SECTION 22 0510
BASIC PLUMBING REQUIREMENTS

PART 1 GENERAL

1.01 WORK INCLUDED

A. Provide all labor, tools, materials, accessories, parts, transportation, taxes, and related items, essential for installation of the work and necessary to make work, complete, and operational. Provide new equipment and material unless otherwise called for. References to codes, specifications and standards called for in the specification sections and on the drawings mean, the latest edition, amendment and revision of such referenced standard in effect on the date of these Contract Documents.

1.02 LICENSING

A. The Contractor shall hold a license to perform the work as issued by the local jurisdiction.

B. Plumbing work shall be performed by, or under, the direct supervision of a licensed master plumber if so required by the local jurisdiction.

C. The Contractor shall be responsible for reviewing the local jurisdiction requirements prior to bidding.

1.03 PERMITS

A. Apply for and obtain all required permits and inspections, pay all fees and charges including all service charges.

1.04 CODE COMPLIANCE

A. Provide work in compliance with the following:
   1. The Building Code of New York State including The Fire Code; Property Maintenance Code; Plumbing Code, Mechanical Code and Fuel Gas Code; and The Energy Code of New York.
   2. New York State Department of Labor Rules and Regulations.
   3. Occupational Safety and Health Administration (OSHA).
   4. National Fuel Gas Code, NFPA 54.
   5. National Electrical Code, NFPA 70.
   6. Local Codes and Ordinances.
   7. Life Safety Codes, NFPA 101 (2000).
   8. New York Board of Fire Underwriters.
   9. New York State Education Department “Manual of Planning Standards”.

1.05 GLOSSARY

A. ACI American Concrete Institute

B. AGA American Gas Association

C. AGCA Associated General Contractors of America, Inc.

D. AIA American Institute of Architects

E. AISC American Institute of Steel Construction

F. AFBMA Anti-Friction Bearing Manufacturer’s Association

G. AMCA Air Moving and Conditioning Association, Inc.

H. ANSI American National Standards Institute

I. ARI Air Conditioning and Refrigeration Institute

J. ASHRAE American Society of Heating, Refrigeration, and Air Conditioning Engineers, Inc.

K. ASME American Society of Mechanical Engineers

L. ASPE American Society of Plumbing Engineers
M. ASTM American Society for Testing Materials
N. FM Factory Mutual Insurance Company
O. IBR Institute of Boiler & Radiation Manufacturers
P. IEEE Institute of Electrical and Electronics Engineers
Q. IRI Industrial Risk Insurers
R. NYBFU New York Board of Fire Underwriters
S. NEC National Electrical Code
T. NEMA National Electrical Manufacturer's Association
U. NESC National Electrical Safety Code
V. NFPA National Fire Protection Association
W. NYS/DEC New York State Department of Environmental Conservation
X. NYSDOH New York State Department of Health
Y. NYS/UFPBC New York State Uniform Fire Prevention and Building Code
Z. OSHA Occupational Safety and Health Administration
AA. SBI Steel Boiler Institute
BB. SMACNA Sheet Metal and Air Conditioning Contractors National Association
CC. UFPO Underground Facilities Protective Organization
DD. UL Underwriter's Laboratories, Inc.

1.06 DEFINITIONS

A.	Acceptance	Owner acceptance of the project from Contractor upon certification by Owner's Representative.
B.	Approval/Approved	Written permission to use a material or system.
C.	As Called For	Materials, equipment including the execution specified/shown in the Contract Documents.
D.	Code Requirements	Minimum requirements.
E.	Concealed	Work installed in pipe and duct shafts, chases or recesses, inside walls, above ceilings, in slabs or below grade.
F.	Design Equipment	Refer to the article, Equipment Arrangements, and the article, Substitutions.
G.	Design Make	Refer to the articles, Equipment Arrangements, and the article, Substitutions.
H.	Exposed	Work not identified as concealed.
I.	Equal or Equivalent	Equally acceptable as determined by Owner's Representative.
J.	Furnish	Supply and deliver to installed location.
K.	Furnished by Others	Receive delivery at job site or where called for and install.
L.	Inspection	Visual observations by Owner's site Representative.
M.	Install	Mount and connect equipment and associated materials ready for use.
N.	Labeled	Refers to classification by a standards agency.

O. Make — Refers to the article, Equipment Arrangements, and the article, Substitutions.

P. Or Approved Equal — Approved equal or equivalent as determined by Owner's Representative.

Q. Owner's Representative — The Prime Professional.

R. Prime Professional — Architect or Engineer having a contract directly with the Owner for professional services.

S. Provide — Furnish, install, and connect ready for use.

T. Relocate — Disassemble, disconnect, and transport equipment to new locations, then clean, test, and install ready for use.

U. Replace — Remove and provide new item.

V. Review — A general contractual conformance check of specified products.

W. Roughing — Pipe, duct, conduit, equipment layout and installation.

X. Satisfactory — As specified in contract documents.

Y. Site Representative — Owner's inspector or "Clerk of Works" at the work site.

1.07 SHOP DRAWINGS/PRODUCT DATA/SAMPLES

A. Submit Shop Drawings on all items of equipment and materials to be furnished and installed. Submission of Shop Drawings and samples shall be accompanied by a transmittal letter, stating name of Project and Contractor, number of drawings, titles, and other pertinent data called for in individual sections. Shop Drawings shall be dated and contain: Name of Project; name of Prime Professional; name of Prime Contractor; description or names of equipment, materials and items; and complete identification of locations at which materials or equipment are to be installed. Individual piecemeal or incomplete submittals will not be accepted. Similar items, (all types specified) shall be submitted at one time. Number each submittal by trade. Indicate deviations from contract requirements on Letter of Transmittal. Shop Drawings will be given a general review only. Corrections or comments made on the Shop Drawings during the review do not relieve Contractor from compliance with requirements of the drawings and specifications. The Contractor is responsible for: confirming and correcting all quantities; checking electrical characteristics 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.

1.08 PROTECTION OF PERSONS AND PROPERTY

A. Contractor shall assume responsibility for construction safety at all times and provide, as part of contract, all trench or building shoring, scaffolding, shielding, dust/fume protection, mechanical/electrical protection, special grounding, safety railings, barriers, and other safety feature required to provide safe conditions for all workmen and site visitors.

1.09 EQUIPMENT ARRANGMENTS

A. The Contract Documents are prepared on basis of one manufacturer as "design equipment," even though other manufacturer's names are listed as acceptable makes. If Contractor elects to use one (1) of the listed makes other than "design equipment," submit detailed drawings, indicating proposed installation of equipment. Show maintenance arrangement. Make required changes in the work of other trades, at no increase in any contract. Provide larger motors, feeders, breakers, and equipment, additional control devices, valves, fittings and other miscellaneous equipment required for proper operation, and assume responsibility for proper location of roughing and connections by other trades. Remove and replace door frames, access doors, walls, ceilings, or floors required to install other than design make equipment. If revised arrangement submittal is rejected, revise and resubmit specified "design equipment" item which conforms to contract documents.

1.10 CONTINUITY OF SERVICES

A. The building will be in use during construction operations. Maintain existing systems in operation within all rooms of building at all times. Refer to “General Conditions of the Contract for Construction” for temporary facilities for additional contract requirements. Schedules for various phases of contract work shall be coordinated with all other trades and with Owner’s Representative. Provide, as part of contract, temporary mechanical and plumbing connections and relocations as required to accomplish the above. Obtain approval in writing as to date, time, and location for shutdown of existing mechanical/plumbing facilities or services.

1.11 UTILITY COMPANY SERVICES

A. Make arrangements with the Owner’s gas supplier for relocation of existing gas lines. Provide service to the building as required. Coordinate all activities between the Owner and supplier. The installation of the gas service shall comply with the published standards, including but no limited to NFPA 54 and NFPA 58. PAY ALL UTILITY SUPPLIER CHARGES; INCLUDE CHARGES IN THE BASE BID.

1.12 ROUGHING

A. Due to small scale of Drawings, it's not possible to indicate all offsets, fittings, changes in elevation, interferences, etc. Make necessary changes in Contract Work, equipment locations, etc., as part of a contract to accommodate work to obstacles and interferences encountered. Before installing, verify exact location and elevations at work site. DO NOT SCALE plans. If field conditions, details, changes in equipment or shop drawing information require an important rearrangement, report same to Owner’s Representative for review. Obtain written approval for all major changes before installing.

B. Install work so that items both existing and new are operable and serviceable. Eliminate interference with removal of coils, motors, filters, belt guards and/or operation of doors. Provide easy, safe, and code mandated clearances at controllers, motor starters, valve access, and other equipment requiring maintenance and operation. Where Contractor could not reasonably be expected to find such trade interferences due to concealment in walls, ceiling or floors, such relocations will be done by Change Order, if not, included in contract work. Contractor shall relocate existing work in way of new construction. VISIT SITE BEFORE BIDDING TO DETERMINE SCOPE OF WORK SINCE FEW OF SUCH ITEMS CAN BE SHOWN. Provide new materials, including new piping and insulation for relocated work.

