - I. Support Brackets: Locate at maximum 36-inch spacing to support front panel and element.
  - J. Finish: Baked finish in manufacturer's standard color as selected by Architect.
  - K. Damper: Knob-operated internal damper at enclosure outlet.
  - L. Access Doors: Factory made, permanently hinged with tamper-resistant fastener, minimum size 6 by 7 inches, integral with enclosure.
  - M. Enclosure Style: As scheduled.
    1. Front Inlet Grille: Punched louver; painted to match enclosure.
    2. Front Inlet Grille: Extruded-aluminum linear bar grille; pencil-proof bar spacing.
      - a. Mill-finish aluminum.
      - b. Anodized finish, color as selected by Architect from manufacturer's standard colors.
      - c. Painted to match enclosure.
    3. Outlet Grille: Punched louver; painted to match enclosure.
    4. Outlet Grille: Extruded-aluminum linear bar grille; pencil-proof bar spacing.
      - a. Mill-finish aluminum.
      - b. Anodized finish, color as selected by Architect from manufacturer's standard colors.
      - c. Painted to match enclosure.
  - N. Accessories: Filler sections, corners, relay sections, and splice plates all matching the enclosure and grille finishes.
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**PART 3 EXECUTION****3.01 EXAMINATION**

- A. Examine areas to receive finned-tube radiation heaters for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for hydronic-piping connections to verify actual locations before installation of finned-tube radiation heaters.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.02 BASEBOARD RADIATION HEATER INSTALLATION**

- A. Install units level and plumb.
- B. Install enclosure continuously around corners, using outside and inside corner fittings.
- C. Join sections with splice plates and filler pieces to provide continuous enclosure.
- D. Install access doors for access to valves.
- E. Install enclosure continuously from wall to wall.
- F. Terminate enclosures with manufacturer's end caps except where enclosures are indicated to extend to adjoining walls.
- G. Install valves within reach of access door provided in enclosure.
- H. Install air-seal gasket between wall and recessed flanges or front cover of fully recessed unit.
- I. Install piping within pedestals for freestanding units.

**3.03 FINNED-TUBE RADIATION HEATER INSTALLATION**

- A. Install units level and plumb.
- B. Install enclosure continuously around corners, using outside and inside corner fittings.
- C. Join sections with splice plates and filler pieces to provide continuous enclosure.
- D. Install access doors for access to valves.
- E. Install enclosure continuously from wall to wall.
- F. Terminate enclosures with manufacturer's end caps except where enclosures are indicated to extend to adjoining walls.
- G. Install valves within reach of access door provided in enclosure.
- H. Install air-seal gasket between wall and recessed flanges or front cover of fully recessed unit.
- I. Install piping within pedestals for freestanding units.

**3.04 CONNECTIONS**

- A. Piping installation requirements are specified in Section 232113 "Hydronic Piping" and Section 232116 "Hydronic Piping Specialties. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect hot-water finned-tube radiation heaters and components to piping according to Section 232113 "Hydronic Piping" and Section 232116 "Hydronic Piping Specialties."
  - 1. Install shutoff valves on inlet and outlet, and balancing valve on outlet.
- C. Install control valves as required by Section 230923.11 "Control Valves."
- D. Install piping adjacent to finned-tube radiation heaters to allow service and maintenance.

**3.05 FIELD QUALITY CONTROL**

- A. Perform the following field tests and inspections:
    - 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
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- 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
  - B. Units will be considered defective if they do not pass tests and inspections.
  - C. Prepare test and inspection reports.

**END OF SECTION 238236**

**SECTION 260505  
SELECTIVE DEMOLITION FOR ELECTRICAL**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Electrical demolition.

**1.02 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.

**PART 2 PRODUCTS**

**2.01 MATERIALS AND EQUIPMENT**

- A. Materials and equipment for patching and extending work: As specified in individual sections.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify that abandoned wiring and equipment serve only abandoned facilities.
- B. Demolition drawings are based on casual field observation and existing record documents.
- C. Report discrepancies to Architect/Engineer before disturbing existing installation.
- D. Beginning of demolition means installer accepts existing conditions.

**3.02 PREPARATION**

- A. Disconnect electrical systems in walls, floors, and ceilings to be removed.
- B. Coordinate utility service outages with utility company.
- C. Provide temporary wiring and connections to maintain existing systems in service during construction. When work must be performed on energized equipment or circuits, use personnel experienced in such operations.
- D. Existing Electrical Service: Maintain existing system in service until new system is complete and ready for service. Disable system only to make switchovers and connections. Minimize outage duration.

**3.03 DEMOLITION AND EXTENSION OF EXISTING ELECTRICAL WORK**

- A. Remove, relocate, and extend existing installations to accommodate new construction.
- B. Remove abandoned wiring to source of supply.
- C. Remove exposed abandoned conduit, including abandoned conduit above accessible ceiling finishes. Cut conduit flush with walls and floors, and patch surfaces.
- D. Disconnect abandoned outlets and remove devices. Remove abandoned outlets if conduit servicing them is abandoned and removed. Provide blank cover for abandoned outlets that are not removed.
- E. Disconnect and remove electrical devices and equipment serving utilization equipment that has been removed.
- F. Repair adjacent construction and finishes damaged during demolition and extension work.
- G. Maintain access to existing electrical installations that remain active. Modify installation or provide access panel as appropriate.

**END OF SECTION 260505**

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**SECTION 260519**  
**LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Single conductor building wire.
- B. Underground feeder and branch-circuit cable.
- C. Metal-clad cable.
- D. Manufactured wiring systems.
- E. Wiring connectors.
- F. Electrical tape.
- G. Heat shrink tubing.
- H. Oxide inhibiting compound.
- I. Wire pulling lubricant.
- J. Cable ties.
- K. Firestop sleeves.

**1.02 RELATED REQUIREMENTS**

- A. Section 078400 - Firestopping.
- B. Section 260505 - Selective Demolition for Electrical: Disconnection, removal, and/or extension of existing electrical conductors and cables.
- C. Section 260526 - Grounding and Bonding for Electrical Systems: Additional requirements for grounding conductors and grounding connectors.
- D. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- E. Section 284600 - Fire Detection and Alarm: Fire alarm system conductors and cables.

**1.03 REFERENCE STANDARDS**

- A. ASTM B3 - Standard Specification for Soft or Annealed Copper Wire 2013 (Reapproved 2018).
  - B. ASTM B8 - Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft 2011 (Reapproved 2017).
  - C. ASTM B33 - Standard Specification for Tin-Coated Soft or Annealed Copper Wire for Electrical Purposes 2010, with Editorial Revision (2020).
  - D. ASTM B787/B787M - Standard Specification for 19 Wire Combination Unilay-Stranded Copper Conductors for Subsequent Insulation 2004 (Reapproved 2020).
  - E. ASTM D3005 - Standard Specification for Low-Temperature Resistant Vinyl Chloride Plastic Pressure-Sensitive Electrical Insulating Tape 2017.
  - F. ASTM D4388 - Standard Specification for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes 2020.
  - G. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
  - H. NECA 120 - Standard for Installing Armored Cable (AC) and Type Metal-Clad (MC) Cable 2018.
  - I. NECA 121 - Standard for Installing Nonmetallic-Sheathed Cable (Type NM-B) and Underground Feeder and Branch-Circuit Cable (Type UF) 2007.
  - J. NEMA WC 70 - Power Cables Rated 2000 Volts or Less for the Distribution of Electrical Energy 2021.
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- K. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems 2021.
  - L. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
  - M. UL 44 - Thermoset-Insulated Wires and Cables Current Edition, Including All Revisions.
  - N. UL 83 - Thermoplastic-Insulated Wires and Cables Current Edition, Including All Revisions.
  - O. UL 183 - Manufactured Wiring Systems Current Edition, Including All Revisions.
  - P. UL 486A-486B - Wire Connectors Current Edition, Including All Revisions.
  - Q. UL 486C - Splicing Wire Connectors Current Edition, Including All Revisions.
  - R. UL 486D - Sealed Wire Connector Systems Current Edition, Including All Revisions.
  - S. UL 493 - Thermoplastic-Insulated Underground Feeder and Branch-Circuit Cables Current Edition, Including All Revisions.
  - T. UL 510 - Polyvinyl Chloride, Polyethylene, and Rubber Insulating Tape Current Edition, Including All Revisions.
  - U. UL 1569 - Metal-Clad Cables Current Edition, Including All Revisions.

#### **1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate sizes of raceways, boxes, and equipment enclosures installed under other sections with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
  - 2. Coordinate with electrical equipment installed under other sections to provide terminations suitable for use with the conductors to be installed.
  - 3. Notify Architect/Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

#### **1.05 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conductors and cables, including detailed information on materials, construction, ratings, listings, and available sizes, configurations, and stranding.
- C. Project Record Documents: Record actual installed circuiting arrangements. Record actual routing for underground circuits.

#### **1.06 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Receive, inspect, handle, and store conductors and cables in accordance with manufacturer's instructions.

#### **1.08 FIELD CONDITIONS**

- A. Do not install or otherwise handle thermoplastic-insulated conductors at temperatures lower than 14 degrees F, unless otherwise permitted by manufacturer's instructions. When installation below this temperature is unavoidable, notify Architect/Engineer and obtain direction before proceeding with work.
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**PART 2 PRODUCTS****2.01 CONDUCTOR AND CABLE APPLICATIONS**

- A. Do not use conductors and cables for applications other than as permitted by NFPA 70 and product listing.
- B. Provide single conductor building wire installed in suitable raceway unless otherwise indicated, permitted, or required.
  - 1. Exceptions:
    - a. Use manufactured wiring systems for branch circuits where concealed above accessible ceilings for lighting.
- C. Nonmetallic-sheathed cable is not permitted.
- D. Metal-clad cable is permitted only as follows:
  - 1. Where not otherwise restricted, may be used:
    - a. Where concealed in hollow stud walls and above accessible ceilings for branch circuits up to 20 A.
  - 2. In addition to other applicable restrictions, may not be used:
    - a. Where exposed to damage.
    - b. For damp, wet, or corrosive locations, unless provided with a PVC jacket listed as suitable for those locations.

**2.02 CONDUCTOR AND CABLE GENERAL REQUIREMENTS**

- A. Provide products that comply with requirements of NFPA 70.
  - B. Provide products listed, classified, and labeled as suitable for the purpose intended.
  - C. Provide new conductors and cables manufactured not more than one year prior to installation.
  - D. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, etc. as required for a complete operating system.
  - E. Comply with NEMA WC 70.
  - F. Thermoplastic-Insulated Conductors and Cables: Listed and labeled as complying with UL 83.
  - G. Thermoset-Insulated Conductors and Cables: Listed and labeled as complying with UL 44.
  - H. Conductors for Grounding and Bonding: Also comply with Section 260526.
  - I. Conductor Material:
    - 1. Provide copper conductors only. Aluminum conductors are not acceptable for this project. Conductor sizes indicated are based on copper.
    - 2. Copper Conductors: Soft drawn annealed, 98 percent conductivity, uncoated copper conductors complying with ASTM B3, ASTM B8, or ASTM B787/B787M unless otherwise indicated.
    - 3. Tinned Copper Conductors: Comply with ASTM B33.
  - J. Minimum Conductor Size:
    - 1. Branch Circuits: 12 AWG.
      - a. Exceptions:
        - 1) 20 A, 120 V circuits longer than 75 feet: 10 AWG, for voltage drop.
        - 2) 20 A, 120 V circuits longer than 150 feet: 8 AWG, for voltage drop.
    - 2. Control Circuits: 14 AWG.
  - K. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
  - L. Conductor Color Coding:
    - 1. Color code conductors as indicated unless otherwise required by the authority having jurisdiction. Maintain consistent color coding throughout project.
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2. Color Coding Method: Integrally colored insulation.
3. Color Code:
  - a. 208Y/120 V, 3 Phase, 4 Wire System:
    - 1) Phase A: Black.
    - 2) Phase B: Red.
    - 3) Phase C: Blue.
    - 4) Neutral/Grounded: White.
  - b. Equipment Ground, All Systems: Green.

### **2.03 SINGLE CONDUCTOR BUILDING WIRE**

- A. Manufacturers:
  1. Copper Building Wire:
    - a. Cerro Wire LLC: [www.cerrowire.com/#sle](http://www.cerrowire.com/#sle).
    - b. Encore Wire Corporation: [www.encorewire.com/#sle](http://www.encorewire.com/#sle).
    - c. General Cable Technologies Corporation: [www.generalcable.com/#sle](http://www.generalcable.com/#sle).
    - d. Southwire Company: [www.southwire.com/#sle](http://www.southwire.com/#sle).
    - e. Substitutions: See Section 016000 - Product Requirements.
- B. Description: Single conductor insulated wire.
- C. Conductor Stranding:
  1. Feeders and Branch Circuits:
    - a. Size 10 AWG and Smaller: Solid.
    - b. Size 8 AWG and Larger: Stranded.
- D. Insulation Voltage Rating: 600 V.
- E. Insulation:
  1. Copper Building Wire: Type THHN/THWN or THHN/THWN-2, except as indicated below.

### **2.04 UNDERGROUND FEEDER AND BRANCH-CIRCUIT CABLE**

- A. Manufacturers:
  1. Cerro Wire LLC: [www.cerrowire.com/#sle](http://www.cerrowire.com/#sle).
  2. Encore Wire Corporation: [www.encorewire.com/#sle](http://www.encorewire.com/#sle).
  3. Southwire Company: [www.southwire.com/#sle](http://www.southwire.com/#sle).
  4. Substitutions: See Section 016000 - Product Requirements.
- B. Description: NFPA 70, Type UF multiple-conductor cable listed and labeled as complying with UL 493, Type UF-B.
- C. Provide equipment grounding conductor unless otherwise indicated.
- D. Conductor Stranding:
  1. Size 10 AWG and Smaller: Solid.
  2. Size 8 AWG and Larger: Stranded.
- E. Insulation Voltage Rating: 600 V.