C. Coordinate work with other trades and determine exact route or location of each duct, pipe, conduit, etc., before fabrication and installation. Coordinate with Architectural Drawings. Obtain from Owner’s Representative exact location of all equipment in finished areas (i.e., thermostat, fixture, and switch mounting heights, and equipment mounting heights). Coordinate all work with the architectural reflected ceiling plans and/or existing Architecture. Mechanical and plumbing drawings show design arrangement only for diffusers, grilles, registers, air terminals, lighting fixtures, speakers, and other items. Do not rough-in contract work without reflected ceiling location plans.

D. Before roughing for equipment furnished by Owner or in other Contracts, obtain from Owner and other Contractors, approved roughing drawings giving exact location for each piece of equipment. Do not “rough in” services without final layout drawings approved for construction. Cooperate with other trades to insure proper location and size of connections to insure proper functioning of all systems and equipment. For equipment and connections provided in this contract, prepare roughing drawing as follows:
   1. Existing Equipment: Measure the existing equipment and prepare for installation in new location.
   2. New Equipment: Obtain equipment roughing drawings and dimensions, then prepare roughing-in-drawings. If such information is not available in time, obtain an acknowledgement in writing, then make space arrangements as required with Owner’s Representative.

1.13 COORDINATION DRAWINGS

A. Before construction work commences, Contractors for all trades shall submit coordination drawings in the form of reproducible transparencies drawn at not less than 3/8 inch scale. Such drawings will be required throughout all areas for all trades. These drawings shall show resolutions of trade conflicts in congested areas. Mechanical equipment rooms shall be drawn early in coordination drawing process simultaneous with all other congested areas. Prepare Coordination Drawings as follows:

1. The HVAC Trade shall prepare the base plan Coordination Drawings showing all ductwork, all pertinent heating piping, and equipment. These drawings may be sepias of the required ductwork Shop Drawings. The drawings shall be coordinated with lighting fixtures, air diffusers, other ceiling mounted items, ceiling heights, structural work, maintenance clearances, electric code clearance, reflected ceiling plans, and other contract requirements. Reposition proposed locations of work after coordination drawing review by the Owner's Representative. Provide adjustments to exact size, location, and offsets of ducts, pipes, conduit, etc., to achieve reasonable appearance objectives. Provide these adjustments as part of contract. Minor revisions need not be re-drawn.
2. HVAC Contractor shall provide sepia transparencies and/or prints and submit the base plan to all major trades' Contractors.
3. The Plumbing Trade shall draft location of piping and equipment on the base plan, indicating areas of conflict and suggested resolutions.
4. The Electrical Trade shall draft location of lighting fixtures, cable trays, and feeders over 1-1/2 inches on the base plan, indicating areas of conflict and suggested resolution.
5. The General Contractor shall indicate areas of architectural/structural conflicts or obstacles and coordinate to suit the overall construction schedule.
6. The General Contractor shall expedite all drawing work and coordinate to suit the overall construction schedule. He shall then review these drawings and compare them with the architectural, structural, equipment, and other drawings and determine that all of the work can be installed without interference. In the case of unresolved interferences, he shall notify the Owner's Representative. The Owner's Representative will then direct the various Contractors as to how to revise their drawings as required to eliminate installation interferences.
7. If a given trade proceeds to resolving conflicts, then if necessary, that Trade shall change its work at no extra cost in order to permit others to proceed with a coordinated installation. Coordination approval will be given by areas after special site meetings involving all Trades.

B. Coordination Drawings are intended for the respective Contractor's use during construction and shall not replace any Shop Drawings, or record drawings required elsewhere in these Contract Documents.

1.14 REMOVAL WORK

A. Where existing equipment removals are called for, submit to Owner's Representative a complete list of all items that Owner wishes to retain that do not contain asbestos or PCB material shall be delivered to location directed by Owner. Items that Owner does not wish to retain shall be removed from site and legally disposed of. Removal and disposal of material containing asbestos and/or PCB's shall be in accordance with Federal, State, and Local laws requirements. Where equipment is called for to be relocated, contractor shall carefully remove, clean and recondition, then reinstall. Removal all abandoned piping, wiring, equipment, lighting, ductwork, tubing, supports, fixtures, etc. Visit each room, crawl space, and roof to determine the total Scope of Work. The disturbance or dislocation of asbestos-containing materials causes asbestos fibers to be released into the building's atmosphere, thereby creating a health hazard to workmen and building occupants. Consistent with Industrial Code Rule 56 and the content of recognized asbestos-control work, the Contractor shall apprise all of his workers, supervisory personnel, subcontractors, Owner and Consultants who will be at the job site of the seriousness of the hazard and of proper safeguards and work procedures which must be followed, as described in New York State Department of Labor Industrial Code Rule 56.

1.15 EQUIPMENT AND MATERIAL INSTALLATION

A. Provide materials that meet the following minimum requirements:
   1. Materials shall have a flame spread rating of 25 or less and smoke developed rating of 50 or less, in accordance with NFPA 255.
   2. All equipment and material for which there is a listing service shall bear a UL label.
   3. Potable water systems and equipment shall be built according to AWWA Standards.
   4. Gas-fired equipment and system shall meet AGA Regulations and shall have AGA label.
   5. Electrical equipment and systems shall meet UL Standards and requirements of the NEC.

1.16 CUTTING AND PATCHING

A. Each trade shall include their required cutting and patching work unless shown as part of the General Construction work on the architectural drawings. Refer to "General Conditions of the Contract for Construction," for additional requirements. Cut and drill from both sides of walls and/or floors to eliminate splaying. Patch any cut or abandoned holes left by removals of equipment, fixtures, etc. Patch adjacent existing work disturbed by installation of new work including insulation, walls and wall covering, ceiling and floor covering, other finished surfaces. Patch openings and damaged areas equal to existing surface finish. Cut openings in prefabricated construction units in accordance with manufacturer's instructions.

1.17 PAINTING

A. Include painting for patchwork with color to match adjacent surfaces. Where color cannot be adequately matched, paint entire surface. Provide one (1) coat of primer and two (2) finish coats or as called for in the mechanical and electrical specifications. Refer to General Construction Specifications for additional information.

1.18 CONCEALMENT

A. Conceal all Contract Work above ceilings and in walls, below slabs, and elsewhere throughout building. If concealment is impossible or impractical, notify Owner's Representative before starting that part of the work and install only after his review. In areas with no ceilings, install only after Owner's Representative reviews and comments on arrangement and appearance.

1.19 CHASES

A. New Construction:
   1. Certain chases, recessed, openings, shafts, and wall pockets will be provided as part of "General Building Construction Plans and Specifications." Mechanical and electrical trades work shall provide all other openings required for their Contract Work.

2. Check Architectural and Structural Design and Shop Drawings to verify correct size and location for all openings, recesses and chases in general building construction work.
3. Assume responsibility for correct and final location and size of such openings.
4. Rectify improperly sized, improperly located or omitted chases or openings due to faulty or late information or failure to check final location.
5. Provide 18 gauge galvanized sleeves and inserts. Extend all sleeves 2 inch above finished floor. Set sleeves and inserts in place ahead of new construction, securely fastened during concrete pouring. Correct, by drilling, omitted or improperly located sleeves. Assume responsibility for all work and equipment damaged during course of drilling. Firestop all unused sleeves.
6. Provide angle iron frame where openings are required for Contract Work, unless provided by General Contractor.

B. In Existing Buildings:
1. Drill holes for floor and/or roof slab openings.
2. Multiple pipes smaller than 1 inch properly spaced and supported may pass through one (1) 6 inch or smaller diameter opening.
3. Seal voids in fire rated assemblies with a fire-stopping seal system to maintain the fire resistance of the assembly. Provide 18 gauge galvanized sleeves at fire rated assemblies. Extend sleeves 2 inches above floors.
4. In wall openings, drill or cut holes to suit. Provide 18 gauge galvanized sleeves at shafts and fire rated assemblies. Provide fire-stopping seal between sleeves and wall in drywall construction. Provide fire-stopping similar to that for floor openings.

1.20 FLASHING, SEALING, FIRE-STOPPING

A. See Specification Section 22 0515 - Plumbing Firestopping.

1.21 SUPPORTS

A. Provide required supports, beams, angles, hangers, rods, bases, braces, and other items to properly support contract work. Supports shall meet the approval of the Owner's Representative. Modify studs, add studs, add framing, or otherwise reinforce studs in metal stud walls and partitions as required to suit contract work. If necessary, in stud walls, provide special supports from floor to structure above. For precast panels/planks and metal decks, support Mechanical/Electrical Work as determined by manufacturer and Owner's Representative. Provide heavy gauge steel mounting plates for mounting contract work. Mounting plates shall span two (2) or more studs. Size, gauge, and strength of mounting plates shall be sufficient for equipment size, weight, and desired rigidity.

1.22 ACCESS PANELS

A. Access panels shall be furnished by the Mechanical and Plumbing Trades and installed by General Contractor. Location and size shall be the responsibility of each trade. Bear cost of construction changes necessary due to improper information or failure to provide proper information in ample time. Access panels over 324 square inches shall have two (2) cam locks. Contractor shall provide proper frame and door type for various wall or ceiling finishes. Access panels shall be manufactured by Milcor, or approved equal. Provide General Contractor with a set of architectural black and white prints with size and approximate locations of access panels shown.

1.23 CONCRETE BASES

A. Provide concrete bases for all floor-mounted equipment (unless otherwise noted). Provide 3,000 pound concrete, chamfer edges, trowel finish, and securely bond to floor by roughening slab and coating with cement grout. Bases 4 inches high (unless otherwise indicated); shape and size to accommodate equipment. Set anchor bolts in sleeves before pouring and after anchoring and leveling, fill equipment bases with grout.

1.24 PLUMBING EQUIPMENT CONNECTIONS

A. Contractor is responsible for draining, filling, venting, chemically treating and restarting any systems which are affected by work shown on the Contract Documents unless specifically noted otherwise.

B. Provide roughing and final water, waste, vent, propane, etc., connections to all equipment. Provide loose key stops, sanitary “P” traps, tailpiece, adapters, gas cocks, and all necessary piping and fittings from roughing point to equipment. Provide installation of sinks, faucets, traps, tailpiece furnished by others. Provide continuation of piping and connection to equipment that is furnished by others. Provide relief valve discharge piping from equipment relief valves to point(s) of safe discharge.

C. Provide as part of Plumbing Work valved water outlet adjacent to equipment requiring same. Provide equipment type floor drains, or drain hubs, adjacent to equipment.

D. Install controls and devices furnished by others.

E. Refer to Contract Documents for roughing schedules and equipment lists indicating scope of connections required.

F. Provide for Owner furnished and Contractor furnished equipment all valves, piping, piping accessories, traps, pressure reducing valves, gauges, relief valves, vents, drains, insulation, sheet metal work, controls, dampers, and wiring as required.

G. Refer to Manufacturer drawings and specifications for requirements of kitchen equipment, laboratory equipment and special equipment. Verify connection requirements before bidding.

1.25 STORAGE AND PROTECTION OF MATERIALS

A. Store materials on dry base, at least 6 inches above-ground or floor. Store so as not to interfere with other work or obstruct access to buildings or facilities. Provide waterproof/windproof covering. Remove and provide special storage for items subject to moisture damage. Protect against theft or damage from any cause. Replace items stolen or damaged, at no cost to Owner.

B. Refer to “General Conditions of the Contract for Construction.”

1.26 FREEZING AND WATER DAMAGE

A. Take all necessary precautions with equipment, systems and building to prevent damage due to freezing and/or water damage. Repair or replace, at no charge in Contract, any such damage to equipment, systems, and building. Perform first season's winterizing in presence of Owner’s operating staff.

1.27 LUBRICATION CHART

A. Provide lubrication chart, 8-1/2 inch x 11 inch minimum size, typed in capital letters, mounted under clear laminated plastic; secure to wall in area of equipment. List all motors and equipment in Contract. Obtain and list necessary information by name/location of equipment, manufacturer recommended types of lubrication and schedule. Lubricate motors as soon as installed and perform lubrication maintenance until final acceptance. Plumbing Trade shall add Contract items to the chart provided by the heating trade or provide separate charts.

1.28 OWNER INSTRUCTIONS

A. Before final acceptance of the work, furnish necessary skilled labor to operate all systems by seasons. Instruct designated person on proper operation, and care of systems/equipment. Repeat instructions, if necessary. Obtain written acknowledgement from person instructed prior to final payment. Contractor is fully responsible for system until final acceptance, even though operated by Owner’s personnel, unless otherwise agreed in writing. List under clear plastic, operating, maintenance, and starting precautions procedures to be followed by Owner for operating systems and equipment.

1.29 MAINTENANCE MANUALS

A. Prepare Instructions and Maintenance Portfolios. Include one copy of each of approved Shop Drawings, wiring diagrams, piping diagrams spare parts lists, as-built drawings and manufacturer's instructions. Include typewritten instructions, describing equipment, starting/operating procedures, emergency operating instructions, summer-winter changeover, freeze protection, precautions and recommended maintenance procedures. Include name, address, and telephone number of supplier manufacturer representative and service agency for all major equipment items in a three ring binder with name of project on the cover. Deliver to Owner's Representative before request for final acceptance.

1.30 RECORD DRAWINGS

A. The Contractor shall obtain at his expense one (1) set of Construction Contract Drawings including non-reproducible black and white prints and one (1) set of reproducible mylars for the purpose of recording record conditions.

B. The Contractor shall perform all survey work required for the location and construction of the work and to record information necessary for completion of the record drawings. Record drawings shall show the actual location of the constructed facilities in the same manner as was shown on the bid drawings. All elevations and dimensions shown on the drawings shall be verified or corrected so as to provide a complete and accurate record of the facilities as constructed.

C. It shall be the responsibility of the Contractor to mark each sheet of the non-reproducible drawings in pencil and to record thereon in a legible manner, any and all approved field changes and conditions as they occur. A complete file of approved field sketches, diagrams, and other changes shall also be maintained. At completion of the Work, each sheet of record prints, plus all approved field sketches and diagrams, shall be used in preparation of the mylar reproducible record drawings.

D. Completed reproducible mylar drawings shall be certified as reflecting record conditions and submitted to the Engineer for approval.

1.31 ADDITIONAL ENGINEERING SERVICES

A. In the event that the Consultant is required to provide additional engineering services as a result of substitution of equivalent materials or equipment by the Contractor or changes by the Contractor in dimension, weight, power requirements, etc., of the equipment and accessories furnished, or if the Consultant is required to examine and evaluate any changes proposed by the Contractor for the convenience of the Contractor, then the Consultant's expenses in connection with such additional services shall be paid by the Contractor and may be deducted from any monies owed to the Contractor.

1.32 FINAL INSPECTION

A. Upon completion of all punch list items, the Contractor shall provide a copy of the punch list back to the Engineer with each items noted as completed or the current status of the item. Upon receipt, the Engineer will schedule a final inspection.

1.33 ALL TRADES TEMPORARY HEAT

A. Refer to the Standard General Conditions of the Contract for Construction and Supplementary Conditions.

1.34 PLUMBING TEMPORARY FACILITIES

A. Refer to the Standard General Conditions of the Contract for Construction and Supplementary Conditions.

1.35 CLEANING

A. It is the Contractor's responsibility to keep clean all equipment and fixtures provided under this contract for the duration of the project. Each Trade shall keep the premises free from an accumulation of waste material or rubbish caused by his operations. The facilities require an environment of extreme cleanliness, and it is the Contractor's responsibility to adhere to the strict regulations regarding procedures on the existing premises. After all tests are made and installations completed satisfactorily:

B. Thoroughly clean entire installation, both exposed surfaces and interiors.

C. Remove all debris caused by work.

D. Remove tools, surplus, materials, when work is finally accepted.

PART 2 PRODUCT - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION

SECTION 22 0516
EXPANSION FITTINGS AND LOOPS FOR PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Flexible pipe connectors.

1.02 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data:
   1. Flexible Pipe Connectors: Indicate maximum temperature and pressure rating, face-to-face length, live length, hose wall thickness, hose convolutions per foot and per assembly, fundamental frequency of assembly, braid structure, and total number of wires in braid.
   2. Expansion Joints: Indicate maximum temperature and pressure rating, and maximum expansion compensation.

PART 2 PRODUCTS

2.01 FLEXIBLE PIPE CONNECTORS - STEEL PIPING

A. Inner Hose: Carbon steel.

B. Exterior Sleeve: Single braided, stainless steel.

C. Pressure Rating: 125 psi and 450 degrees F.

D. Joint: Flanged.

E. Size: Use pipe sized units.

F. Maximum offset: 3/4 inch on each side of installed center line.

2.02 FLEXIBLE PIPE CONNECTORS - COPPER PIPING

A. Inner Hose: Bronze.

B. Exterior Sleeve: Braided bronze.

C. Pressure Rating: 125 psi and 450 degrees F.

D. Joint: Flanged.

E. Size: Use pipe sized units.

F. Maximum offset: 3/4 inch on each side of installed center line.

G. Application: Copper piping.

2.03 ACCESSORIES

A. Pipe Alignment Guides:
   1. Two piece welded steel with enamel paint, bolted, with spider to fit standard pipe, frame with four mounting holes, clearance for minimum 1 inch thick insulation, minimum 3 inches travel.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Anchor pipe to building structure where indicated. Provide pipe guides so movement is directed along axis of pipe only. Erect piping such that strain and weight is not on cast connections or apparatus.

C. Provide support and equipment required to control expansion and contraction of piping. Provide loops, pipe offsets, and swing joints, or expansion joints where required.

D. Substitute grooved piping for vibration isolated equipment instead of flexible connectors. Grooved piping need not be anchored.

END OF SECTION

SECTION 22 0517
SLEEVES AND SLEEVE SEALS FOR PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe sleeves.

B. Manufactured sleeve-seal systems.

1.02 REFERENCE STANDARDS

A. ASTM E814 - Standard Test Method for Fire Tests of Penetration Firestop Systems 2023a.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
   1. See Section 01 6000 - Product Requirements, for additional provisions.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.

1.05 WARRANTY

A. See Section 01 7800 - Closeout Submittals, for additional warranty requirements.

PART 2 PRODUCTS

2.01 PIPE SLEEVES

A. 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.

B. 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.

C. 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.

D. 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 complying with ASTM E814 in accordance with Section 07 8400 to prevent the spread of fire, smoke, and gases.