### **2.05 METAL-CLAD CABLE**

- A. Manufacturers:
  1. AFC Cable Systems Inc: [www.afcweb.com/#sle](http://www.afcweb.com/#sle).
  2. Encore Wire Corporation: [www.encorewire.com/#sle](http://www.encorewire.com/#sle).
  3. Service Wire Co: [www.servicewire.com/#sle](http://www.servicewire.com/#sle).
  4. Southwire Company: [www.southwire.com/#sle](http://www.southwire.com/#sle).
  5. Substitutions: See Section 016000 - Product Requirements.
- B. Description: NFPA 70, Type MC cable listed and labeled as complying with UL 1569, and listed for use in classified firestop systems to be used.
- C. Conductor Stranding:

1. Size 10 AWG and Smaller: Solid.
  2. Size 8 AWG and Larger: Stranded.
- D. Insulation Voltage Rating: 600 V.
- E. Insulation: Type THHN, THHN/THWN, or THHN/THWN-2.
- F. Grounding: Full-size integral equipment grounding conductor.
- G. Armor: Steel, interlocked tape.
- H. Provide PVC jacket applied over cable armor where indicated or required for environment of installed location.

## **2.06 MANUFACTURED WIRING SYSTEMS**

- A. Manufacturers:
1. AFC Cable Systems Inc: [www.afcweb.com/#sle](http://www.afcweb.com/#sle).
  2. D&P Custom Lights & Wiring Systems, Inc: [www.dandpcustomlights.com/#sle](http://www.dandpcustomlights.com/#sle).
  3. RELOC Wiring Solutions, a brand of Acuity Brands, Inc: [www.relocwiring.com/#sle](http://www.relocwiring.com/#sle).
  4. Wiremold, a brand of Legrand North America, Inc: [www.legrand.us/#sle](http://www.legrand.us/#sle).
- B. Description: Manufactured wiring assemblies complying with NFPA 70 Article 604, and listed and labeled as complying with UL 183.
- C. Provide components necessary to transition between manufactured wiring system and other wiring methods.
- D. Branch Circuit Cables:
1. Conductor Stranding (Size 10 AWG and Smaller): Solid.
  2. Insulation Voltage Rating: 600 V.
  3. Insulation: Type THHN.
  4. Grounding: Full-size integral equipment grounding conductor.
  5. Armor: Steel, interlocked tape.
- E. Connectors: Keyed and color-coded to prevent interconnection of different voltages.
- F. Fixture Leads: Type TFN insulation.

## **2.07 WIRING CONNECTORS**

- A. Description: Wiring connectors appropriate for the application, suitable for use with the conductors to be connected, and listed as complying with UL 486A-486B or UL 486C as applicable.
- B. Connectors for Grounding and Bonding: Comply with Section 260526.
- C. Wiring Connectors for Splices and Taps:
1. Copper Conductors Size 8 AWG and Smaller: Use twist-on insulated spring connectors.
  2. Copper Conductors Size 6 AWG and Larger: Use mechanical connectors or compression connectors.
- D. Wiring Connectors for Terminations:
1. Provide terminal lugs for connecting conductors to equipment furnished with terminations designed for terminal lugs.
  2. Provide compression adapters for connecting conductors to equipment furnished with mechanical lugs when only compression connectors are specified.
  3. Where over-sized conductors are larger than the equipment terminations can accommodate, provide connectors suitable for reducing to appropriate size, but not less than required for the rating of the overcurrent protective device.
  4. Copper Conductors Size 8 AWG and Larger: Use mechanical connectors or compression connectors where connectors are required.
  5. Stranded Conductors Size 10 AWG and Smaller: Use crimped terminals for connections to terminal screws.

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- E. Do not use insulation-piercing or insulation-displacement connectors designed for use with conductors without stripping insulation.
  - F. Do not use push-in wire connectors as a substitute for twist-on insulated spring connectors.
  - G. Twist-on Insulated Spring Connectors: Rated 600 V, 221 degrees F for standard applications and 302 degrees F for high temperature applications; pre-filled with sealant and listed as complying with UL 486D for damp and wet locations.
    - 1. Manufacturers:
      - a. 3M: [www.3m.com/#sle](http://www.3m.com/#sle).
      - b. Ideal Industries, Inc: [www.idealindustries.com/#sle](http://www.idealindustries.com/#sle).
      - c. Substitutions: See Section 016000 - Product Requirements.
  - H. Mechanical Connectors: Provide bolted type or set-screw type.
    - 1. Manufacturers:
      - a. Burndy LLC: [www.burndy.com/#sle](http://www.burndy.com/#sle).
      - b. IlSCO: [www.ilSCO.com/#sle](http://www.ilSCO.com/#sle).
      - c. Thomas & Betts Corporation: [www.tnb.com/#sle](http://www.tnb.com/#sle).
      - d. Substitutions: See Section 016000 - Product Requirements.
  - I. Compression Connectors: Provide circumferential type or hex type crimp configuration.
    - 1. Manufacturers:
      - a. Burndy LLC: [www.burndy.com/#sle](http://www.burndy.com/#sle).
      - b. IlSCO: [www.ilSCO.com/#sle](http://www.ilSCO.com/#sle).
      - c. Thomas & Betts Corporation: [www.tnb.com/#sle](http://www.tnb.com/#sle).
      - d. Substitutions: See Section 016000 - Product Requirements.
  - J. Crimped Terminals: Nylon-insulated, with insulation grip and terminal configuration suitable for connection to be made.
    - 1. Manufacturers:
      - a. Burndy LLC: [www.burndy.com/#sle](http://www.burndy.com/#sle).
      - b. IlSCO: [www.ilSCO.com/#sle](http://www.ilSCO.com/#sle).

## 2.08 ACCESSORIES

- A. Electrical Tape:
    - 1. Manufacturers:
      - a. 3M: [www.3m.com/#sle](http://www.3m.com/#sle).
      - b. Plymouth Rubber Europa: [www.plymouthrubber.com/#sle](http://www.plymouthrubber.com/#sle).
      - c. Substitutions: See Section 016000 - Product Requirements.
    - 2. Vinyl Color Coding Electrical Tape: Integrally colored to match color code indicated; listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; suitable for continuous temperature environment up to 221 degrees F.
    - 3. Vinyl Insulating Electrical Tape: Complying with ASTM D3005 and listed as complying with UL 510; minimum thickness of 7 mil; resistant to abrasion, corrosion, and sunlight; conformable for application down to 0 degrees F and suitable for continuous temperature environment up to 221 degrees F.
    - 4. Rubber Splicing Electrical Tape: Ethylene Propylene Rubber (EPR) tape, complying with ASTM D4388; minimum thickness of 30 mil; suitable for continuous temperature environment up to 194 degrees F and short-term 266 degrees F overload service.
    - 5. Moisture Sealing Electrical Tape: Insulating mastic compound laminated to flexible, all-weather vinyl backing; minimum thickness of 90 mil.
  - B. Heat Shrink Tubing: Heavy-wall, split-resistant, with factory-applied adhesive; rated 600 V; suitable for direct burial applications; listed as complying with UL 486D.
    - 1. Manufacturers:
      - a. 3M: [www.3m.com/#sle](http://www.3m.com/#sle).
      - b. Burndy LLC: [www.burndy.com/#sle](http://www.burndy.com/#sle).
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- c. Thomas & Betts Corporation: [www.tnb.com/#sle](http://www.tnb.com/#sle).
  - C. Oxide Inhibiting Compound: Listed; suitable for use with the conductors or cables to be installed.
    - 1. Manufacturers:
      - a. Burndy LLC: [www.burndy.com/#sle](http://www.burndy.com/#sle).
      - b. Ideal Industries, Inc: [www.idealindustries.com/#sle](http://www.idealindustries.com/#sle).
      - c. Ilsco: [www.ilsco.com/#sle](http://www.ilsco.com/#sle).
  - D. Wire Pulling Lubricant: Listed; suitable for use with the conductors or cables to be installed and suitable for use at the installation temperature.
    - 1. Manufacturers:
      - a. 3M: [www.3m.com/#sle](http://www.3m.com/#sle).
      - b. American Polywater Corporation: [www.polywater.com/#sle](http://www.polywater.com/#sle).
      - c. Ideal Industries, Inc: [www.idealindustries.com/#sle](http://www.idealindustries.com/#sle).
      - d. Substitutions: See Section 016000 - Product Requirements.
  - E. Cable Ties: Material and tensile strength rating suitable for application.
    - 1. Manufacturers:
      - a. Burndy LLC: [www.burndy.com/#sle](http://www.burndy.com/#sle).
  - F. Sealing Systems for Roof Penetrations: Premanufactured components and accessories as required to preserve integrity of roofing system and maintain roof warranty; suitable for cables and roofing system to be installed; designed to accommodate existing penetrations where applicable.
    - 1. Products:
      - a. Menzies Metal Products; Electrical Roof Stack and Cap: [www.menzies-metal.com/#sle](http://www.menzies-metal.com/#sle).
      - b. Menzies Metal Products; Electrical Retro Box: [www.menzies-metal.com/#sle](http://www.menzies-metal.com/#sle).
      - c. Substitutions: See Section 016000 - Product Requirements.
  - G. Firestop Sleeves: Listed; provide as required to preserve fire resistance rating of building elements.
    - 1. Products:
      - a. HoldRite, a brand of Reliance Worldwide Corporation; HydroFlame Pro Series/HydroFlame Custom Built: [www.holdrite.com/#sle](http://www.holdrite.com/#sle).
      - b. Substitutions: See Section 016000 - Product Requirements.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that interior of building has been protected from weather.
- B. Verify that work likely to damage wire and cable has been completed.
- C. Verify that raceways, boxes, and equipment enclosures are installed and are properly sized to accommodate conductors and cables in accordance with NFPA 70.
- D. Verify that field measurements are as indicated.
- E. Verify that conditions are satisfactory for installation prior to starting work.

### **3.02 PREPARATION**

- A. Clean raceways thoroughly to remove foreign materials before installing conductors and cables.

### **3.03 INSTALLATION**

- A. Circuiting Requirements:
  - 1. Unless dimensioned, circuit routing indicated is diagrammatic.

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2. When circuit destination is indicated without specific routing, determine exact routing required.
  3. Arrange circuiting to minimize splices.
  4. Maintain separation of Class 1, Class 2, and Class 3 remote-control, signaling, and power-limited circuits in accordance with NFPA 70.
- B. Install products in accordance with manufacturer's instructions.
- C. Perform work in accordance with NECA 1 (general workmanship).
- D. Install underground feeder and branch-circuit cable (Type UF-B) in accordance with NECA 121.
- E. Install metal-clad cable (Type MC) in accordance with NECA 120.
- F. Installation in Raceway:
1. Tape ends of conductors and cables to prevent infiltration of moisture and other contaminants.
  2. Pull all conductors and cables together into raceway at same time.
  3. Do not damage conductors and cables or exceed manufacturer's recommended maximum pulling tension and sidewall pressure.
  4. Use suitable wire pulling lubricant where necessary, except when lubricant is not recommended by the manufacturer.
- G. Paralleled Conductors: Install conductors of the same length and terminate in the same manner.
- H. Secure and support conductors and cables in accordance with NFPA 70 using suitable supports and methods approved by the authority having jurisdiction. Provide independent support from building structure. Do not provide support from raceways, piping, ductwork, or other systems.
- I. Terminate cables using suitable fittings.
1. Metal-Clad Cable (Type MC):
    - a. Use listed fittings.
    - b. Cut cable armor only using specialized tools to prevent damaging conductors or insulation. Do not use hacksaw or wire cutters to cut armor.
- J. Install conductors with a minimum of 12 inches of slack at each outlet.
- K. Neatly train and bundle conductors inside boxes, wireways, panelboards and other equipment enclosures.
- L. Group or otherwise identify neutral/grounded conductors with associated ungrounded conductors inside enclosures in accordance with NFPA 70.
- M. Make wiring connections using specified wiring connectors.
1. Make splices and taps only in accessible boxes. Do not pull splices into raceways or make splices in conduit bodies or wiring gutters.
  2. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors.
  3. Do not remove conductor strands to facilitate insertion into connector.
  4. Clean contact surfaces on conductors and connectors to suitable remove corrosion, oxides, and other contaminants. Do not use wire brush on plated connector surfaces.
  5. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
  6. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- N. Insulate splices and taps that are made with uninsulated connectors using methods suitable for the application, with insulation and mechanical strength at least equivalent to unspliced conductors.
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- O. Insulate ends of spare conductors using vinyl insulating electrical tape.
  - P. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.
  - Q. Unless specifically indicated to be excluded, provide final connections to all equipment and devices, including those furnished by others, as required for a complete operating system.

**3.04 FIELD QUALITY CONTROL**

- A. See Section 014000 - DO NOT USE BSD Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS, except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.3.2. The insulation resistance test is required for all conductors. The resistance test for parallel conductors listed as optional is not required.
- D. Correct deficiencies and replace damaged or defective conductors and cables.

**END OF SECTION 260519**

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**SECTION 260526**  
**GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Grounding and bonding requirements.
- B. Conductors for grounding and bonding.
- C. Connectors for grounding and bonding.
- D. Ground rod electrodes.

**1.02 RELATED REQUIREMENTS**

- A. Section 260519 - Low-Voltage Electrical Power Conductors and Cables: Additional requirements for conductors for grounding and bonding, including conductor color coding.
- B. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- C. Section 265600 - Exterior Lighting: Additional grounding and bonding requirements for pole-mounted luminaires.