2.02 MANUFACTURED SLEEVE-SEAL SYSTEMS

A. 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. Provide sleeves when penetrating footings, floors, walls, and partitions. Seal pipe including sleeve penetrations to achieve fire resistance equivalent to fire separation required.

E. 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.

F. 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.

END OF SECTION

SECTION 22 0519
METERS AND GAUGES FOR PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pressure gauges and pressure gauge taps.

B. Thermometers and thermometer wells.

C. Static pressure gauges.

1.02 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. UL 393 - Indicating Pressure Gauges for Fire-Protection Service Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide list that indicates use, operating range, total range and location for manufactured components.

PART 2 PRODUCTS

2.01 PRESSURE GAUGES

A. 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 and kPa.

2.02 PRESSURE GAUGE TAPPINGS

A. Gauge Cock: Tee or lever handle, brass for maximum 150 psi.

2.03 STEM TYPE THERMOMETERS

A. 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. Accuracy: 2 percent, per ASTM E77.
   4. Calibration: Degrees F.

2.04 STATIC PRESSURE GAUGES

A. 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.

B. 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. Provide one pressure gauge per pump, installing taps before strainers and on suction and discharge of pump. Pipe to gauge.

C. 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.

END OF SECTION

SECTION 22 0523
GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Applications.

B. Ball valves.

C. Butterfly valves.

D. Check valves.

E. Globe valves.

1.02 REFERENCE STANDARDS

A. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250 2020.

B. ASME B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard 2020.

C. ASME B16.10 - Face-to-Face and End-to-End Dimensions of Valves 2022.

D. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings 2021.

E. ASME B16.34 - Valves — Flanged, Threaded, and Welding End 2020.

F. ASME B31.9 - Building Services Piping 2020.

G. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings 2004 (Reapproved 2019).

H. ASTM A536 - Standard Specification for Ductile Iron Castings 1984, with Editorial Revision (2019).

I. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings 2017.

J. AWWA C606 - Grooved and Shouldered Joints 2022.

K. MSS SP-67 - Butterfly Valves 2022.

L. MSS SP-71 - Gray Iron Swing Check Valves, Flanged and Threaded Ends 2018.

M. MSS SP-72 - Ball Valves with Flanged or Butt-Welding Ends for General Service 2010a.

N. MSS SP-80 - Bronze Gate, Globe, Angle, and Check Valves 2019.

O. MSS SP-85 - Gray Iron Globe and Angle Valves, Flanged and Threaded Ends 2011.

P. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends 2010, with Errata .

Q. NSF 61 - Drinking Water System Components - Health Effects 2022, with Errata.

R. NSF 372 - Drinking Water System Components - Lead Content 2022.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, 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.

PART 2 PRODUCTS

2.01 APPLICATIONS

A. Provide the following valves for the applications if not indicated on drawings:
   1. Shutoff: Ball, butterfly, plug.
   2. Throttling: Provide globe, angle, ball, or butterfly.

B. Domestic, Hot and Cold Water Valves:
   1. 2 NPS and Smaller:
      a. Bronze and Brass: Provide with solder-joint ends.
      b. Ball: One piece, full port, brass with brass trim.
      c. Bronze Swing Check: Class 125, bronze disc.
      d. Bronze Globe: Class 125, bronze disc.
   2. 2-1/2 NPS and Larger:
      a. Iron, 2-1/2 NPS to 4 NPS: Provide with threaded ends.
      b. Iron Ball: Class 150.
      c. Iron Single-Flange Butterfly: 200 CWP, EPDM seat, aluminum-bronze disc.
      d. Iron Grooved-End Butterfly: 175 CWP.
      e. Iron Swing Check: Class 125, metal seats.
      f. Iron Grooved-End Swing Check: 300 CWP.
      g. Iron Globe: 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. Hand Lever: Quarter-turn valves 6 NPS and smaller except plug valves.

D. Valve-End Connections:
   1. Flanges on Iron Valves: ASME B16.1 for flanges on iron valves.
   2. Pipe Flanges and Flanged Fittings 1/2 NPS through 24 NPS: ASME B16.5.
   3. Solder Joint Connections: ASME B16.18.
   4. Grooved End Connections: AWWA C606.

E. General ASME Compliance:
   1. Ferrous Valve Dimensions and Design Criteria: ASME B16.10 and ASME B16.34.
   2. Solder-joint Connections: ASME B16.18.
   3. Building Services Piping Valves: ASME B31.9.

F. Potable Water Use:
   1. Certified: Approved for use in compliance with NSF 61 and NSF 372.
   2. Lead-Free Certified: Wetted surface material includes less than 0.25 percent lead content.

2.03 BRASS, BALL VALVES

A. Two Piece, Full Port with Brass Trim and Soldered Connections:
   1. Comply with MSS SP-110.
   2. SWP Rating: 150 psig.
   3. CWP Rating: 600 psig, WOG.
   4. Body: Forged brass.
   5. Seats: PTFE.
   6. Ball: Chrome-plated brass.

B. Two Piece, Full Port with Press Connection:
   1. CWP Rating: 250 psig, WOG.
   2. Body: Forged brass.
   3. Seats: EPDM.
   4. Ball: Chrome-plated brass.
   5. Blow-out Proof Stem: Forged brass.

6. Maximum Service Temperature: 250 deg F.

2.04 IRON, BALL VALVES

A. Class 125, Full Port, Stainless Steel Trim:
   1. Comply with MSS SP-72.
   2. CWP Rating: 200 psig.
   3. Body: ASTM A536 Grade 65-45-12, ductile iron.
   4. Ends: Flanged.
   5. Seats: PTFE.
   6. Operator: Lever, with locking handle.

2.05 IRON, SINGLE FLANGE BUTTERFLY VALVES

A. Lug Style: Bi-directional dead-end service without use of downstream flange.
   1. Comply with MSS SP-67, Type I.
   2. CWP Rating: 200 psig.
   3. Body: ASTM A126, cast iron or ASTM A536, ductile iron.
   4. Stem: One or two-piece stainless steel.
   5. Seat: EPDM.
   6. Disc: Stainless steel.

2.06 IRON, GROOVED-END BUTTERFLY VALVES

A. CWP Rating: 175 psig (1200 kPa).
   1. Comply with MSS SP-67, Type I.
   2. Body: Coated ductile iron.
   3. Stem: Two-piece stainless steel.
   4. Disc: Coated ductile iron.
   5. Disc Seal: EPDM.

2.07 BRONZE, SWING CHECK VALVES

A. General:
   1. Fabricate from dezincification resistant material.
   2. Copper alloys containing more than 15 percent zinc are not permitted.

B. Class 125 CWP Rating; 200 psig (1,380 kPa) WOG:
   1. Comply with MSS SP-80, Type 3.
   2. Design: Y-pattern, horizontal or vertical flow.
   3. Body: Bronze, ASTM B62.
   4. Ends: Threaded.
   5. Disc: Bronze.

2.08 IRON, HORIZONTAL SWING CHECK VALVES

A. Class 125:
   1. Comply with MSS SP-71, Type I.
   2. CWP Rating: 200 psig.
   3. Design: Clear or full waterway.
   4. Body: ASTM A126, gray cast iron with bolted bonnet.
   5. Ends: Flanged.
   6. Trim: Composition.
   7. Seat Ring and Disc Holder: Bronze.
   8. Disc: PTFE.
   9. Gasket: Asbestos free.

2.09 IRON, GROOVED-END SWING CHECK VALVES

A. 300 CWP:
   1. CWP Rating: 300 psig.
   2. Body: ASTM A536, Grade 65-45-12 ductile iron.
   3. Seal: EPDM.
   4. Disc: Ductile iron.
   5. Coating: Black, non-lead paint.

2.10 BRONZE, GLOBE VALVES

A. General:
   1. Fabricate from dezincification resistant material.
   2. Copper alloys containing more than 15 percent zinc are not permitted.

B. Class 125: CWP Rating 200 psig:
   1. Comply with MSS SP-80, Type 1.
   2. Body: ASTM B62, bronze with integral seat and screw-in bonnet.
   3. Ends: Threaded joint.
   4. Stem: Bronze.
   5. Disc: PTFE.
   6. Packing: Asbestos free.
   7. Handwheel: Malleable Iron.

2.11 IRON, GLOBE VALVES

A. Class 125: CWP Rating: 200 psig:.
   1. Comply with MSS SP-85, Type I.
   2. Body: Gray iron; ASTM A126, with bolted bonnet.
   3. Ends: Flanged.
   4. Trim: Bronze.
   5. Packing and Gasket: Asbestos free.
   6. Operator: Handwheel or chainwheel.

PART 3 EXECUTION

3.01 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.

END OF SECTION

SECTION 22 0529
HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Support and attachment components for equipment, piping, and other plumbing work.

1.02 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 2023b.

H. MFMA-4 - Metal Framing Standards Publication 2004.

I. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide manufacturer's standard catalog pages and data sheets for metal channel (strut) framing systems, nonpenetrating rooftop supports, post-installed concrete and masonry anchors, and thermal insulated pipe supports.

1.04 QUALITY ASSURANCE

A. Comply with applicable building code.

PART 2 PRODUCTS

2.01 SUPPORT AND ATTACHMENT COMPONENTS

A. General Requirements:
   1. Provide all required hangers, supports, anchors, fasteners, fittings, accessories, and hardware as necessary for the complete installation of plumbing 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. Steel Components: Use corrosion resistant materials suitable for the environment where installed.
      a. Zinc-Plated Steel: Electroplated in accordance with ASTM B633.
      b. Galvanized Steel: Hot-dip galvanized after fabrication in accordance with ASTM A123/A123M or ASTM A153/A153M.

B. Metal Channel (Strut) Framing Systems:
   1. Comply with MFMA-4.

C. Hanger Rods: Threaded zinc-plated steel unless otherwise indicated.
   1. Minimum Size, Unless Otherwise Indicated or Required:
      a. Piping up to 1 inch (27 mm) nominal: 3/8 inch diameter.
      b. Piping larger than 1 inch (27 mm) nominal: 3/8 inch diameter.

D. Pipe Stanchions: For pipe runs, use stanchions of same type and material where vertical adjustment is required for stationary pipe.
   1. Material: Malleable iron, ASTM A47/A47M; or carbon steel, ASTM A36/A36M.
   2. Provide coated or plated saddles to isolate steel hangers from dissimilar metal tube or pipe.

E. Beam Clamps: MSS SP-58 Types 19 through 23, 25 or 27 through 30 based on required load.
   1. Material: ASTM A36/A36M carbon steel or ASTM A181/A181M forged steel.
   2. Provide clamps with hardened steel cup-point set screws and lock-nuts for anchoring in place.

F. Riser Clamps:
   1. Provide copper plated clamps for copper tubing support.
   2. For insulated pipe runs, provide two bolt-type clamps designed for installation under insulation.

G. 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.

H. Pipe Shields for Insulated Piping:
   1. 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.

I. 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. Sheet Metal: Use sheet metal screws.
   8. Wood: Use wood screws.
   9. Plastic and lead anchors are not permitted.
   10. 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 INSTALLATION

A. Install products in accordance with manufacturer's instructions.

B. Provide independent support from building structure. Do not provide support from piping, ductwork, conduit, or other systems.

C. Unless specifically indicated or approved by Architect, do not provide support from suspended ceiling support system or ceiling grid.

D. Unless specifically indicated or approved by Architect, do not provide support from roof deck.

E. Do not penetrate or otherwise notch or cut structural members without approval of Structural Engineer.

F. 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.

G. Preset Concrete Inserts: Use manufacturer-provided closure strips to inhibit concrete seepage during concrete pour.

H. Secure fasteners according to manufacturer's recommended torque settings.

I. Remove temporary supports.

END OF SECTION

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SECTION 22 0553
IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Nameplates.

B. Tags.

C. Pipe markers.

D. Ceiling tacks.

1.02 REFERENCE STANDARDS

A. ASME A13.1 - Scheme for the Identification of Piping Systems 2020.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Chart and Schedule: Submit valve chart and schedule, including valve tag number, location, function, and valve manufacturer's name and model number.

C. Product Data: Provide manufacturers catalog literature for each product required.

PART 2 PRODUCTS

2.01 IDENTIFICATION APPLICATIONS

A. Piping: Pipe markers.

B. Pumps: Nameplates.

C. Tanks: Nameplates.

D. Valves: Tags and ceiling tacks where located above lay-in ceiling.

2.02 NAMEPLATES

A. Description: Laminated three-layer plastic with engraved letters.
   1. Letter Color: White.
   2. Letter Height: 1/4 inch.
   3. Background Color: Black.
   4. Plastic: Comply with ASTM D709.

2.03 TAGS

A. Metal Tags: Brass with stamped letters; tag size minimum 1-1/2 inch diameter with smooth edges.

B. Valve Tag Chart: Typewritten letter size list in anodized aluminum frame.

2.04 PIPE MARKERS

A. Comply with ASME A13.1.

B. 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.

C. Plastic Tape Pipe Markers: Flexible, vinyl film tape with pressure sensitive adhesive backing and printed markings.

D. Underground Plastic Pipe Markers: Bright colored continuously printed plastic ribbon tape, minimum 6 inches wide by 4 mil thick, manufactured for direct burial service.

E. Color code as follows:
   1. Potable, Cooling, Boiler, Feed, Other Water: Green with white letters.

2.05 CEILING TACKS

A. Description: Steel with 3/4 inch diameter color coded head.

B. Color code as follows:
   1. Plumbing Valves: Green.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install plastic 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. Install plastic pipe markers in accordance with manufacturer's instructions.

D. Install plastic tape pipe markers complete around pipe in accordance with manufacturer's instructions.

E. Install underground plastic pipe markers 6 to 8 inches below finished grade, directly above buried pipe.

F. Locate ceiling tacks to locate valves or dampers above lay-in panel ceilings. Locate in corner of panel closest to equipment.

END OF SECTION

SECTION 22 0716
PLUMBING EQUIPMENT INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Covering.

1.02 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 C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus 2021.

C. ASTM C534/C534M - Standard Specification for Preformed Flexible Elastomeric Cellular Thermal Insulation in Sheet and Tubular Form 2023.

D. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications 2013 (Reapproved 2019).

E. ASTM C1410 - Standard Specification for Cellular Melamine Thermal and Sound-Absorbing Insulation 2017 (Reapproved 2023).

F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023b.

G. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for equipment scheduled.

1.04 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.

1.05 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 CELLULAR MELAMINE

A. Insulation: Flexible preformed open-cell polymeric foam tubing, slit lengthwise for installation, complying with applicable requirements of ASTM C1410.
   1. K Value: ASTM C177; 0.25 at 75 degrees F.
   2. Minimum Service Temperature: Minus 40 degrees F.
   3. Maximum Service Temperature: 350 degrees F.

4. Density: 0.56 lb/cu ft.

2.03 GLASS FIBER, FLEXIBLE

A. 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.

B. Vapor Barrier Jacket: Kraft paper reinforced with glass fiber yarn and bonded to aluminized film.
   1. Secure with self-sealing longitudinal laps and butt strips.

2.04 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.

2.05 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. Thickness: 10 mil.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install cellular melamine with factory-applied jackets with a manufacturer-approved adhesive along seams, both straight lap joints and circumferential lap joints.

C. 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.

D. Cover glass fiber insulation with metal mesh and finish with heavy coat of insulating cement.

END OF SECTION

SECTION 22 0719
PLUMBING PIPING INSULATION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Piping insulation.

B. Jackets and accessories.

1.02 RELATED REQUIREMENTS

A. Section 07 8400 - Firestopping.

B. Section 22 1005 - Plumbing Piping: Placement of hangers and hanger inserts.

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 C547 - Standard Specification for Mineral Fiber Pipe Insulation 2022a.

E. ASTM C795 - Standard Specification for Thermal Insulation for Use in Contact with Austenitic Stainless Steel 2008 (Reapproved 2023).

F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2023b.

G. ASTM E96/E96M - Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials 2022a, with Editorial Revision (2023).

H. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials Current Edition, Including All Revisions.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide product description, thermal characteristics, list of materials and thickness for each service, and locations.

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

A. 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.

2.03 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. Canvas Jacket: UL listed 6 oz/sq yd plain weave cotton fabric treated with dilute fire retardant lagging adhesive.

C. 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.

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Exposed Piping: Locate insulation and cover seams in least visible locations.

C. Insulated pipes conveying fluids below ambient temperature: Insulate entire system including fittings, valves, unions, flanges, strainers, flexible connections, and expansion joints.

D. 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.

E. 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.

F. 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.

G. 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.

H. Continue insulation through walls, sleeves, pipe hangers, and other pipe penetrations. Finish at supports, protrusions, and interruptions. At fire separations, refer to Section 07 8400.

I. Pipe Exposed in Mechanical Equipment Rooms or Finished Spaces (less than 10 feet above finished floor): Finish with canvas jacket sized for finish painting.

J. Buried Piping: Provide factory fabricated assembly with inner all-purpose service jacket with self-sealing lap, and asphalt impregnated open mesh glass fabric, with one mil thick aluminum foil sandwiched between three layers of bituminous compound; outer surface faced with a polyester film.

K. Heat Traced Piping: Insulate fittings, joints, and valves with insulation of like material, thickness, and finish as adjoining pipe. Size large enough to enclose pipe and heat tracer. Cover with aluminum jacket with seams located on bottom side of horizontal piping.

END OF SECTION

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SECTION 22 1005
PLUMBING PIPING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Pipe, pipe fittings, specialties, and connections for piping systems.
   1. Sanitary sewer.
   2. Domestic water.
   3. Storm water.
   4. Flanges, unions, and couplings.
   5. Pipe hangers and supports.
   6. Ball valves.
   7. Balancing valves.

1.02 RELATED REQUIREMENTS

A. Section 08 3100 - Access Doors and Panels.

B. Section 22 0516 - Expansion Fittings and Loops for Plumbing Piping.

1.03 REFERENCE STANDARDS

A. ASME B16.3 - Malleable Iron Threaded Fittings: Classes 150 and 300 2021.

B. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings 2021.