**1.03 REFERENCE STANDARDS**

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- B. NEMA GR 1 - Grounding Rod Electrodes and Grounding Rod Electrode Couplings 2022.
- C. NETA ATS - Standard For Acceptance Testing Specifications For Electrical Power Equipment And Systems 2021.
- D. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- E. UL 467 - Grounding and Bonding Equipment Current Edition, Including All Revisions.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements for submittals procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for grounding and bonding system components.
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

**1.05 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

**PART 2 PRODUCTS****2.01 GROUNDING AND BONDING REQUIREMENTS**

- A. Do not use products for applications other than as permitted by NFPA 70 and product listing.
  - B. Unless specifically indicated to be excluded, provide all required components, conductors, connectors, conduit, boxes, fittings, supports, accessories, etc. as necessary for a complete grounding and bonding system.
  - C. Where conductor size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
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- D. Grounding Electrode System:
1. Provide connection to required and supplemental grounding electrodes indicated to form grounding electrode system.
    - a. Provide continuous grounding electrode conductors without splice or joint.
    - b. Install grounding electrode conductors in raceway where exposed to physical damage. Bond grounding electrode conductor to metallic raceways at each end with bonding jumper.
  2. Ground Rod Electrode(s):
    - a. Provide single electrode unless otherwise indicated or required.
    - b. Space electrodes not less than 10 feet from each other and any other ground electrode.
- E. Bonding and Equipment Grounding:
1. Provide bonding for equipment grounding conductors, equipment ground busses, metallic equipment enclosures, metallic raceways and boxes, device grounding terminals, and other normally non-current-carrying conductive materials enclosing electrical conductors/equipment or likely to become energized as indicated and in accordance with NFPA 70.
  2. Provide insulated equipment grounding conductor in each feeder and branch circuit raceway. Do not use raceways as sole equipment grounding conductor.
  3. Where circuit conductor sizes are increased for voltage drop, increase size of equipment grounding conductor proportionally in accordance with NFPA 70.
  4. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
  5. Terminate branch circuit equipment grounding conductors on solidly bonded equipment ground bus only. Do not terminate on neutral (grounded) or isolated/insulated ground bus.
  6. Provide bonding jumper across expansion or expansion/deflection fittings provided to accommodate conduit movement.
- F. Pole-Mounted Luminaires: Also comply with Section 265600.

## **2.02 GROUNDING AND BONDING COMPONENTS**

- A. General Requirements:
1. Provide products listed, classified, and labeled as suitable for the purpose intended.
  2. Provide products listed and labeled as complying with UL 467 where applicable.
- B. Conductors for Grounding and Bonding, in Addition to Requirements of Section 260526:
1. Use insulated copper conductors unless otherwise indicated.
    - a. Exceptions:
      - 1) Use bare copper conductors where installed underground in direct contact with earth.
      - 2) Use bare copper conductors where directly encased in concrete (not in raceway).
- C. Connectors for Grounding and Bonding:
1. Description: Connectors appropriate for the application and suitable for the conductors and items to be connected; listed and labeled as complying with UL 467.
  2. Unless otherwise indicated, use exothermic welded connections for underground, concealed and other inaccessible connections.
  3. Unless otherwise indicated, use mechanical connectors, compression connectors, or exothermic welded connections for accessible connections.
  4. Manufacturers - Mechanical and Compression Connectors:
    - a. Advanced Lightning Technology (ALT): [www.altfab.com/#sle](http://www.altfab.com/#sle).
    - b. Burndy LLC: [www.burndy.com/#sle](http://www.burndy.com/#sle).
    - c. Harger Lightning & Grounding: [www.harger.com/#sle](http://www.harger.com/#sle).
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- d. Thomas & Betts Corporation: [www.tnb.com/#sle](http://www.tnb.com/#sle).
  - e. Substitutions: See Section 016000 - Product Requirements.
- D. Ground Rod Electrodes:
- 1. Comply with NEMA GR 1.
  - 2. Material: Copper-bonded (copper-clad) steel.
  - 3. Size: 5/8 inch diameter by 10 feet length, unless otherwise indicated.
  - 4. Manufacturers:
    - a. Advanced Lightning Technology (ALT): [www.altfab.com/#sle](http://www.altfab.com/#sle).
    - b. Erico International Corporation: [www.erico.com/#sle](http://www.erico.com/#sle).
    - c. Galvan Industries, Inc: [www.galvanelectrical.com/#sle](http://www.galvanelectrical.com/#sle).
    - d. Harger Lightning & Grounding: [www.harger.com/#sle](http://www.harger.com/#sle).

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that work likely to damage grounding and bonding system components has been completed.
- B. Verify that field measurements are as indicated.
- C. Verify that conditions are satisfactory for installation prior to starting work.

### **3.02 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Ground Rod Electrodes: Unless otherwise indicated, install ground rod electrodes vertically. Where encountered rock prohibits vertical installation, install at 45 degree angle or bury horizontally in trench at least 30 inches (750 mm) deep in accordance with NFPA 70 or provide ground plates.
- D. Make grounding and bonding connections using specified connectors.
  - 1. Remove appropriate amount of conductor insulation for making connections without cutting, nicking or damaging conductors. Do not remove conductor strands to facilitate insertion into connector.
  - 2. Remove nonconductive paint, enamel, or similar coating at threads, contact points, and contact surfaces.
  - 3. Exothermic Welds: Make connections using molds and weld material suitable for the items to be connected in accordance with manufacturer's recommendations.
  - 4. Mechanical Connectors: Secure connections according to manufacturer's recommended torque settings.
  - 5. Compression Connectors: Secure connections using manufacturer's recommended tools and dies.
- E. Identify grounding and bonding system components in accordance with Section 260553.

### **3.03 FIELD QUALITY CONTROL**

- A. See Section 014000 - DO NOT USE BSD Quality Requirements, for additional requirements.
- B. Inspect and test in accordance with NETA ATS except Section 4.
- C. Perform inspections and tests listed in NETA ATS, Section 7.13.
- D. Perform ground electrode resistance tests under normally dry conditions. Precipitation within the previous 48 hours does not constitute normally dry conditions.
- E. Investigate and correct deficiencies where measured ground resistances do not comply with specified requirements.

**END OF SECTION 260526**

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**SECTION 260529**  
**HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Support and attachment requirements and components for equipment, conduit, cable, boxes, and other electrical work.

**1.02 RELATED REQUIREMENTS**

- A. Section 260533.13 - Conduit for Electrical Systems: Additional support and attachment requirements for conduits.
- B. Section 260533.16 - Boxes for Electrical Systems: Additional support and attachment requirements for boxes.

**1.03 REFERENCE STANDARDS**

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2023.
- C. ASTM B633 - Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel 2023.
- D. MFMA-4 - Metal Framing Standards Publication 2004.
- E. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- F. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for channel (strut) framing systems, non-penetrating rooftop supports, and post-installed concrete and masonry anchors.
- C. Shop Drawings: Include details for fabricated hangers and supports where materials or methods other than those indicated are proposed for substitution.
- D. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

**1.05 QUALITY ASSURANCE**

- A. Comply with NFPA 70.
- B. Comply with applicable building code.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

**PART 2 PRODUCTS****2.01 SUPPORT AND ATTACHMENT COMPONENTS**

- A. General Requirements:
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1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of electrical work.
  2. Provide products listed, classified, and labeled as suitable for the purpose intended, where applicable.
  3. Where support and attachment component types and sizes are not indicated, select in accordance with manufacturer's application criteria as required for the load to be supported with a minimum safety factor of \_\_\_\_\_. Include consideration for vibration, equipment operation, and shock loads where applicable.
  4. Do not use products for applications other than as permitted by NFPA 70 and product listing.
  5. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
    - a. Indoor Dry Locations: Use zinc-plated steel or approved equivalent unless otherwise indicated.
    - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel, stainless steel, or approved equivalent unless otherwise indicated.
    - c. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
    - d. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.
- B. Conduit and Cable Supports: Straps, clamps, etc. suitable for the conduit or cable to be supported.
1. Conduit Straps: One-hole or two-hole type; steel or malleable iron.
  2. Conduit Clamps: Bolted type unless otherwise indicated.
  3. Manufacturers:
    - a. Cooper Crouse-Hinds, a division of Eaton Corporation: [www.cooperindustries.com/#sle](http://www.cooperindustries.com/#sle).
    - b. Erico International Corporation: [www.erico.com/#sle](http://www.erico.com/#sle).
    - c. HoldRite, a brand of Reliance Worldwide Corporation: [www.holdrite.com/#sle](http://www.holdrite.com/#sle).
    - d. O-Z/Gedney, a brand of Emerson Electric Co: [www.emerson.com/#sle](http://www.emerson.com/#sle).
    - e. Thomas & Betts Corporation: [www.tnb.com/#sle](http://www.tnb.com/#sle).
    - f. Substitutions: See Section 016000 - Product Requirements.
- C. Outlet Box Supports: Hangers, brackets, etc. suitable for the boxes to be supported.
1. Manufacturers:
    - a. Cooper Crouse-Hinds, a division of Eaton Corporation: [www.cooperindustries.com/#sle](http://www.cooperindustries.com/#sle).
    - b. Erico International Corporation: [www.erico.com/#sle](http://www.erico.com/#sle).
    - c. HoldRite, a brand of Reliance Worldwide Corporation: [www.holdrite.com/#sle](http://www.holdrite.com/#sle).
    - d. O-Z/Gedney, a brand of Emerson Electric Co: [www.emerson.com/#sle](http://www.emerson.com/#sle).
    - e. Thomas & Betts Corporation: [www.tnb.com/#sle](http://www.tnb.com/#sle).
    - f. Substitutions: See Section 016000 - Product Requirements.
- D. Metal Channel (Strut) Framing Systems: Factory-fabricated continuous-slot metal channel (strut) and associated fittings, accessories, and hardware required for field-assembly of supports.
1. Comply with MFMA-4.
  2. Channel Material:
    - a. Indoor Dry Locations: Use painted steel, zinc-plated steel, or galvanized steel.
    - b. Outdoor and Damp or Wet Indoor Locations: Use galvanized steel.
  3. Minimum Channel Thickness: Steel sheet, 12 gauge, 0.1046 inch.
  4. Minimum Channel Dimensions: 1-5/8 inch width by 13/16 inch height.
  5. Manufacturers:
    - a. Cooper B-Line, a division of Eaton Corporation: [www.cooperindustries.com/#sle](http://www.cooperindustries.com/#sle).
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- b. Thomas & Betts Corporation: [www.tnb.com/#sle](http://www.tnb.com/#sle).
  - c. Unistrut, a brand of Atkore International Inc: [www.unistrut.com/#sle](http://www.unistrut.com/#sle).
  - d. Substitutions: See Section 016000 - Product Requirements.
- E. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
- 1. Minimum Size, Unless Otherwise Indicated or Required:
    - a. Equipment Supports: 1/2 inch diameter.
    - b. Single Conduit up to 1 inch (27 mm) trade size: 1/4 inch diameter.
    - c. Trapeze Support for Multiple Conduits: 3/8 inch diameter.
- F. Non-Penetrating Rooftop Supports for Low-Slope Roofs: Steel pedestals with thermoplastic or rubber bases that rest on top of roofing membrane, not requiring any attachment to the roof structure and not penetrating the roofing assembly, with support fixtures as specified.
- 1. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
  - 2. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports.
  - 3. Mounting Height: Provide minimum clearance of 6 inches under supported component to top of roofing.
  - 4. Manufacturers:
    - a. Cooper B-Line, a division of Eaton Corporation: [www.cooperindustries.com/#sle](http://www.cooperindustries.com/#sle).
    - b. Erico International Corporation: [www.erico.com/#sle](http://www.erico.com/#sle).
    - c. PHP Systems/Design: [www.phpsd.com/#sle](http://www.phpsd.com/#sle).
- G. Anchors and Fasteners:
- 1. Unless otherwise indicated and where not otherwise restricted, use the anchor and fastener types indicated for the specified applications.
  - 2. Concrete: Use preset concrete inserts, expansion anchors, or screw anchors.
  - 3. Solid or Grout-Filled Masonry: Use expansion anchors or screw anchors.
  - 4. Hollow Masonry: Use toggle bolts.
  - 5. Hollow Stud Walls: Use toggle bolts.
  - 6. Steel: Use beam clamps, machine bolts, or welded threaded studs.
  - 7. Powder-actuated fasteners are not permitted.
  - 8. Hammer-driven anchors and fasteners are not permitted.
  - 9. Preset Concrete Inserts: Continuous metal channel (strut) and spot inserts specifically designed to be cast in concrete ceilings, walls, and floors.
    - a. Comply with MFMA-4.
    - b. Channel Material: Use galvanized steel.
    - c. Manufacturer: Same as manufacturer of metal channel (strut) framing system.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive support and attachment components.
- C. Verify that conditions are satisfactory for installation prior to starting work.

### **3.02 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
  - B. Perform work in accordance with NECA 1 (general workmanship).
  - C. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
  - D. Unless specifically indicated or approved by Architect/Engineer, do not provide support from suspended ceiling support system or ceiling grid.
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- E. Unless specifically indicated or approved by Architect/Engineer, do not provide support from roof deck.
  - F. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.
  - G. Equipment Support and Attachment:
    - 1. Use metal fabricated supports or supports assembled from metal channel (strut) to support equipment as required.
    - 2. Use metal channel (strut) secured to studs to support equipment surface-mounted on hollow stud walls when wall strength is not sufficient to resist pull-out.
    - 3. Use metal channel (strut) to support surface-mounted equipment in wet or damp locations to provide space between equipment and mounting surface.
    - 4. Securely fasten floor-mounted equipment. Do not install equipment such that it relies on its own weight for support.
  - H. Conduit Support and Attachment: Also comply with Section 260533.13.
  - I. Box Support and Attachment: Also comply with Section 260533.16.
  - J. Preset Concrete Inserts: Use manufacturer provided closure strips to inhibit concrete seepage during concrete pour.
  - K. Secure fasteners according to manufacturer's recommended torque settings.
  - L. Remove temporary supports.

### **3.03 FIELD QUALITY CONTROL**

- A. See Section 014000 - DO NOT USE BSD Quality Requirements, for additional requirements.
- B. Inspect support and attachment components for damage and defects.
- C. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- D. Correct deficiencies and replace damaged or defective support and attachment components.

**END OF SECTION 260529**

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**SECTION 260533.13**  
**CONDUIT FOR ELECTRICAL SYSTEMS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Galvanized steel rigid metal conduit (RMC).
- B. Flexible metal conduit (FMC).
- C. Liquidtight flexible metal conduit (LFMC).
- D. Electrical metallic tubing (EMT).
- E. Rigid polyvinyl chloride (PVC) conduit.
- F. Liquidtight flexible nonmetallic conduit (LFNC).
- G. Conduit fittings.
- H. Accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 078400 - Firestopping.
- B. Section 260519 - Low-Voltage Electrical Power Conductors and Cables: Metal clad cable (Type MC), armored cable (Type AC), and manufactured wiring systems, including uses permitted.
- C. Section 260526 - Grounding and Bonding for Electrical Systems.
  - 1. Includes additional requirements for fittings for grounding and bonding.
- D. Section 260529 - Hangers and Supports for Electrical Systems.
- E. Section 260533.16 - Boxes for Electrical Systems.
- F. Section 260533.23 - Surface Raceways for Electrical Systems.
- G. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- H. Section 312316.13 - Trenching: Excavating, bedding, and backfilling.
- I. Section 337119 - Electrical Underground Ducts, Ductbanks, and Manholes.