C. ASME B16.22 - Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings 2021.

D. ASME B31.1 - Power Piping 2022.

E. 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.

F. ASTM A47/A47M - Standard Specification for Ferritic Malleable Iron Castings 1999, with Editorial Revision (2022).

G. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless 2022.

H. ASTM A74 - Standard Specification for Cast Iron Soil Pipe and Fittings 2021.

I. ASTM A234/A234M - Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature Service 2023a.

J. ASTM B32 - Standard Specification for Solder Metal 2020.

K. ASTM B42 - Standard Specification for Seamless Copper Pipe, Standard Sizes 2020.

L. ASTM B88 - Standard Specification for Seamless Copper Water Tube 2022.

M. ASTM B88M - Standard Specification for Seamless Copper Water Tube (Metric) 2020.

N. ASTM B813 - Standard Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube 2016.

O. ASTM B828 - Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings 2016.

P. ASTM C564 - Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings 2020a.

Q. ASTM D2564 - Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems 2020.

R. ASTM D2665 - Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings 2020.

S. ASTM D2729 - Standard Specification for Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings 2021.

T. 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.

U. ASTM D3034 - Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings 2021.

V. AWWA C606 - Grooved and Shouldered Joints 2022.

W. AWWA C651 - Disinfecting Water Mains 2014, with Addendum (2020).

X. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation 2018, with Amendment (2019).

Y. MSS SP-110 - Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends 2010, with Errata .

Z. NSF 61 - Drinking Water System Components - Health Effects 2022, with Errata.

AA. NSF 372 - Drinking Water System Components - Lead Content 2022.

1.04 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements 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.

C. Welders' Certificates: Submit certification of welders' compliance with ASME BPVC-IX.

D. Project Record Documents: Record actual locations of valves.

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, ASTM specification, potable water certification, water pressure rating.

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.

1.07 FIELD CONDITIONS

A. Do not install underground piping when bedding is wet or frozen.

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 SANITARY SEWER PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. Cast Iron Pipe: ASTM A74 extra heavy weight.
   1. Fittings: Cast iron.
   2. Joints: Hub-and-spigot, CISPI HSN compression type with ASTM C564 neoprene gaskets or lead and oakum.

B. PVC Pipe: ASTM D2665 or ASTM D3034.
   1. Fittings: PVC.
   2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.03 SANITARY SEWER PIPING, ABOVE GRADE

A. Cast Iron Pipe: ASTM A74, service weight.
   1. Fittings: Cast iron.
   2. Joint Seals: ASTM C564 neoprene gaskets, or lead and oakum.

B. PVC Pipe: ASTM D2729.
   1. Fittings: PVC.
   2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.04 DOMESTIC WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. Copper Pipe: ASTM B42, hard drawn.
   1. Fittings: ASME B16.18, cast copper alloy or ASME B16.22 wrought copper and bronze.
   2. Joints: ASTM B32, alloy Sn95 solder.

2.05 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.
   3. Mechanical Press Sealed Fittings: Double-pressed type, NSF 61 and NSF 372 approved or certified, utilizing EPDM, nontoxic, synthetic rubber sealing elements.

2.06 STORM WATER PIPING, BURIED WITHIN 5 FEET OF BUILDING

A. Cast Iron Pipe: ASTM A74 extra heavy weight.
   1. Fittings: Cast iron.
   2. Joint Seals: ASTM C564 neoprene gaskets, or lead and oakum.

B. PVC Pipe: ASTM D2665 or ASTM D3034.
   1. Fittings: PVC.
   2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.07 STORM WATER PIPING, ABOVE GRADE

A. Cast Iron Pipe: ASTM A74 extra heavy weight.
   1. Fittings: Cast iron.
   2. Joint Seals: ASTM C564 neoprene gaskets, or lead and oakum.

B. PVC Pipe: ASTM D2665 or ASTM D3034.
   1. Fittings: PVC.
   2. Joints: Solvent welded, with ASTM D2564 solvent cement.

2.08 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.

2.09 FLANGES, UNIONS, AND COUPLINGS

A. Unions for Pipe Sizes 3 inch and Under:
   1. Ferrous Pipe: Class 150 malleable iron threaded unions.
   2. Copper Tube and Pipe: Class 150 bronze unions with soldered joints.

B. 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 or ductile iron.
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.

2.10 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.
   3. Trapeze Hangers: Welded steel channel frames attached to structure.
   4. Vertical Pipe Support: Steel riser clamp.

B. Plumbing Piping - Drain, Waste, and Vent:
   1. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
   2. Hangers for Pipe Sizes 2 inch and Over: Carbon steel, adjustable, clevis.
   3. Wall Support for Pipe Sizes to 3 inch: Cast iron hook.
   4. Wall Support for Pipe Sizes 4 inch and Over: Welded steel bracket and wrought steel clamp.

C. Plumbing Piping - Water:
   1. Hangers for Pipe Sizes 1/2 to 1-1/2 inch: Malleable iron, adjustable swivel, split ring.
   2. Hangers for Cold Pipe Sizes 2 inch and Over: Carbon steel, adjustable, clevis.
   3. Hangers for Hot Pipe Sizes 2 to 4 inch: Carbon steel, adjustable, clevis.

2.11 BALL VALVES

A. Construction, 4 inch and Smaller: MSS SP-110, Class 150, 400 psi CWP, bronze 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.

2.12 BALANCING VALVES

A. 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.

B. Automatic Flow Limiting Cartridge with Ball Valve, Size 1/2 to 1 inch:
   1. Class 125, brass or bronze body, stainless steel cartridge, leak-proof stem, threaded or soldered connections with built-in union, dual PT (hot and cold pressure-temperature) test ports for 400 psi, 0.25 to 1.5 gpm WOG service.

C. Calibration: Control flow within five percent of selected rating, over operating pressure range of 10 times minimum pressure required for control, maximum minimum pressure 3.5 psi.

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. See Section 22 0516.

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 08 3100.

I. Provide support for utility meters in accordance with requirements of utility companies.

J. Install bell and spigot pipe with bell end upstream.

K. Copper Pipe and Tube: Make soldered joints in accordance with ASTM B828, using specified solder, and flux meeting ASTM B813; in potable water systems use flux also complying with NSF 61 and NSF 372.

L. PVC Pipe: Make solvent-welded joints in accordance with ASTM D2855.

3.04 APPLICATION

A. Install unions downstream of valves and at equipment or apparatus connections.

B. Install ball valves for shut-off and to isolate equipment, part of systems, or vertical risers.

C. Install globe valves for throttling, bypass, or manual flow control services.

3.05 TOLERANCES

A. Drainage Piping: Establish invert elevations within 1/2 inch vertically of location indicated and slope to drain at minimum of 1/8 inch per foot slope.

B. Water Piping: Slope at minimum of 1/32 inch per foot and arrange to drain at low points.

3.06 DISINFECTION OF DOMESTIC WATER PIPING SYSTEM

A. Prior to starting work, verify system is complete, flushed, and clean.

B. Ensure acidity (pH) of water to be treated is between 7.4 and 7.6 by adding alkali (caustic soda or soda ash) or acid (hydrochloric).

C. Inject disinfectant, free chlorine in liquid, powder, tablet, or gas form throughout system to obtain 50 to 80 mg/L residual.

D. Bleed water from outlets to ensure distribution and test for disinfectant residual at minimum 15 percent of outlets.

E. Maintain disinfectant in system for 24 hours.

F. If final disinfectant residual tests less than 25 mg/L, repeat treatment.

G. Flush disinfectant from system until residual equal to that of incoming water or 1.0 mg/L.

H. Take samples no sooner than 24 hours after flushing, from 10 percent of outlets and from water entry, and analyze in accordance with AWWA C651.

3.07 SCHEDULES

A. Pipe Hanger Spacing:
   1. Metal Piping:
      a. Pipe Size: 1/2 inch to 1-1/4 inch:
         1) Maximum Hanger Spacing: 6.5 ft.
         2) Hanger Rod Diameter: 3/8 inches.
      b. Pipe Size: 1-1/2 inch to 2 inch:

1) Maximum Hanger Spacing: 10 ft.
2) Hanger Rod Diameter: 3/8 inch.

c. Pipe Size: 2-1/2 inch to 3 inch:
1) Maximum Hanger Spacing: 10 ft.
2) Hanger Rod Diameter: 1/2 inch.

d. Pipe Size: 4 inch to 6 inch:
1) Maximum Hanger Spacing: 10 ft.
2) Hanger Rod Diameter: 5/8 inch.

2. Plastic Piping:
a. All Sizes:
1) Maximum Hanger Spacing: 6 ft.
2) Hanger Rod Diameter: 3/8 inch.

END OF SECTION

SECTION 22 1006
PLUMBING PIPING SPECIALTIES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Drains.

B. Cleanouts.

C. Water hammer arrestors.

D. Exterior penetration accessories.

1.02 REFERENCE STANDARDS

A. ASME A112.6.3 - Floor and Trench Drains 2019.

B. NSF 61 - Drinking Water System Components - Health Effects 2022, with Errata.

C. NSF 372 - Drinking Water System Components - Lead Content 2022.

D. PDI-WH 201 - Water Hammer Arresters 2017.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements for submittal procedures.