**1.03 REFERENCE STANDARDS**

- A. ANSI C80.1 - American National Standard for Electrical Rigid Steel Conduit (ERSC) 2020.
  - B. ANSI C80.3 - American National Standard for Electrical Metallic Tubing -- Steel (EMT-S) 2020.
  - C. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
  - D. NECA 101 - Standard for Installing Steel Conduits (Rigid, IMC, EMT) 2020.
  - E. NECA 111 - Standard for Installing Nonmetallic Raceways (RNC, ENT, LFNC) 2017.
  - F. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable 2014.
  - G. NEMA TC 2 - Electrical Polyvinyl Chloride (PVC) Conduit 2020.
  - H. NEMA TC 3 - Polyvinyl Chloride (PVC) Fittings for Use with Rigid PVC Conduit and Tubing 2021.
  - I. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
  - J. UL 1 - Flexible Metal Conduit Current Edition, Including All Revisions.
  - K. UL 6 - Electrical Rigid Metal Conduit-Steel Current Edition, Including All Revisions.
  - L. UL 360 - Liquid-Tight Flexible Metal Conduit Current Edition, Including All Revisions.
  - M. UL 514B - Conduit, Tubing, and Cable Fittings Current Edition, Including All Revisions.
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- N. UL 651 - Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings Current Edition, Including All Revisions.
- O. UL 797 - Electrical Metallic Tubing-Steel Current Edition, Including All Revisions.
- P. UL 1242 - Electrical Intermediate Metal Conduit-Steel Current Edition, Including All Revisions.

#### **1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate minimum sizes of conduits with the actual conductors to be installed, including adjustments for conductor sizes increased for voltage drop.
  - 2. Coordinate the arrangement of conduits with structural members, ductwork, piping, equipment and other potential conflicts installed under other sections or by others.
  - 3. Verify exact conduit termination locations required for boxes, enclosures, and equipment installed under other sections or by others.
  - 4. Coordinate the work with other trades to provide roof penetrations that preserve the integrity of the roofing system and do not void the roof warranty.
  - 5. Notify Architect/Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.
- B. Sequencing:
  - 1. Do not begin installation of conductors and cables until installation of conduit is complete between outlet, junction and splicing points.

#### **1.05 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements for submittals procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for conduits and fittings.
- C. Shop Drawings:
  - 1. Include proposed locations of roof penetrations and proposed methods for sealing.

#### **1.06 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Receive, inspect, handle, and store conduit and fittings in accordance with manufacturer's instructions.

### **PART 2 PRODUCTS**

#### **2.01 CONDUIT APPLICATIONS**

- A. Do not use conduit and associated fittings for applications other than as permitted by NFPA 70 and product listing.
- B. Unless otherwise indicated and where not otherwise restricted, use the conduit types indicated for the specified applications. Where more than one listed application applies, comply with the most restrictive requirements. Where conduit type for a particular application is not specified, use galvanized steel rigid metal conduit.
- C. Underground:
  - 1. Under Slab on Grade: Use galvanized steel rigid metal conduit or rigid PVC conduit.
  - 2. Exterior, Direct-Buried: Use galvanized steel rigid metal conduit or rigid PVC conduit.
  - 3. Where rigid polyvinyl (PVC) conduit is provided, transition to galvanized steel rigid metal conduit where emerging from underground.
  - 4. Where steel conduit is installed in direct contact with earth, use corrosion pretection tap to provide supplementary corrosion protection.
- D. Concealed Within Hollow Stud Walls: Use electrical metallic tubing (EMT).
- E. Concealed Above Accessible Ceilings: Use electrical metallic tubing (EMT).

- F. Interior, Damp or Wet Locations: Use galvanized steel rigid metal conduit.
- G. Exposed, Interior, Not Subject to Physical Damage: Use electrical metallic tubing (EMT).
- H. Exposed, Interior, Subject to Physical Damage: Use galvanized steel rigid metal conduit.
- I. Exposed, Exterior: Use galvanized steel rigid metal conduit.
- J. Connections to Vibrating Equipment:
  - 1. Dry Locations: Use flexible metal conduit.
  - 2. Damp, Wet, or Corrosive Locations: Use liquidtight flexible metal conduit.
  - 3. Maximum Length: 6 feet unless otherwise indicated.

## **2.02 CONDUIT REQUIREMENTS**

- A. Fittings for Grounding and Bonding: Also comply with Section 260526.
- B. Provide all conduit, fittings, supports, and accessories required for a complete raceway system.
- C. Provide products listed, classified, and labeled as suitable for the purpose intended.
- D. Minimum Conduit Size, Unless Otherwise Indicated:
  - 1. Branch Circuits: 3/4 inch (21 mm) trade size.
  - 2. Branch Circuit Homeruns: 3/4 inch (21 mm) trade size.
- E. Where conduit size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

## **2.03 GALVANIZED STEEL RIGID METAL CONDUIT (RMC)**

- A. Manufacturers:
  - 1. Allied Tube & Conduit, a division of Atkore International: [www.alliedeg.com/#sle](http://www.alliedeg.com/#sle).
  - 2. Nucor Tubular Products: [www.nucortubular.com/#sle](http://www.nucortubular.com/#sle).
  - 3. Western Tube, a division of Zekelman Industries: [www.westerntube.com/#sle](http://www.westerntube.com/#sle).
  - 4. Wheatland Tube, a division of Zekelman Industries: [www.wheatland.com/#sle](http://www.wheatland.com/#sle).
  - 5. Substitutions: See Section 016000 - Product Requirements.
- B. Description: NFPA 70, Type RMC galvanized steel rigid metal conduit complying with ANSI C80.1 and listed and labeled as complying with UL 6.
- C. Fittings:
  - 1. Manufacturers:
    - a. Bridgeport Fittings Inc: [www.bptfittings.com/#sle](http://www.bptfittings.com/#sle).
    - b. O-Z/Gedney, a brand of Emerson Electric Co: [www.emerson.com/#sle](http://www.emerson.com/#sle).
    - c. Thomas & Betts Corporation: [www.tnb.com/#sle](http://www.tnb.com/#sle).
    - d. Substitutions: See Section 016000 - Product Requirements.
  - 2. Non-Hazardous Locations: Use fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
  - 3. Material: Use steel or malleable iron.
  - 4. Connectors and Couplings: Use threaded type fittings only. Threadless set screw and compression (gland) type fittings are not permitted.

## **2.04 FLEXIBLE METAL CONDUIT (FMC)**

- A. Manufacturers:
  - 1. AFC Cable Systems, Inc: [www.afcweb.com/#sle](http://www.afcweb.com/#sle).
  - 2. Electri-Flex Company: [www.electriflex.com/#sle](http://www.electriflex.com/#sle).
  - 3. International Metal Hose: [www.metalhose.com/#sle](http://www.metalhose.com/#sle).
  - 4. Substitutions: See Section 016000 - Product Requirements.
- B. Description: NFPA 70, Type FMC standard wall steel flexible metal conduit listed and labeled as complying with UL 1, and listed for use in classified firestop systems to be used.
- C. Fittings:
  - 1. Manufacturers:

- a. Bridgeport Fittings Inc: [www.bptfittings.com/#sle](http://www.bptfittings.com/#sle).
  - b. O-Z/Gedney, a brand of Emerson Electric Co: [www.emerson.com/#sle](http://www.emerson.com/#sle).
  - c. Thomas & Betts Corporation: [www.tnb.com/#sle](http://www.tnb.com/#sle).
  - d. Substitutions: See Section 016000 - Product Requirements.
2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
3. Material: Use steel.

## **2.05 LIQUIDTIGHT FLEXIBLE METAL CONDUIT (LFMC)**

- A. Manufacturers:
  1. AFC Cable Systems, Inc: [www.afcweb.com/#sle](http://www.afcweb.com/#sle).
  2. Electri-Flex Company: [www.electriflex.com/#sle](http://www.electriflex.com/#sle).
  3. International Metal Hose: [www.metalhose.com/#sle](http://www.metalhose.com/#sle).
  4. Substitutions: See Section 016000 - Product Requirements.
- B. Description: NFPA 70, Type LFMC polyvinyl chloride (PVC) jacketed steel flexible metal conduit listed and labeled as complying with UL 360.
- C. Fittings:
  1. Manufacturers:
    - a. Bridgeport Fittings Inc: [www.bptfittings.com/#sle](http://www.bptfittings.com/#sle).
    - b. O-Z/Gedney, a brand of Emerson Electric Co: [www.emerson.com/#sle](http://www.emerson.com/#sle).
    - c. Thomas & Betts Corporation: [www.tnb.com/#sle](http://www.tnb.com/#sle).
    - d. Substitutions: See Section 016000 - Product Requirements.
  2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
  3. Material: Use steel or malleable iron.

## **2.06 ELECTRICAL METALLIC TUBING (EMT)**

- A. Manufacturers:
  1. Allied Tube & Conduit, a division of Atkore International: [www.alliedeg.com/#sle](http://www.alliedeg.com/#sle).
  2. Nucor Tubular Products: [www.nucortubular/#sle](http://www.nucortubular/#sle).
  3. Western Tube, a division of Zekelman Industries: [www.westerntube.com/#sle](http://www.westerntube.com/#sle).
  4. Wheatland Tube, a division of Zekelman Industries: [www.wheatland.com/#sle](http://www.wheatland.com/#sle).
  5. Substitutions: See Section 016000 - Product Requirements.
- B. Description: NFPA 70, Type EMT steel electrical metallic tubing complying with ANSI C80.3 and listed and labeled as complying with UL 797.
- C. Fittings:
  1. Manufacturers:
    - a. Bridgeport Fittings Inc: [www.bptfittings.com/#sle](http://www.bptfittings.com/#sle).
    - b. O-Z/Gedney, a brand of Emerson Electric Co: [www.emerson.com/#sle](http://www.emerson.com/#sle).
    - c. Thomas & Betts Corporation: [www.tnb.com/#sle](http://www.tnb.com/#sle).
  2. Description: Fittings complying with NEMA FB 1 and listed and labeled as complying with UL 514B.
  3. Material: Use steel.
  4. Connectors and Couplings: Use compression (gland) type.
    - a. Do not use indenter type connectors and couplings.
    - b. Do not use set-screw type connectors and couplings.

## **2.07 RIGID POLYVINYL CHLORIDE (PVC) CONDUIT**

- A. Manufacturers:
  1. Cantex Inc: [www.cantexinc.com/#sle](http://www.cantexinc.com/#sle).
  2. Carlon, a brand of Thomas & Betts Corporation: [www.carlon.com/#sle](http://www.carlon.com/#sle).
  3. JM Eagle: [www.jmeagle.com/#sle](http://www.jmeagle.com/#sle).
  4. Substitutions: See Section 016000 - Product Requirements.

- B. Description: NFPA 70, Type PVC rigid polyvinyl chloride conduit complying with NEMA TC 2 and listed and labeled as complying with UL 651; Schedule 40 unless otherwise indicated, Schedule 80 where subject to physical damage; rated for use with conductors rated 90 degrees C.
- C. Fittings:
  - 1. Manufacturer: Same as manufacturer of conduit to be connected.
  - 2. Description: Fittings complying with NEMA TC 3 and listed and labeled as complying with UL 651; material to match conduit.

## **2.08 ACCESSORIES**

- A. Corrosion Protection Tape: PVC-based, minimum thickness of 20 mil.
- B. Conduit Joint Compound: Corrosion-resistant, electrically conductive; suitable for use with the conduit to be installed.
- C. Solvent Cement for PVC Conduit and Fittings: As recommended by manufacturer of conduit and fittings to be installed.
- D. Pull Strings: Use nylon cord with average breaking strength of not less than 200 pound-force.
- E. Sealing Compound for Sealing Fittings: Listed for use with the particular fittings to be installed.
- F. Modular Seals for Conduit Penetrations: Rated for minimum of 40 psig; Suitable for the conduits to be installed.
- G. Sealing Systems for Roof Penetrations: Premanufactured components and accessories as required to preserve integrity of roofing system and maintain roof warranty; suitable for conduits and roofing system to be installed; designed to accommodate existing penetrations where applicable.
  - 1. Products:
    - a. Menzies Metal Products; Electrical Roof Stack and Cap: [www.menzies-metal.com/#sle](http://www.menzies-metal.com/#sle).
    - b. Menzies Metal Products; Electrical Retro Box: [www.menzies-metal.com/#sle](http://www.menzies-metal.com/#sle).
    - c. Substitutions: See Section 016000 - Product Requirements.
- H. Firestop Sleeves: Listed; provide as required to preserve fire resistance rating of building elements.
  - 1. Products:
    - a. HoldRite, a brand of Reliance Worldwide Corporation; HydroFlame Pro Series/HydroFlame Custom Built: [www.holdrite.com/#sle](http://www.holdrite.com/#sle).
    - b. Substitutions: See Section 016000 - Product Requirements.
- I. Duct Bank Spacers: Nonmetallic; designed for maintaining conduit/duct spacing for concrete encasement in open trench installation; suitable for the conduit/duct arrangement to be installed.
  - 1. Products:
    - a. Advance Products & Systems, LLC; Duct Bank Spacers: [www.apsonline.com/#sle](http://www.apsonline.com/#sle).
    - b. Substitutions: See Section 016000 - Product Requirements.
- J. Bore Spacers: Nonmetallic; designed for maintaining conduit/duct spacing for installation within casing; furnished with roller wheels to facilitate installation, openings to facilitate grout flow, and holes for stabilization cable; suitable for the casing and conduit/duct arrangement to be installed.
  - 1. Products:
    - a. Advance Products & Systems, LLC; Bore Spacers: [www.apsonline.com/#sle](http://www.apsonline.com/#sle).
    - b. Substitutions: See Section 016000 - Product Requirements.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field measurements are as indicated.

- B. Verify that mounting surfaces are ready to receive conduits.
- C. Verify that conditions are satisfactory for installation prior to starting work.

### 3.02 INSTALLATION

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Install galvanized steel rigid metal conduit (RMC) in accordance with NECA 101.
- D. Install rigid polyvinyl chloride (PVC) conduit in accordance with NECA 111.
- E. Conduit Routing:
  - 1. Unless dimensioned, conduit routing indicated is diagrammatic.
  - 2. When conduit destination is indicated without specific routing, determine exact routing required.
  - 3. Conduits in the following areas may be exposed, unless otherwise indicated:
    - a. Electrical rooms.
    - b. Mechanical equipment rooms.
  - 4. Conduits installed underground or embedded in concrete may be routed in the shortest possible manner unless otherwise indicated. Route all other conduits parallel or perpendicular to building structure and surfaces, following surface contours where practical.
  - 5. Arrange conduit to maintain adequate headroom, clearances, and access.
  - 6. Arrange conduit to provide no more than the equivalent of four 90 degree bends between pull points.
  - 7. Arrange conduit to provide no more than 150 feet between pull points.
  - 8. Route conduits above water and drain piping where possible.
  - 9. Maintain minimum clearance of 6 inches between conduits and piping for other systems.
- F. Conduit Support:
  - 1. Secure and support conduits in accordance with NFPA 70 and Section 260529 using suitable supports and methods approved by the authority having jurisdiction.
  - 2. Provide independent support from building structure. Do not provide support from piping, ductwork, or other systems.
  - 3. Installation Above Suspended Ceilings: Do not provide support from ceiling support system. Do not provide support from ceiling grid or allow conduits to lay on ceiling tiles.
  - 4. Use conduit strap to support single surface-mounted conduit.
    - a. Use clamp back spacer with conduit strap for damp and wet locations to provide space between conduit and mounting surface.
  - 5. Use conduit clamp to support single conduit from beam clamp or threaded rod.
  - 6. Use trapeze hangers assembled from threaded rods and metal channel (strut) with accessory conduit clamps to support multiple parallel suspended conduits.
  - 7. Use of wire for support of conduits is not permitted.
  - 8. Where conduit support intervals specified in NFPA 70 and NECA standards differ, comply with the most stringent requirements.
- G. Connections and Terminations:
  - 1. Use approved zinc-rich paint or conduit joint compound on field-cut threads of galvanized steel conduits prior to making connections.
  - 2. Where two threaded conduits must be joined and neither can be rotated, use three-piece couplings or split couplings. Do not use running threads.
  - 3. Use suitable adapters where required to transition from one type of conduit to another.
  - 4. Provide drip loops for liquidtight flexible conduit connections to prevent drainage of liquid into connectors.
  - 5. Terminate threaded conduits in boxes and enclosures using threaded hubs or double lock nuts for dry locations and raintight hubs for wet locations.



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6. Where spare conduits stub up through concrete floors and are not terminated in a box or enclosure, provide threaded couplings equipped with threaded plugs set flush with finished floor.
  7. Provide insulating bushings or insulated throats at all conduit terminations to protect conductors.
  8. Secure joints and connections to provide maximum mechanical strength and electrical continuity.
- H. Penetrations:
1. Do not penetrate or otherwise notch or cut structural members, including footings and grade beams, without approval of Structural Engineer.
  2. Make penetrations perpendicular to surfaces unless otherwise indicated.
  3. Provide sleeves for penetrations as indicated or as required to facilitate installation. Set sleeves flush with exposed surfaces unless otherwise indicated or required.
  4. Conceal bends for conduit risers emerging above ground.
  5. Seal interior of conduits entering the building from underground at first accessible point to prevent entry of moisture and gases.
  6. Provide suitable modular seal where conduits penetrate exterior wall below grade.
  7. Where conduits penetrate waterproof membrane, seal as required to maintain integrity of membrane.
  8. Make penetrations for roof-mounted equipment within associated equipment openings and curbs where possible to minimize roofing system penetrations. Where penetrations are necessary, seal as indicated or as required to preserve integrity of roofing system and maintain roof warranty. Include proposed locations of penetrations and methods for sealing with submittals.
  9. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.
- I. Underground Installation:
1. Provide trenching and backfilling in accordance with Section 312316.13.
  2. Provide underground warning tape in accordance with Section 260553 along entire conduit length.
- J. Conduit Movement Provisions: Where conduits are subject to movement, provide expansion and expansion/deflection fittings to prevent damage to enclosed conductors or connected equipment. This includes, but is not limited to:
1. Where conduits cross structural joints intended for expansion, contraction, or deflection.
  2. Where calculated in accordance with NFPA 70 for rigid polyvinyl chloride (PVC) conduit installed above ground to compensate for thermal expansion and contraction.
  3. Where conduits are subject to earth movement by settlement or frost.
- K. Condensation Prevention: Where conduits cross barriers between areas of potential substantial temperature differential, provide sealing fitting or approved sealing compound at an accessible point near the penetration to prevent condensation. This includes, but is not limited to:
1. Where conduits pass from outdoors into conditioned interior spaces.
  2. Where conduits pass from unconditioned interior spaces into conditioned interior spaces.
  3. Where conduits penetrate coolers or freezers.
- L. Provide pull string in all empty conduits and in conduits where conductors and cables are to be installed by others. Leave minimum slack of 12 inches at each end.
- M. Provide grounding and bonding in accordance with Section 260526.
- N. Identify conduits in accordance with Section 260553.

### **3.03 FIELD QUALITY CONTROL**

- A. See Section 014000 - DO NOT USE BSD Quality Requirements, for additional requirements.
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- B. Repair cuts and abrasions in galvanized finishes using zinc-rich paint recommended by manufacturer. Replace components that exhibit signs of corrosion.
- C. Correct deficiencies and replace damaged or defective conduits.

#### **3.04 CLEANING**

- A. Clean interior of conduits to remove moisture and foreign matter.

#### **3.05 PROTECTION**

- A. Immediately after installation of conduit, use suitable manufactured plugs to provide protection from entry of moisture and foreign material and do not remove until ready for installation of conductors.

**END OF SECTION 260533.13**

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**SECTION 260533.16**  
**BOXES FOR ELECTRICAL SYSTEMS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Outlet and device boxes up to 100 cubic inches, including those used as junction and pull boxes.
- B. Cabinets and enclosures, including junction and pull boxes larger than 100 cubic inches.
- C. Underground boxes/enclosures.

**1.02 RELATED REQUIREMENTS**

- A. Section 083100 - Access Doors and Panels: Panels for maintaining access to concealed boxes.
- B. Section 260529 - Hangers and Supports for Electrical Systems.
- C. Section 260533.13 - Conduit for Electrical Systems:
  - 1. Conduit bodies and other fittings.
  - 2. Additional requirements for locating boxes to limit conduit length and/or number of bends between pulling points.
- D. Section 260553 - Identification for Electrical Systems: Identification products and requirements.
- E. Section 262726 - Wiring Devices:
  - 1. Wall plates.

**1.03 REFERENCE STANDARDS**

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- B. NECA 130 - Standard for Installing and Maintaining Wiring Devices 2016.
- C. NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit, Electrical Metallic Tubing, and Cable 2014.
- D. NEMA OS 1 - Sheet-Steel Outlet Boxes, Device Boxes, Covers, and Box Supports 2013 (Reaffirmed 2020).
- E. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- F. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. SCTE 77 - Specifications for Underground Enclosure Integrity 2017.
- H. UL 50 - Enclosures for Electrical Equipment, Non-Environmental Considerations Current Edition, Including All Revisions.
- I. UL 50E - Enclosures for Electrical Equipment, Environmental Considerations Current Edition, Including All Revisions.
- J. UL 508A - Industrial Control Panels Current Edition, Including All Revisions.
- K. UL 514A - Metallic Outlet Boxes Current Edition, Including All Revisions.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
    - 1. Coordinate the work with other trades to avoid placement of ductwork, piping, equipment, or other potential obstructions within the dedicated equipment spaces and working clearances for electrical equipment required by NFPA 70.
    - 2. Coordinate arrangement of electrical equipment with the dimensions and clearance requirements of the actual equipment to be installed.
    - 3. Coordinate minimum sizes of boxes with the actual installed arrangement of conductors, clamps, support fittings, and devices, calculated according to NFPA 70.
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4. Coordinate minimum sizes of pull boxes with the actual installed arrangement of connected conduits, calculated according to NFPA 70.
5. Coordinate the placement of boxes with millwork, furniture, devices, equipment, etc. installed under other sections or by others.
6. Coordinate the work with other trades to preserve insulation integrity.
7. Coordinate the work with other trades to provide walls suitable for installation of flush-mounted boxes where indicated.
8. Notify Architect/Engineer of any conflicts with or deviations from Contract Documents. Obtain direction before proceeding with work.

#### **1.05 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.

#### **1.06 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

### **PART 2 PRODUCTS**

#### **2.01 BOXES**

- A. General Requirements:
  1. Do not use boxes and associated accessories for applications other than as permitted by NFPA 70 and product listing.
  2. Provide all boxes, fittings, supports, and accessories required for a complete raceway system and to accommodate devices and equipment to be installed.
  3. Provide products listed, classified, and labeled as suitable for the purpose intended.
  4. Where box size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.
  5. Provide grounding terminals within boxes where equipment grounding conductors terminate.
- B. Outlet and Device Boxes Up to 100 cubic inches, Including Those Used as Junction and Pull Boxes:
  1. Use sheet-steel boxes for dry locations unless otherwise indicated or required.
  2. Use cast iron boxes or cast aluminum boxes for damp or wet locations unless otherwise indicated or required; furnish with compatible weatherproof gasketed covers.
  3. Use cast iron boxes or cast aluminum boxes where exposed galvanized steel rigid metal conduit is used.
  4. Use suitable concrete type boxes where flush-mounted in concrete.
  5. Use suitable masonry type boxes where flush-mounted in masonry walls.
  6. Use raised covers suitable for the type of wall construction and device configuration where required.
  7. Use shallow boxes where required by the type of wall construction.
  8. Do not use "through-wall" boxes designed for access from both sides of wall.
  9. Sheet-Steel Boxes: Comply with NEMA OS 1, and list and label as complying with UL 514A.
  10. Cast Metal Boxes: Comply with NEMA FB 1, and list and label as complying with UL 514A; furnish with threaded hubs.

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11. Boxes for Supporting Luminaires and Ceiling Fans: Listed as suitable for the type and weight of load to be supported; furnished with fixture stud to accommodate mounting of luminaire where required.
  12. Boxes for Ganged Devices: Use multigang boxes of single-piece construction. Do not use field-connected gangable boxes unless specifically indicated or permitted.
  13. Wall Plates: Comply with Section 262726.
  14. Manufacturers:
    - a. Cooper Crouse-Hinds, a division of Eaton Corporation: [www.cooperindustries.com/#sle](http://www.cooperindustries.com/#sle).
    - b. Hubbell Incorporated; Bell Products: [www.hubbell-rtb.com/#sle](http://www.hubbell-rtb.com/#sle).
    - c. Hubbell Incorporated; RACO Products: [www.hubbell-rtb.com/#sle](http://www.hubbell-rtb.com/#sle).
    - d. O-Z/Gedney, a brand of Emerson Electric Co: [www.emerson.com/#sle](http://www.emerson.com/#sle).
    - e. Thomas & Betts Corporation: [www.tnb.com/#sle](http://www.tnb.com/#sle).
- C. Cabinets and Enclosures, Including Junction and Pull Boxes Larger Than 100 cubic inches:
1. Comply with NEMA 250, and list and label as complying with UL 50 and UL 50E, or UL 508A.
  2. NEMA 250 Environment Type, Unless Otherwise Indicated:
  3. Junction and Pull Boxes Larger Than 100 cubic inches:
    - a. Provide screw-cover or hinged-cover enclosures unless otherwise indicated.
  4. Finish for Painted Steel Enclosures: Manufacturer's standard grey unless otherwise indicated.
  5. Manufacturers:
    - a. Cooper B-Line, a division of Eaton Corporation: [www.cooperindustries.com/#sle](http://www.cooperindustries.com/#sle).
    - b. Hoffman, a brand of Pentair Technical Products: [www.hoffmanonline.com/#sle](http://www.hoffmanonline.com/#sle).
    - c. Hubbell Incorporated; Wiegmann Products: [www.hubbell-wiegmann.com/#sle](http://www.hubbell-wiegmann.com/#sle).
    - d. Substitutions: See Section 016000 - Product Requirements.
- D. Underground Boxes/Enclosures:
1. Description: In-ground, solid bottom boxes furnished with flush, non-skid covers with legend indicating type of service and stainless steel cover bolts.
  2. Size: As indicated on drawings.
  3. Depth: As required to extend below frost line to prevent frost upheaval, but not less than 12 inches.
  4. Provide logo on cover to indicate type of service.
  5. Applications:
    - a. Sidewalks and Landscaped Areas Subject Only to Occasional Nondeliberate Vehicular Traffic: Use polymer concrete enclosures, with minimum SCTE 77 Tier 8 load rating.
    - b. Do not use polymer concrete enclosures in areas subject to deliberate vehicular traffic.
  6. Polymer Concrete Underground Boxes/Enclosures: Comply with SCTE 77.
    - a. Manufacturers:
      - 1) Hubbell Incorporated; Quazite Products: [www.hubbellpowersystems.com/#sle](http://www.hubbellpowersystems.com/#sle).
      - 2) MacLean Highline: [www.macleanhigline.com/#sle](http://www.macleanhigline.com/#sle).
      - 3) Oldcastle Precast, Inc: [www.oldcastleprecast.com/#sle](http://www.oldcastleprecast.com/#sle).
      - 4) Substitutions: See Section 016000 - Product Requirements.
    - b. Combination fiberglass/polymer concrete boxes/enclosures are acceptable.
    - c. Product(s):
      - 1) MacLean Highline PHA Series: Straight wall, all-polymer concrete splice box/pull box; available Tier 8, Tier 15, and Tier 22 load ratings.
      - 2) MacLean Highline CHA Series: Fiberglass/polymer concrete splice box/pull box; available Tier 8 and Tier 15 load ratings.
      - 3) MacLean Highline CVA Series: Fiberglass/polymer concrete splice vault; available Tier 8, Tier 15, and Tier 22 load ratings.
-

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that mounting surfaces are ready to receive boxes.
- C. Verify that conditions are satisfactory for installation prior to starting work.