B. Product Data: Provide component sizes, rough-in requirements, service sizes, and finishes.

1.04 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with not less than three years documented experience.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Specialties in Potable Water Supply Systems: Provide products that comply with NSF 61 and NSF 372 for maximum lead content.

2.02 DRAINS

A. Floor Drains:
   1. Manufacturers:
      a. Jay R. Smith Manufacturing Company: www.jrsmith.com
      b. Zurn Industries, LLC: www.zurn.com
      c. Watts; Model FD-100-A: www.watts.com.
      d. Substitutions: See Section 01 6000 - Product Requirements.

B. Floor Drain (FD-1):
   1. ASME A112.6.3; epoxy coated cast ironfloor drain with anchor flange, weep holes, reversible clamping collar, and round, adjustable round heal proof nickel-bronze strainer.

C. Floor Sink (FS-1):
   1. Type 304 Stainless Steel sanitary floor sink with loose set cast stainless steel grate, dome bottom strainer and no hub outlet.
   2. Manufacturers:
      a. Watts: Model FS-780 www.watts.com.
      b. Substitutions: See Section 01 6000 - Product Requirements.

2.03 CLEANOUTS

A. Cleanouts at Interior Finished Floor Areas (CO-A):
   1. Lacquered cast iron body with anchor flange, reversible clamping collar, threaded top assembly, and round gasketed scored cover in service areas and round gasketed depressed cover to accept floor finish in finished floor areas.

2.04 WATER HAMMER ARRESTORS

A. Water Hammer Arrestors:
   1. Stainless steel construction, bellows type sized in accordance with PDI-WH 201, precharged suitable for operation in temperature range minus 100 to 300 degrees F and maximum 250 psi working pressure.

2.05 AIR VENTS

A. 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.

B. 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.

2.06 FLOOR DRAIN TRAP SEALS

A. Manufacturers:
   1. Green Drains; GD4: www.greendrains.com
   2. Substitutions: See Section 01 6000 - Product Requirements.

B. Description: Push-fit EPDM or silicone fitting with a one-way membrane.

2.07 EXTERIOR PENETRATION ACCESSORIES

A. Sealing Systems for Roof Penetrations: Premanufactured components and accessories as required to preserve integrity of roofing system and maintain roof warranty; suitable for piping, cables, and roofing system to be installed; designed to accommodate existing penetrations where applicable.

B. Plumbing Ventilation Thru Roof Accessories - Retrofit:
   1. Plumbing Pipe Extension Kit: Extends roof plumbing pipes above minimum clearance from roof surface per local codes and Authority Having Jurisdiction (AHJ).

PART 3 EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Extend cleanouts to finished floor or wall surface. Lubricate threaded cleanout plugs with mixture of graphite and linseed oil. Ensure clearance at cleanout for rodding of drainage system.

C. Install floor cleanouts at elevation to accommodate finished floor.

D. Install water hammer arrestors complete with accessible isolation valve on hot and cold water supply piping to lavatory sinks, washing machine outlets, or water closets.

END OF SECTION

SECTION 22 4000
PLUMBING FIXTURES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Water closets.

B. Lavatories.

C. Sinks.

D. Washing Machine Outlet Box

1.02 REFERENCE STANDARDS

A. ASME A112.19.2 - Ceramic Plumbing Fixtures 2018, with Errata.

B. NSF 61 - Drinking Water System Components - Health Effects 2022, with Errata.

C. NSF 372 - Drinking Water System Components - Lead Content 2022.

D. UL (DIR) - Online Certifications Directory Current Edition.

1.03 SUBMITTALS

A. See Section 01 3000 - Administrative Requirements, for submittal procedures.

B. Product Data: Provide catalog illustrations of fixtures, sizes, rough-in dimensions, utility sizes, trim, and finishes.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Accept fixtures on site in factory packaging. Inspect for damage.

B. Protect installed fixtures from damage by securing areas and by leaving factory packaging in place to protect fixtures and prevent use.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

A. Potable Water Systems: Provide plumbing fittings and faucets that comply with NSF 61 and NSF 372 for maximum lead content; label pipe and fittings.

B. Water Efficiency: EPA WaterSense label is required for all water closets, urinals, lavatory faucets, and showerheads.

2.02 REGULATORY REQUIREMENTS

A. Comply with applicable codes for installation of plumbing systems.

B. Comply with UL (DIR) requirements.

C. Perform work in accordance with local health department regulations.

D. Provide certificate of compliance from Authority Having Jurisdiction indicating approval of installation.

2.03 FLUSH VALVE WATER CLOSETS

A. Water Closets (WC-2): Vitreous china, ASME A112.19.2, floor mounted, siphon jet flush action, china bolt caps.
   1. Flush Valve: Exposed (top spud).
   2. Flush Operation: Sensor operated.
   3. Color: White.
   4. Manufacturers:
      a. American Standard, Inc: www.americanstandard-us.com/
      b. Kohler Company: www.kohler.com/
      c. Zurn Industries, Inc;Model Z5655-BWL1: www.zurn.com/

d. Substitutions: See Section01 6000-Product Requirements.

B. Water Closets (WC-2A (ADA height)): Vitreous china, ASME A112.19.2, floor mounted, siphon jet flush action, china bolt caps.
   1. Flush Valve: Exposed (top spud).
   2. Flush Operation: Sensor operated.
   3. Color: White.
   4. Manufacturers:
      a. American Standard, Inc: www.americanstandard-us.com/
      b. Kohler Company: www.kohler.com/
      c. Zurn Industries, Inc; Model Z5665-BWL1: www.zurn.com/
      d. Substitutions: See Section 01 6000 - Product Requirements.

C. Flush Valves: ASME A112.18.1, piston with debris screen and solenoid with self cleaning mechanism , complete with vacuum breaker stops and accessories.
   1. Sensor-Operated Type: Solenoid operator, battery powered, infrared sensor with mechanical over-ride or over-ride push button.
   2. Manufacturers:
      a. Sloan Valve Company; Model 811-1.28-OR: www.sloanvalve.com/
      b. Zurn Industries, Inc: www.zurn.com/
      c. Substitutions: See Section 01 6000 - Product Requirements.

D. Seats:
   1. Manufacturers:
      a. American Standard, Inc: www.americanstandard-us.com/
      b. Bemis Manufacturing Company: www.bemismfg.com/
      c. Church Seat Company; 295CT: www.churchseats.com/
      d. Zurn Industries, Inc: www.zurn.com/
      e. Substitutions: See Section 01 6000 - Product Requirements.
   2. Solid white plastic, open front, extended back, self-sustaining hinge, brass bolts, with cover.

2.04 LAVATORIES (LAV-1A) (ADA)

A. Lavatory Manufacturers:
   1. American Standard, Inc; Model Decorum 9024.001EC: www.americanstandard-us.com/
   2. Kohler Company: www.kohler.com/
   3. Zurn Industries, Inc: www.zurn.com/
   4. Substitutions: See Section 01 6000 - Product Requirements.

B. Vitreous China Wall Hung Basin: ASME A112.19.2; vitreous china wall hung lavatory, 20 by 18 inch minimum, rectangular basin with splash lip, and rear overflow.

C. Supply Faucet Manufacturers:
   1. American Standard, Inc: www.americanstandard-us.com/
   2. Zurn Industries, Inc: www.zurn.com/
   3. Chicago Faucets; Model EQ-A11C-23ABCP: www.chicagofaucets.com.
   4. Substitutions: See Section 01 6000 - Product Requirements.

D. Sensor Operated Faucet: Cast brass, chrome plated, deck mounted with sensor located on neck of spout.
   1. Spout Style: Standard.
   2. Power Supply: Battery, easily replaceable, lithium, minimum 200,000 cycles. Self-generating hydropowered Ecopower System.
   3. Mixing Valve: Built in ASSE 1070 Thermostatic Mixing Valve.
   4. Water Supply: 3/8 inch compression connections.
   5. Aerator: 0.5 GPM, laminar flow device.

6. Sensor range: Automatically adjusts.
7. Finish: Polished chrome.

2.05 LAVATORIES (LAV-2A) (ADA)

A. Manufacturers:
1. Bradley; Model Terreon MF2944: www.bradleycorp.com
2. Substitutions: See Section 01 6000 - Product Requirements.

B. General
1. Size and Capacity
a. Accommodates 1–4 users at a time, using less water, energy and space than four lavs with conventional faucets. The pre-assembled sprayhead module is equipped with four independent streamformers, each controlled by a separate pushbutton or infrared sensor.
2. Flow Control/Rate
a. Operating water pressure range is 20–80 psi. Flow regulators keep flow rate constant at all pressures. A flow restrictor keeps the flow rate constant under any pressure.

C. Construction
1. Bowl and Pedestal
a. Constructed of Terreon®, a densified solid surface material composed of bio-based resin, or Terreon®RE, a densified solid surface material composed of a bio-based resin and preconsumer recycled granules. Terreon and TerreonRE are resistant to chemicals, stains, burns, and impact. Surface damage can be easily repaired with everyday cleansers or fine grit abrasives. Terreon and TerreonRE are GREENGUARD® certified as low-emitting materials. Pedestal frame and access panels are constructed of heavy gauge type 300 Series stainless steel.
2. Vandal Resistance
a. The molded sprayhead is an integral element of the bowl module. All streamformers and pushbuttons/infrared sensors are secured to the unit from inside the sprayhead module. All valving, water supplies, and waste connections are concealed inside the pedestal. The front access panel is removable only with a hex key. The Terreon and TerreonRE bowl are resistant to stains, burns, and impact, Surface damage is easily repaired and repair work is virtually undetectable.
3. Valves and Fittings
a. In addition to the bowl and pedestal, the following valves and fittings are standard: Navigator® thermostatic mixing valve, stop valves, flexible stainless steel supply hoses, drain spud, and locknut. Stop valves mounted onto nominal copper tubing.