### **3.02 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
  - B. Install boxes in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards where mounting heights are not indicated.
  - C. Arrange equipment to provide minimum clearances in accordance with manufacturer's instructions and NFPA 70.
  - D. Provide separate boxes for emergency power and normal power systems.
  - E. Unless otherwise indicated, provide separate boxes for line voltage and low voltage systems.
  - F. Box Locations:
    - 1. Locate boxes to be accessible. Provide access panels in accordance with Section 083100 as required.
    - 2. Locate junction and pull boxes as indicated, as required to facilitate installation of conductors, and to limit conduit length and/or number of bends between pulling points in accordance with Section 260533.13.
  - G. Box Supports:
    - 1. Secure and support boxes in accordance with NFPA 70 and Section 260529 using suitable supports and methods approved by the authority having jurisdiction.
    - 2. Provide independent support from building structure except for cast metal boxes (other than boxes used for fixture support) supported by threaded conduit connections in accordance with NFPA 70. Do not provide support from piping, ductwork, or other systems.
  - H. Install boxes plumb and level.
  - I. Flush-Mounted Boxes:
    - 1. Install boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that front edge of box or associated raised cover is not set back from finished surface more than 1/4 inch or does not project beyond finished surface.
    - 2. Install boxes in combustible materials such as wood so that front edge of box or associated raised cover is flush with finished surface.
    - 3. Repair rough openings around boxes in noncombustible materials such as concrete, tile, gypsum, plaster, etc. so that there are no gaps or open spaces greater than 1/8 inch at the edge of the box.
  - J. Install boxes as required to preserve insulation integrity.
  - K. Underground Boxes/Enclosures:
    - 1. Install enclosure on gravel base, minimum 6 inches deep.
    - 2. Install additional bracing inside enclosures in accordance with manufacturer's instructions to minimize box sidewall deflections during backfilling. Backfill with cover bolted in place.
  - L. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
  - M. Install firestopping to preserve fire resistance rating of partitions and other elements, using materials and methods specified in Section 078400.
  - N. Close unused box openings.
-

- O. Install blank wall plates on junction boxes and on outlet boxes with no devices or equipment installed or designated for future use.
- P. Provide grounding and bonding in accordance with Section 260526.
- Q. Identify boxes in accordance with Section 260553.

### **3.03 CLEANING**

- A. Clean interior of boxes to remove dirt, debris, plaster and other foreign material.

### **3.04 PROTECTION**

- A. Immediately after installation, protect boxes from entry of moisture and foreign material until ready for installation of conductors.

**END OF SECTION 260533.16**

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**SECTION 260533.23**  
**SURFACE RACEWAYS FOR ELECTRICAL SYSTEMS****PART 1 GENERAL****1.01 SECTION INCLUDES**

- A. Surface raceway systems.
- B. Wireways.

**1.02 RELATED REQUIREMENTS**

- A. Section 260526 - Grounding and Bonding for Electrical Systems.
- B. Section 260529 - Hangers and Supports for Electrical Systems.
- C. Section 260533.13 - Conduit for Electrical Systems.
- D. Section 260533.16 - Boxes for Electrical Systems.
- E. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

**1.03 REFERENCE STANDARDS**

- A. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- B. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- C. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2020.
- D. UL 5 - Surface Metal Raceways and Fittings Current Edition, Including All Revisions.
- E. UL 870 - Wireways, Auxiliary Gutters, and Associated Fittings Current Edition, Including All Revisions.

**1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets including dimensions, knockout sizes and locations, materials, fabrication details, finishes, service condition requirements, and accessories.
  - 1. Surface Raceway Systems: Include information on fill capacities for conductors and cables.
- C. Shop Drawings:
  - 1. Wireways: Provide dimensioned plan and elevation views including adjacent equipment with all required clearances indicated.

**1.05 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Receive, inspect, handle, and store products in accordance with manufacturer's instructions.

**PART 2 PRODUCTS****2.01 RACEWAY REQUIREMENTS**

- A. Provide all components, fittings, supports, and accessories required for a complete raceway system.
-

- B. Provide products listed, classified, and labeled as suitable for the purpose intended.
- C. Do not use raceways for applications other than as permitted by NFPA 70 and product listing.

## **2.02 SURFACE RACEWAY SYSTEMS**

- A. Manufacturers:
  - 1. Hubbell Incorporated: [www.hubbell.com/#sle](http://www.hubbell.com/#sle).
  - 2. MonoSystems, Inc: [www.monosystems.com/#sle](http://www.monosystems.com/#sle).
  - 3. Wiremold, a brand of Legrand North America, Inc: [www.legrand.us/#sle](http://www.legrand.us/#sle).
  - 4. Substitutions: See Section 016000 - Product Requirements.
- B. Surface Metal Raceways: Listed and labeled as complying with UL 5.

## **2.03 WIREWAYS**

- A. Manufacturers:
  - 1. Cooper B-Line, a division of Cooper Industries: [www.cooperindustries.com/#sle](http://www.cooperindustries.com/#sle).
  - 2. Enduro Composites: [www.endurocomposites.com/#sle](http://www.endurocomposites.com/#sle).
  - 3. Hoffman, a brand of Pentair Technical Products: [www.hoffmanonline.com/#sle](http://www.hoffmanonline.com/#sle).
  - 4. Schneider Electric; Square D Products: [www.schneider-electric.us/#sle](http://www.schneider-electric.us/#sle).
- B. Description: Lay-in wireways and wiring troughs with removable covers; listed and labeled as complying with UL 870.
- C. Wireway Type, Unless Otherwise Indicated:
  - 1. Indoor Clean, Dry Locations: NEMA 250, Type 1, painted steel with screw-cover.
  - 2. Outdoor Locations: NEMA 250, Type 3R, painted steel with screw-cover; include provision for padlocking.
- D. Finish for Painted Steel Wireways: Manufacturer's standard grey unless otherwise indicated.
- E. Where wireway size is not indicated, size to comply with NFPA 70 but not less than applicable minimum size requirements specified.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes and conduit terminations are installed in proper locations and are properly sized in accordance with NFPA 70 to accommodate raceways.
- C. Verify that mounting surfaces are ready to receive raceways and that final surface finishes are complete, including painting.
- D. Verify that conditions are satisfactory for installation prior to starting work.

### **3.02 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Perform work in accordance with NECA 1 (general workmanship).
- C. Install raceways plumb and level.
- D. Arrange wireways and associated raceway connections to comply with NFPA 70, including but not limited to requirements for deflected conductors and wireways used as pullboxes. Increase size of wireway where necessary.
- E. Secure and support raceways in accordance with Section 260529 at intervals complying with NFPA 70 and manufacturer's requirements.
- F. Close unused raceway openings.
- G. Provide grounding and bonding in accordance with Section 260526.
- H. Identify raceways in accordance with Section 260553.

**3.03 FIELD QUALITY CONTROL**

- A. See Section 014000 - DO NOT USE BSD Quality Requirements, for additional requirements.
- B. Inspect raceways for damage and defects.
- C. Correct wiring deficiencies and replace damaged or defective raceways.

**3.04 CLEANING**

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

**3.05 PROTECTION**

- A. Protect installed raceways from subsequent construction operations.

**END OF SECTION 260533.23**

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## **SECTION 260553 IDENTIFICATION FOR ELECTRICAL SYSTEMS**

### **PART 1 GENERAL**

#### **1.01 SECTION INCLUDES**

- A. Electrical identification requirements.
- B. Identification nameplates and labels.
- C. Wire and cable markers.
- D. Voltage markers.
- E. Underground warning tape.
- F. Warning signs and labels.

#### **1.02 RELATED REQUIREMENTS**

- A. Section 260519 - Low-Voltage Electrical Power Conductors and Cables: Color coding for power conductors and cables 600 V and less; vinyl color coding electrical tape.
- B. Section 262726 - Wiring Devices - Lutron: Device and wallplate finishes; factory pre-marked wallplates.

#### **1.03 REFERENCE STANDARDS**

- A. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- B. UL 969 - Marking and Labeling Systems Current Edition, Including All Revisions.

#### **1.04 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements for submittals procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets for each product.
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation and installation of product.

#### **1.05 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.

#### **1.06 FIELD CONDITIONS**

- A. Do not install adhesive products when ambient temperature is lower than recommended by manufacturer.

### **PART 2 PRODUCTS**

#### **2.01 IDENTIFICATION REQUIREMENTS**

- A. Identification for Equipment:
  - 1. Use identification nameplate to identify each piece of electrical distribution and control equipment and associated sections, compartments, and components.
    - a. Enclosed switches, circuit breakers, and motor controllers:
      - 1) Identify voltage and phase.
      - 2) Identify power source and circuit number. Include location when not within sight of equipment.
      - 3) Identify load(s) served. Include location when not within sight of equipment.
  - 2. Use identification label or identification nameplate on inside of door at each fused switch to identify required NEMA fuse class and size.
  - 3. Use identification label or identification nameplate on inside of door at each motor controller to identify nameplate horsepower, full load amperes, code letter, service factor,

voltage, and phase of motor(s) controlled.

- B. Identification for Conductors and Cables:
  - 1. Color Coding for Power Conductors 600 V and Less: Comply with Section 260519.
  - 2. Use identification nameplate or identification label to identify color code for ungrounded and grounded power conductors inside door or enclosure at each piece of feeder or branch-circuit distribution equipment when premises has feeders or branch circuits served by more than one nominal voltage system.
  - 3. Use wire and cable markers to identify circuit number or other designation indicated for power, control, and instrumentation conductors and cables at the following locations:
    - a. Within boxes when more than one circuit is present.
    - b. Within equipment enclosures when conductors and cables enter or leave the enclosure.
  - 4. Use wire and cable markers to identify connected grounding electrode system components for grounding electrode conductors.
- C. Identification for Raceways:
  - 1. Use voltage markers or color-coded bands to identify systems other than normal power system for accessible conduits at maximum intervals of 20 feet.
    - a. Color-Coded Bands: Use field-painting or vinyl color coding electrical tape to mark bands 3 inches wide.
      - 1) Color Code:
        - (a) Fire Alarm System: Red.
      - 2) Vinyl Color Coding Electrical Tape: Comply with Section 260519.
  - 2. Use identification labels or plastic marker tags to identify spare conduits at each end. Identify purpose and termination location.
  - 3. Use underground warning tape to identify underground raceways.
- D. Identification for Devices:
  - 1. Wiring Device and Wallplate Finishes: Comply with Section 262726.
  - 2. Use identification label to identify fire alarm system devices.

## **2.02 IDENTIFICATION NAMEPLATES AND LABELS**

- A. Identification Nameplates:
  - 1. Manufacturers:
    - a. Brimar Industries, Inc: [www.brimar.com/#sle](http://www.brimar.com/#sle).
    - b. Kolbi Pipe Marker Co: [www.kolbipipemarkers.com/#sle](http://www.kolbipipemarkers.com/#sle).
    - c. Seton Identification Products: [www.seton.com/#sle](http://www.seton.com/#sle).
  - 2. Materials:
    - a. Indoor Clean, Dry Locations: Use plastic nameplates.
    - b. Outdoor Locations: Use plastic, stainless steel, or aluminum nameplates suitable for exterior use.
  - 3. Plastic Nameplates: Two-layer or three-layer laminated acrylic or electrically non-conductive phenolic with beveled edges; minimum thickness of 1/16 inch; engraved text.
  - 4. Stainless Steel Nameplates: Minimum thickness of 1/32 inch; engraved or laser-etched text.
  - 5. Aluminum Nameplates: Anodized; minimum thickness of 1/32 inch; engraved or laser-etched text.
  - 6. Mounting Holes for Mechanical Fasteners: Two, centered on sides for sizes up to 1 inch high; Four, located at corners for larger sizes.
- B. Identification Labels:
  - 1. Manufacturers:
    - a. Brady Corporation: [www.bradyid.com/#sle](http://www.bradyid.com/#sle).
    - b. Brother International Corporation: [www.brother-usa.com/#sle](http://www.brother-usa.com/#sle).
    - c. Panduit Corp: [www.panduit.com/#sle](http://www.panduit.com/#sle).

2. Materials: Use self-adhesive laminated plastic labels; UV, chemical, water, heat, and abrasion resistant.
3. Text: Use factory pre-printed or machine-printed text. Do not use handwritten text unless otherwise indicated.
- C. Format for Fire Alarm Device Identification:
  1. Minimum Size: 3/8 inch by 1.5 inches.
  2. Legend: Designation indicated and device zone or address.
  3. Text: All capitalized unless otherwise indicated.
  4. Minimum Text Height: 3/16 inch.
  5. Color: Red text on white background.

### **2.03 WIRE AND CABLE MARKERS**

- A. Manufacturers:
  1. Brady Corporation: [www.bradyid.com/#sle](http://www.bradyid.com/#sle).
  2. HellermannTyton: [www.hellermannntyton.com/#sle](http://www.hellermannntyton.com/#sle).
  3. Panduit Corp: [www.panduit.com/#sle](http://www.panduit.com/#sle).
- B. Markers for Conductors and Cables: Use wrap-around self-adhesive vinyl cloth, wrap-around self-adhesive vinyl self-laminating, heat-shrink sleeve, plastic sleeve, plastic clip-on, or vinyl split sleeve type markers suitable for the conductor or cable to be identified.
- C. Markers for Conductor and Cable Bundles: Use plastic marker tags secured by nylon cable ties.
- D. Legend: Power source and circuit number or other designation indicated.
- E. Text: Use factory pre-printed or machine-printed text, all capitalized unless otherwise indicated.
- F. Minimum Text Height: 1/8 inch.
- G. Color: Black text on white background unless otherwise indicated.

### **2.04 VOLTAGE MARKERS**

- A. Manufacturers:
  1. Brady Corporation: [www.bradyid.com/#sle](http://www.bradyid.com/#sle).
  2. Brimar Industries, Inc: [www.brimar.com/#sle](http://www.brimar.com/#sle).
  3. Seton Identification Products: [www.seton.com/#sle](http://www.seton.com/#sle).
- B. Markers for Conduits: Use factory pre-printed self-adhesive vinyl, self-adhesive vinyl cloth, or vinyl snap-around type markers.
- C. Minimum Size:
  1. Markers for Conduits: As recommended by manufacturer for conduit size to be identified.
- D. Legend:
  1. Markers for System Identification:
- E. Color: Black text on orange background unless otherwise indicated.

### **2.05 UNDERGROUND WARNING TAPE**

- A. Manufacturers:
  1. Brady Corporation: [www.bradyid.com/#sle](http://www.bradyid.com/#sle).
  2. Brimar Industries, Inc: [www.brimar.com/#sle](http://www.brimar.com/#sle).
  3. Seton Identification Products: [www.seton.com/#sle](http://www.seton.com/#sle).
- B. Materials: Use non-detectable type polyethylene tape suitable for direct burial, unless otherwise indicated.
- C. Non-detectable Type Tape: 6 inches wide, with minimum thickness of 4 mil.
- D. Legend: Type of service, continuously repeated over full length of tape.
- E. Color:

## **2.06 WARNING SIGNS AND LABELS**

- A. Manufacturers:
  - 1. Brimar Industries, Inc: [www.brimar.com/#sle](http://www.brimar.com/#sle).
  - 2. Clarion Safety Systems, LLC: [www.clarionsafety.com/#sle](http://www.clarionsafety.com/#sle).
  - 3. Insite Solutions, LLC: [www.stop-painting.com/#sle](http://www.stop-painting.com/#sle).
  - 4. Seton Identification Products: [www.seton.com/#sle](http://www.seton.com/#sle).
- B. Comply with ANSI Z535.2 or ANSI Z535.4 as applicable.
- C. Warning Signs:
  - 1. Materials:
    - a. Indoor Dry, Clean Locations: Use factory pre-printed rigid plastic or self-adhesive vinyl signs.
  - 2. Rigid Signs: Provide four mounting holes at corners for mechanical fasteners.
  - 3. Minimum Size: 7 by 10 inches unless otherwise indicated.
- D. Warning Labels:
  - 1. Materials: Use factory pre-printed or machine-printed self-adhesive polyester or self-adhesive vinyl labels; UV, chemical, water, heat, and abrasion resistant; produced using materials recognized to UL 969.
  - 2. Machine-Printed Labels: Use thermal transfer process printing machines and accessories recommended by label manufacturer.
  - 3. Minimum Size: 2 by 4 inches unless otherwise indicated.

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Clean surfaces to receive adhesive products according to manufacturer's instructions.

### **3.02 INSTALLATION**

- A. Install products in accordance with manufacturer's instructions.
- B. Install identification products to be plainly visible for examination, adjustment, servicing, and maintenance. Unless otherwise indicated, locate products as follows:
  - 1. Surface-Mounted Equipment: Enclosure front.
  - 2. Flush-Mounted Equipment: Inside of equipment door.
  - 3. Free-Standing Equipment: Enclosure front; also enclosure rear for equipment with rear access.
  - 4. Elevated Equipment: Legible from the floor or working platform.
  - 5. Interior Components: Legible from the point of access.
  - 6. Conduits: Legible from the floor.
  - 7. Conductors and Cables: Legible from the point of access.
  - 8. Devices: Outside face of cover.
- C. Install identification products centered, level, and parallel with lines of item being identified.
- D. Secure nameplates to exterior surfaces of enclosures using stainless steel screws and to interior surfaces using self-adhesive backing or epoxy cement.
- E. Install self-adhesive labels and markers to achieve maximum adhesion, with no bubbles or wrinkles and edges properly sealed.
- F. Install underground warning tape above buried lines with one tape per trench at 3 inches below finished grade.
- G. Secure rigid signs using stainless steel screws.

**END OF SECTION 260553**



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**SECTION 260583  
WIRING CONNECTIONS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Electrical connections to equipment.

**1.02 RELATED REQUIREMENTS**

- A. Section 260519 - Low-Voltage Electrical Power Conductors and Cables.
- B. Section 260533.13 - Conduit for Electrical Systems.
- C. Section 260533.16 - Boxes for Electrical Systems.
- D. Section 262726 - Wiring Devices.

**1.03 REFERENCE STANDARDS**

- A. NEMA WD 1 - General Color Requirements for Wiring Devices 1999 (Reaffirmed 2020).
- B. NEMA WD 6 - Wiring Devices - Dimensional Specifications 2021.
- C. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Obtain and review shop drawings, product data, manufacturer's wiring diagrams, and manufacturer's instructions for equipment furnished under other sections.
  - 2. Determine connection locations and requirements.
- B. Sequencing:
  - 1. Install rough-in of electrical connections before installation of equipment is required.
  - 2. Make electrical connections before required start-up of equipment.

**1.05 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide wiring device manufacturer's catalog information showing dimensions, configurations, and construction.
- C. Manufacturer's Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.

**1.06 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. Products: Listed, classified, and labeled as suitable for the purpose intended.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Wiring Devices: As specified in Section 262726.
- B. Flexible Conduit: As specified in Section 260533.13.
- C. Wire and Cable: As specified in Section 260519.
- D. Boxes: As specified in Section 260533.16.

**2.02 EQUIPMENT CONNECTIONS**

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify that equipment is ready for electrical connection, wiring, and energization.
-

### **3.02 ELECTRICAL CONNECTIONS**

- A. Make electrical connections in accordance with equipment manufacturer's instructions.
- B. Make conduit connections to equipment using flexible conduit. Use liquidtight flexible conduit with watertight connectors in damp or wet locations.
- C. Connect heat producing equipment using wire and cable with insulation suitable for temperatures encountered.
- D. Provide receptacle outlet to accommodate connection with attachment plug.
- E. Provide cord and cap where field-supplied attachment plug is required.
- F. Install suitable strain-relief clamps and fittings for cord connections at outlet boxes and equipment connection boxes.
- G. Install disconnect switches, controllers, control stations, and control devices to complete equipment wiring requirements.
- H. Install terminal block jumpers to complete equipment wiring requirements.
- I. Install interconnecting conduit and wiring between devices and equipment to complete equipment wiring requirements.

**END OF SECTION 260583**

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**SECTION 262726  
WIRING DEVICES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Receptacles.
- B. Wall plates.

**1.02 RELATED REQUIREMENTS**

- A. Section 260519 - Low-Voltage Electrical Power Conductors and Cables: Manufactured wiring systems for use with access floor boxes with compatible pre-wired connectors.
- B. Section 260533.16 - Boxes for Electrical Systems.
- C. Section 260533.23 - Surface Raceways for Electrical Systems: Surface raceway systems, including multioutlet assemblies.
- D. Section 260553 - Identification for Electrical Systems: Identification products and requirements.

**1.03 REFERENCE STANDARDS**

- A. FS W-C-596 - Connector, Electrical, Power, General Specification for 2014h, with Amendments (2017).
- B. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- C. NECA 130 - Standard for Installing and Maintaining Wiring Devices 2016.
- D. NEMA WD 1 - General Color Requirements for Wiring Devices 1999 (Reaffirmed 2020).
- E. NEMA WD 6 - Wiring Devices - Dimensional Specifications 2021.
- F. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 498 - Attachment Plugs and Receptacles Current Edition, Including All Revisions.
- H. UL 514D - Cover Plates for Flush-Mounted Wiring Devices Current Edition, Including All Revisions.
- I. UL 943 - Ground-Fault Circuit-Interrupters Current Edition, Including All Revisions.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate the placement of outlet boxes with millwork, furniture, equipment, etc. installed under other sections or by others.
  - 2. Coordinate wiring device ratings and configurations with the electrical requirements of actual equipment to be installed.
  - 3. Coordinate the installation and preparation of uneven surfaces, such as split face block, to provide suitable surface for installation of wiring devices.
  - 4. Notify Architect/Engineer of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

**1.05 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
  - B. Product Data: Provide manufacturer's catalog information showing dimensions, colors, and configurations.
  - C. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation of product.
  - D. Operation and Maintenance Data:
    - 1. GFCI Receptacles: Include information on status indicators.
-

- E. Project Record Documents: Record actual installed locations of wiring devices.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 016000 - Product Requirements, for additional provisions.

#### **1.06 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Products: Listed, classified, and labeled as suitable for the purpose intended.

#### **1.07 DELIVERY, STORAGE, AND PROTECTION**

- A. Store in a clean, dry space in original manufacturer's packaging until ready for installation.

### **PART 2 PRODUCTS**

#### **2.01 WIRING DEVICE APPLICATIONS**

- A. Provide wiring devices suitable for intended use and with ratings adequate for load served.
- B. Provide weather resistant GFCI receptacles with specified weatherproof covers for receptacles installed outdoors or in damp or wet locations.

#### **2.02 WIRING DEVICE FINISHES**

- A. Provide wiring device finishes as described below unless otherwise indicated.
- B. Wiring Devices, Unless Otherwise Indicated: White with white nylon wall plate.
- C. Wiring Devices Installed in Finished Spaces: White with white nylon wall plate.
- D. Wiring Devices Installed in Unfinished Spaces: Gray with galvanized steel wall plate.
- E. Wiring Devices Installed in Wet or Damp Locations: White with specified weatherproof cover.

#### **2.03 RECEPTACLES**

- A. Manufacturers:
  - 1. Hubbell Incorporated; \_\_\_\_\_: [www.hubbell.com/#sle](http://www.hubbell.com/#sle).
  - 2. Leviton Manufacturing Company, Inc; \_\_\_\_\_: [www.leviton.com/#sle](http://www.leviton.com/#sle).
  - 3. Lutron Electronics Company, Inc; Designer Style: [www.lutron.com/#sle](http://www.lutron.com/#sle).
  - 4. Pass & Seymour, a brand of Legrand North America, Inc; \_\_\_\_\_: [www.legrand.us/#sle](http://www.legrand.us/#sle).
  - 5. Substitutions: See Section 016000 - Product Requirements.
- B. Receptacles - General Requirements: Self-grounding, complying with NEMA WD 1 and NEMA WD 6, and listed as complying with UL 498, and where applicable, FS W-C-596; types as indicated on the drawings.
  - 1. Wiring Provisions: Terminal screws for side wiring or screw actuated binding clamp for back wiring with separate ground terminal screw.
  - 2. NEMA configurations specified are according to NEMA WD 6.
- C. Convenience Receptacles:
- D. GFCI Receptacles:
  - 1. GFCI Receptacles - General Requirements: Self-testing, with feed-through protection and light to indicate ground fault tripped condition and loss of protection; listed as complying with UL 943, class A.
    - a. Provide test and reset buttons of same color as device.
  - 2. Weather Resistant GFCI Receptacles: Industrial specification grade, duplex, 20A, 125V, NEMA 5-20R, rectangular decorator style, listed and labeled as weather resistant type complying with UL 498 Supplement SE suitable for installation in damp or wet locations.
    - a. Products:

#### **2.04 WALL PLATES**

- A. Manufacturers:

1. Hubbell Incorporated: [www.hubbell-wiring.com/#sle](http://www.hubbell-wiring.com/#sle).
  2. Leviton Manufacturing Company, Inc: [www.leviton.com/#sle](http://www.leviton.com/#sle).
  3. Lutron Electronics Company, Inc: [www.lutron.com/#sle](http://www.lutron.com/#sle).
  4. Pass & Seymour, a brand of Legrand North America, Inc: [www.legrand.us/#sle](http://www.legrand.us/#sle).
  5. Substitutions: See Section 016000 - Product Requirements.
- B. Wall Plates: Comply with UL 514D.
1. Configuration: One piece cover as required for quantity and types of corresponding wiring devices.
  2. Size: Standard.
  3. Screws: Metal with slotted heads finished to match wall plate finish.
- C. Weatherproof Covers for Wet Locations: Gasketed, cast aluminum, with hinged lockable cover and corrosion-resistant screws; listed as suitable for use in wet locations while in use with attachment plugs connected and identified as extra-duty type.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate devices and conductors in accordance with NFPA 70.
- C. Verify that wall openings are neatly cut and will be completely covered by wall plates.
- D. Verify that final surface finishes are complete, including painting.
- E. Verify that branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.
- F. Verify that conditions are satisfactory for installation prior to starting work.

#### **3.02 PREPARATION**

- A. Provide extension rings to bring outlet boxes flush with finished surface.
- B. Clean dirt, debris, plaster, and other foreign materials from outlet boxes.

#### **3.03 INSTALLATION**

- A. Perform work in accordance with NECA 1 (general workmanship) and, where applicable, NECA 130, including mounting heights specified in those standards unless otherwise indicated.
- B. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of wiring devices provided under this section.
- C. Install wiring devices in accordance with manufacturer's instructions.
- D. Install permanent barrier between ganged wiring devices when voltage between adjacent devices exceeds 300 V.
- E. Where required, connect wiring devices using pigtails not less than 6 inches long. Do not connect more than one conductor to wiring device terminals.
- F. Connect wiring devices by wrapping conductor clockwise 3/4 turn around screw terminal and tightening to proper torque specified by the manufacturer. Where present, do not use push-in pressure terminals that do not rely on screw-actuated binding.
- G. Unless otherwise indicated, connect wiring device grounding terminal to branch circuit equipment grounding conductor and to outlet box with bonding jumper.
- H. Provide GFCI receptacles with integral GFCI protection at each location indicated. Do not use feed-through wiring to protect downstream devices.
- I. Install wiring devices plumb and level with mounting yoke held rigidly in place.
- J. Install wall switches with OFF position down.

- K. Install vertically mounted receptacles with grounding pole on top and horizontally mounted receptacles with grounding pole on left.
- L. Install wall plates to fit completely flush to wall with no gaps and rough opening completely covered without strain on wall plate. Repair or reinstall improperly installed outlet boxes or improperly sized rough openings. Do not use oversized wall plates in lieu of meeting this requirement.
- M. Install blank wall plates on junction boxes and on outlet boxes with no wiring devices installed or designated for future use.
- N. Identify wiring devices in accordance with Section 260553.

#### **3.04 FIELD QUALITY CONTROL**

- A. See Section 014000 - DO NOT USE BSD Quality Requirements, for additional requirements.
- B. Inspect each wiring device for damage and defects.
- C. Operate each wall switch, wall dimmer, and fan speed controller with circuit energized to verify proper operation.
- D. Test each receptacle to verify operation and proper polarity.
- E. Test each GFCI receptacle for proper tripping operation according to manufacturer's instructions.
- F. Correct wiring deficiencies and replace damaged or defective wiring devices.

#### **3.05 CLEANING**

- A. Clean exposed surfaces to remove dirt, paint, or other foreign material and restore to match original factory finish.

**END OF SECTION 262726**

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**SECTION 265600  
EXTERIOR LIGHTING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Exterior luminaires.
- B. Ballasts.
- C. Poles and accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 033000 - Cast-in-Place Concrete: Materials and installation requirements for concrete bases for poles.
- B. Section 260526 - Grounding and Bonding for Electrical Systems.
- C. Section 260529 - Hangers and Supports for Electrical Systems.
- D. Section 260533.16 - Boxes for Electrical Systems.

**1.03 REFERENCE STANDARDS**

- A. IEEE C2 - National Electrical Safety Code(R) (NESC(R)) 2023.
- B. IES LM-79 - Approved Method: Optical and Electrical Measurements of Solid-State Lighting Products 2019.
- C. IES LM-80 - Approved Method: Measuring Maintenance of Light Output Characteristics of Solid-State Light Sources 2021.
- D. NECA 1 - Standard for Good Workmanship in Electrical Construction 2015.
- E. NECA/IESNA 501 - Standard for Installing Exterior Lighting Systems 2000 (Reaffirmed 2006).
- F. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- G. UL 1598 - Luminaires Current Edition, Including All Revisions.
- H. UL 8750 - Light Emitting Diode (LED) Equipment for Use in Lighting Products Current Edition, Including All Revisions.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordination:
  - 1. Coordinate placement of poles and associated foundations with utilities, curbs, sidewalks, trees, walls, fences, striping, etc. installed under other sections or by others. Coordinate elevation to obtain specified foundation height.
  - 2. Notify Architect/Engineer of any conflicts or deviations from Contract Documents to obtain direction prior to proceeding with work.

**1.05 SUBMITTALS**

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
  - B. Shop Drawings:
    - 1. Indicate dimensions and components for each luminaire that is not a standard product of the manufacturer.
    - 2. Provide structural calculations for each pole proposed for substitution.
  - C. Product Data: Provide manufacturer's standard catalog pages and data sheets including detailed information on luminaire construction, dimensions, ratings, finishes, mounting requirements, listings, service conditions, photometric performance, weight, effective projected area (EPA), and installed accessories; include model number nomenclature clearly marked with all proposed features.
    - 1. LED Luminaires:
      - a. Include estimated useful life, calculated based on IES LM-80 test data.
-

- b. Include IES LM-79 test report upon request.
- 2. Poles: Include information on maximum supported effective projected area (EPA) and weight for the design wind speed.
- D. Certificates for Poles and Accessories: Manufacturer's documentation that products are suitable for the luminaires to be installed and comply with designated structural design criteria.
- E. Field Quality Control Reports.
- F. Manufacturer's Installation Instructions: Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, installation, and starting of product.
- G. Operation and Maintenance Data: Instructions for each product including information on replacement parts.
- H. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 016000 - Product Requirements, for additional provisions.
- I. Project Record Documents: Record actual connections and locations of pole foundations, luminaires, and any pull or junction boxes.

#### **1.06 QUALITY ASSURANCE**

- A. Comply with requirements of NFPA 70.
- B. Maintain at the project site a copy of each referenced document that prescribes execution requirements.
- C. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- D. Product Listing Organization Qualifications: An organization recognized by OSHA as a Nationally Recognized Testing Laboratory (NRTL) and acceptable to authorities having jurisdiction.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Receive, handle, and store products according to NECA/IESNA 501 and manufacturer's written instructions.
- B. Keep products in original manufacturer's packaging and protect from damage until ready for installation.

#### **1.08 WARRANTY**

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.

### **PART 2 PRODUCTS**

#### **2.01 LUMINAIRE TYPES**

- A. Furnish products as indicated in luminaire schedule included on the drawings.
- B. Substitutions: See Section 016000 - Product Requirements.

#### **2.02 LUMINAIRES**

- A. Provide products that comply with requirements of NFPA 70.
- B. Provide products that are listed and labeled as complying with UL 1598, where applicable.
- C. Provide products listed, classified, and labeled as suitable for the purpose intended.
- D. Unless otherwise indicated, provide complete luminaires including lamp(s) and all sockets, ballasts, reflectors, lenses, housings and other components required to position, energize and protect the lamp and distribute the light.
- E. Unless specifically indicated to be excluded, provide all required conduit, boxes, wiring, connectors, hardware, poles, foundations, supports, trims, accessories, etc. as necessary for a complete operating system.



- F. Provide products suitable to withstand normal handling, installation, and service without any damage, distortion, corrosion, fading, discoloring, etc.
- G. Provide luminaires listed and labeled as suitable for wet locations unless otherwise indicated.
- H. LED Luminaires:
  - 1. Components: UL 8750 recognized or listed as applicable.
  - 2. Tested in accordance with IES LM-79 and IES LM-80.
  - 3. LED Estimated Useful Life: Minimum of 50,000 hours at 70 percent lumen maintenance, calculated based on IES LM-80 test data.

### **2.03 BALLASTS AND DRIVERS**

- A. Ballasts/Drivers - General Requirements:
  - 1. Provide ballasts containing no polychlorinated biphenyls (PCBs).
  - 2. Minimum Efficiency/Efficacy: Provide ballasts complying with all current applicable federal and state ballast efficiency/efficacy standards.
- B. Dimmable LED Drivers:
  - 1. Dimming Range: Continuous dimming from 100 percent to five percent relative light output unless dimming capability to lower level is indicated, without flicker.
  - 2. Control Compatibility: Fully compatible with the dimming controls to be installed.

### **2.04 POLES**

- A. All Poles:
  - 1. Provide poles and associated support components suitable for the luminaire(s) and associated supports and accessories to be installed.
  - 2. Material: Steel, unless otherwise indicated.
  - 3. Shape: Square straight, unless otherwise indicated.
  - 4. Finish: Match luminaire finish, unless otherwise indicated.
  - 5. Mounting: Install on concrete foundation, height as indicated on the drawings, unless otherwise indicated.
  - 6. Unless otherwise indicated, provide with the following features/accessories:
    - a. Top cap.
    - b. Handhole.
    - c. Anchor bolts with leveling nuts or leveling shims.
    - d. Anchor base cover.
    - e. Pole-top tenon, \_\_\_\_\_ inch.
- B. Metal Poles: Provide ground lug, accessible from handhole or transformer base.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field measurements are as indicated.
- B. Verify that outlet boxes are installed in proper locations and at proper mounting heights and are properly sized to accommodate conductors in accordance with NFPA 70.
- C. Verify that suitable support frames are installed where required.
- D. Verify that branch circuit wiring installation is completed, tested, and ready for connection to luminaires.
- E. Verify that conditions are satisfactory for installation prior to starting work.

### **3.02 INSTALLATION**

- A. Coordinate locations of outlet boxes provided under Section 260533.16 as required for installation of luminaires provided under this section.
- B. Install products in accordance with manufacturer's instructions.
- C. Install luminaires in accordance with NECA/IESNA 501.

- D. Provide required support and attachment in accordance with Section 260529.
- E. Install luminaires plumb and square and aligned with building lines and with adjacent luminaires.
- F. Pole-Mounted Luminaires:
  - 1. Maintain the following minimum clearances:
    - a. Comply with IEEE C2.
    - b. Comply with utility company requirements.
  - 2. Foundation-Mounted Poles:
    - a. Provide cast-in-place concrete foundations for poles as indicated, in accordance with Section 033000.
      - 1) Install anchor bolts plumb per template furnished by pole manufacturer.
      - 2) Position conduits to enter pole shaft.
    - b. Install foundations plumb.
    - c. Install poles plumb, using leveling nuts or shims as required to adjust to plumb.
    - d. Tighten anchor bolt nuts to manufacturer's recommended torque.
    - e. Install non-shrink grout between pole anchor base and concrete foundation, leaving small channel for condensation drainage.
    - f. Install anchor base covers or anchor bolt covers as indicated.
  - 3. Grounding:
    - a. Bond luminaires, metal accessories, metal poles, and foundation reinforcement to branch circuit equipment grounding conductor.
    - b. Provide supplementary ground rod electrode as specified in Section 260526 at each pole bonded to grounding system as indicated.
  - 4. Install separate service conductors, 12 AWG copper, from each luminaire down to handhole for connection to branch circuit conductors.
- G. Install accessories furnished with each luminaire.
- H. Bond products and metal accessories to branch circuit equipment grounding conductor.
- I. Install lamps in each luminaire.

### **3.03 FIELD QUALITY CONTROL**

- A. See Section 014000 - DO NOT USE BSD Quality Requirements, for additional requirements.
- B. Inspect each product for damage and defects.
- C. Operate each luminaire after installation and connection to verify proper operation.
- D. Correct wiring deficiencies and repair or replace damaged or defective products. Repair or replace excessively noisy ballasts as determined by Architect/Engineer.

### **3.04 ADJUSTING**

- A. Aim and position adjustable luminaires to achieve desired illumination as indicated or as directed by Architect/Engineer. Secure locking fittings in place.

### **3.05 CLEANING**

- A. Clean surfaces according to NECA/IESNA 501 and manufacturer's instructions to remove dirt, fingerprints, paint, or other foreign material and restore finishes to match original factory finish.

### **3.06 CLOSEOUT ACTIVITIES**

- A. See Section 017800 - Closeout Submittals, for closeout submittals.
- B. See Section 017900 - Demonstration and Training, for additional requirements.
- C. Demonstration: Demonstrate proper operation of luminaires to Architect/Engineer, and correct deficiencies or make adjustments as directed.

### **3.07 PROTECTION**

- A. Protect installed luminaires from subsequent construction operations.

**END OF SECTION 265600**

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**SECTION 284601**  
**FIRE ALARM SYSTEM (EXISTING SYSTEM)****PART 1 - GENERAL****1.01 SCOPE & RELATED DOCUMENTS**

- A. The work covered by this section of the specifications includes the furnishing of all labor, equipment, materials, and performance of all operations in connection with the modifications and additions to the existing Fire Alarm System(s) as shown on the drawings and as herein specified.
- B. The requirements of the conditions of the Contract, Supplementary Conditions and General Requirements, apply to the work specified in this section.
- C. The complete installation is to conform to the applicable sections of NFPA-72, NFPA-71, Local Code Requirements and National Electrical Code with particular attention to Article 760.
- D. Additionally, the entire installed system and all integrated system operations shall be within the guidelines of the SBCCI Standard Building Code.
- E. The work covered by this section of the specifications is to be coordinated with the related work as specified elsewhere under the project specifications.
- F. The contractor shall provide all required modifications and additions to the existing Fire Alarm System for the removal, relocation of existing devices and addition of new devices. This shall include all additional wiring, devices, modifications to the existing control panel, additional components and modules, addressable cards, testing, troubleshooting and instructions to the owner.

**1.02 QUALITY ASSURANCE**

- A. Each and all items of the Fire Alarm System shall be listed compatible with the existing system under the appropriate category by Underwriters' Laboratories, Inc. (UL), and shall bear the "U.L." label. All control equipment is to be listed under UL category UOJZ as a single control unit. Partial listing shall NOT be acceptable.
- B. All items shall match and be of the same manufacturer as the existing system.
- C. The equipment and installation supervision furnished under this specification is to be provided by a manufacturer who has been engaged in production of this type (software driven) of equipment for at least ten (10) years, and has a fully-equipped service organization within thirty-five (35) miles of the installation.
- D. All control equipment must have transient protection devices to comply with UL864 requirements.
- E. In addition to the UL-UOJZ requirement mentioned above, the system controls shall be UL listed for Power Limited Applications per NEC 760. All circuits must be marked in accordance with NEC article 760-23.
- F. Supplier shall provide documentation that fire alarm technicians are NICET LEVEL 2 certified (minimum of four).
- G. Suppliers' service organization must have been established in the local area for a minimum of ten (10) years with ten (10) years experience on specific equipment brand supplied.

**1.03 SUBMITTALS**

- A. Submit shop drawings for each piece of equipment specified including complete wiring and connection diagrams.
  - B. All submittals shall be submitted in a single complete brochure, which shall be in the form of a soft cover binder with each group separated by an identified index tab.
  - C. Submittals that fail to comply with the above requirements will automatically be rejected.
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- D. It is the Contractor's responsibility to provide submittals in an organized and timely manner in order so as not to delay the project schedule and hamper the work of other trades.
- E. Submit certificate of Fire Alarm System operating tests.

## **PART 2 PRODUCTS**

### **2.01 PERIPHERAL DEVICES**

- A. The Contractor shall furnish and install addressable devices that are compatible with the existing Cerberus Pyrotronics fire alarm System
- B. Devices Required but not limited to:
  - 1. Duct Smoke Detectors
  - 2. Power Supplies
  - 3. Addressable Relay modules

## **PART 3 EXECUTION**

### **3.01 INSTALLATION**

- A. Provide and install all devices in accordance with the plans and specifications, all applicable codes and the manufacturer's recommendations. All wiring shall be installed in strict compliance with all the provisions of NEC - Article 760 A and C, Power-Limited Fire Protective Signaling Circuits or if required may be reclassified as non-power limited and wired in accordance with NEC-Article 760 A and B. Upon completion, the contractor shall so certify in writing to the owner and general contractor.
  - 1. All junction boxes shall be sprayed red and labeled "Fire Alarm". Wiring color code shall be maintained throughout the installation.
- B. Installation of equipment and devices that pertain to other work in the contract shall be closely coordinated with the appropriate subcontractors.
- C. The contractor shall clean all dirt and debris from the inside and the outside of the fire alarm equipment after completion of the installation.
- D. The manufacturer's authorized representative shall provide on-site supervision of installation.

### **3.02 TESTING**

- A. The completed fire alarm system shall be fully tested in accordance with NFPA-72H by the contractor in the presence of the owner's representative and the Local Fire Marshal. Upon completion of a successful test, the contractor shall so certify in writing to the owner and general contractor.

### **3.03 WARRANTY**

- A. The contractor shall warrant the completed fire alarm system wiring and equipment to be free from inherent mechanical and electrical defects for a period of one (1) year from the date of the completed and certified test or from the date of first beneficial use.
- B. The equipment manufacturer shall make available to the owner a maintenance contract proposal to provide a minimum of two (2) inspections and tests per year in compliance with NFPA-72H guidelines.

**END OF SECTION 284601**