D. Activation Type
1. Battery Infared
a. Each battery-powered sensor uses a zone-focused infrared transmitting beam, creating a large detection area not exceeding the bowl perimeter. The sensor is not affected by varying skin tones or darkness. When hands enter the detection area, the sensor starts water flow by opening the solenoid valve electronically. When hands leave the detection area, the sensor stops the flow of water by closing the valve. The 6VDC electronically activated solenoid valve has few moving parts, providing reliable operation that is unaffected by most chemicals and minerals often present in municipal water supplies. Each station is powered by a single lithium battery. Battery type is Duracell® DL 223A or equivalent (included). Battery type is Duracell® DL 223A 6V lithium or equivalent with a life expectancy of 4-5 years or approximately 200,000 cycles.

2.06 WASHING MACHINE OUTELT BOX (OB-1)

A. Manufacturers:
1. Sioux Chief; Model 696-R2313MF: www.siouxchief.com

2. Substitutions: See Section 01 6000 - Product Requirements.

B. Fire Rated outlet boxes shall be used where necessary in plumbing supply/drainage systems. Unit shall allow for mounting with supply lines from top or bottom, mounted over stud or with one outlet box per stud cavity. Supply and drain boxes can be connected using provided galvanized U-Clip or separated as desired into individual stud cavities. Supply box can be inverted. Arrester variations can be installed with arresters at any angle. Unit shall be available with ¼-turn valves. Metal support bracket shall install into top/bottom tracks of box. Drain box shall have a ⅝" integral testable nipple on knockout. Outlet connections shall be generally ¾". Outlet connections should generally be provided with a test/tamper-resistant cap. Valves should be plated. Arrester option handles can be operated together (single throw) or independently.

2.07 SINKS (SK-1)

A. Sink Manufacturers:
1. American Standard, Inc: www.americanstandard-us.com/
2. Elkay; Model D22519: www.elkay.com.
3. Substitutions: See Section 01 6000 - Product Requirements.

B. DualCompartment Bowl: ; 25 by 19 by 6-5/16 inch outside dimensions 22 gauge, 0.05 inch thick, Type 304 stainless steel, drop in.
1. Drain: Two (2) 3-1/2 inch crumb cup and tailpiece.

C. Supply Faucet Manufacturers:
1. American Standard, Inc: www.americanstandard-us.com
2. Zurn Industries, Inc: www.zurn.com
3. Chicago Faucets; Model 527-317ABCP: www.chicagofaucets.com
4. Substitutions: See Section 01 6000 - Product Requirements.

D. Manual Operated Faucet: Cast brass, chrome plated, deck mounted with 8" centers.
1. Spout Style: 6-1/4" rigid/swing double-bend spout
2. 4" vandal proof wristblade handles.
3. Qquarter turn compression operating cartridge
4. Water Supply: 1/2 NPSM coupling nut for 1/2 flexible riser
5. Full-flow outlet with single-screen design.

2.08 SINKS (SK-2)

A. Sink Manufacturers:
1. Best Sheet Metal; Model ADA-230S602056H: www.bsmss.com.
2. Substitutions: See Section 01 6000 - Product Requirements.

B. Single Compartment Bowl: ; 60 by 20 by 6 inch outside dimensions 14 gauge, 0.0625 inch thick, Type 304 stainless steel, three station ADA free standing, with 1 1/2 drain hole.
1. Drain: Solid Welded 1-1/2" NPT drain with 14 GA Stainless Steel perforated screen and tailpiece.

C. Supply Faucet Manufacturers (3 faucets):
1. American Standard, Inc: www.americanstandard-us.com
2. Zurn Industries, Inc: www.zurn.com
3. Chicago Faucets; Model W8W-L9E35-317ABCP: www.chicagofaucets.com
4. Substitutions: See Section 01 6000 - Product Requirements.

D. Manual Faucet: 8" fixed Centers 8" rigid/swing gooseneck spout, chrome plated, wall mounted, 4" metal vandal-proof wristblade handles.
1. Spout Style: 9-1/2in L-type swing spout
2. Aerator: 1.5 GPM, laminar flow device.

2.09 SINKS (SK-3)

A. Sink Manufacturers:
   1. Just Manufacturing Company; Model JPH-ADA-2230-CT: www.justmfg.com.
   2. Substitutions: See Section 01 6000 - Product Requirements.

B. ADA Compliant - Wall-Hung.

C. Seamless welded construction of 16 gauge, type 304 stainless steel.

D. Enclosure of 18 gauge, type 304 stainless steel.

E. Interior and exposed exterior to have a satin blended No. 4

F. Underside of sink to be sound deadening to insulate for sound and reduce condensation.

G. Tapered front bowl wall provides greater ADA Compliant access.

H. Support brackets of 14 ga. type 304 included. Wall clips included.

I. JSL-46 Sensor faucet Battery Operated

J. Thermostatic mixing valve.

K. Emergency eyewash, swing down to operational position activating water Each head with top" dust cover, internal control. ANSI-compliant sign included. Tested and comply with ANSI Z358.1-2014

L. In-line on eyewash and sensor faucets.

M. Separate thermostatic mixing valves for eyewash and faucet.

N. Eyewash mixing valve High Temp Limit set at 90 F (32 C). Outlet dial thermometer color coded to view temperature. Internal cold-water bypass on failure of hot water supply. Min. hot and cold supply 30 psi; max supply pressure 125 PSI. 2.0-9.0 GPM. 1/2" inlets with check and stop valves. Polished chrome plated brass construction with housing cover of type 316 stainless steel. ASSE 1071-2012 tested. Pre-piped enclosure connections to be completed at jobsite.

O. Just J-35-SSF stainless steel grid drain, pre-installed.

2.10 SINKS (SK-4)

A. Sink Manufacturers:
   1. American Standard, Inc: www.americanstandard-us.com/
   2. Elkay; Model LRAD252165: www.elkay.com.
   3. Substitutions: See Section 01 6000 - Product Requirements.

B. Single Compartment Bowl: ; 25 by 21-1/4 by 6-1/2 inch outside dimensions 18 gauge, 0.0625 inch thick, Type 304 stainless steel, drop in, with 3 1/2 drain hole.
   1. Drain: 3-1/2 inch crumb cup and tailpiece.

C. Supply Faucet Manufacturers:
   1. American Standard, Inc: www.americanstandard-us.com
   2. Zurn Industries, Inc: www.zurn.com
   3. Chicago Faucets; Model 527-317ABCP: www.chicagofaucets.com
   4. Substitutions: See Section 01 6000 - Product Requirements.

D. Manual Faucet: 8" fixed Centers 8" rigid/swing gooseneck spout, chrome plated, deck mounted, 4" metal vandal-proof wristblade handles.
   1. Spout Style: 6-1/4in rigid/swing double-bend spout
   2. Water Supply: 1/2" NPSM supply inlets and coupling nut for 3/8 or 1/2 flexible riser.
   3. Single screen outlet for full flow.

2.11 SINKS (SK-5)

A. Sink Manufacturers:
   1. American Standard, Inc: www.americanstandard-us.com/

2. Elkay; Model LRAD171660: www.elkay.com.
3. Substitutions: See Section 01 6000 - Product Requirements.

B. Single Compartment Bowl: ; 17 by 16 by 6inch outside dimensions 18 gauge, 0.0625 inch thick, Type 304 stainless steel, drop in, with 3 1/2 drain hole.
1. Drain: 3-1/2 inch crumb cup and tailpiece.

C. Supply Faucet Manufacturers:
1. American Standard, Inc: www.americanstandard-us.com
2. Zurn Industries, Inc: www.zurn.com
3. Chicago Faucets; Model 527-317ABCP: www.chicagofaucets.com
4. Substitutions: See Section 01 6000 - Product Requirements.

D. Manual Faucet: 8" fixed Centers 8" rigid/swing gooseneck spout, chrome plated, deck mounted, 4" metal vandal-proof wristblade handles.
1. Spout Style: 6-1/4in rigid/swing double-bend spout
2. Water Supply: 1/2" NPSM supply inlets and coupling nut for 3/8 or 1/2 flexible riser.
3. Single screen outlet for full flow.

2.12 SINKS (SK-6)

A. Sink Manufacturers: provided by casework manufacturer.

B. Supply Faucet Manufacturers:
1. American Standard, Inc: www.americanstandard-us.com
2. Zurn Industries, Inc: www.zurn.com
3. Chicago Faucets; Model LWM2-B11-F: www.chicagofaucets.com
4. Substitutions: See Section 01 6000 - Product Requirements.

C. Manual Faucet: Deck mounted dual-inlet water faucet, 8" centers, 8" rigid/swing gooseneck spout with atmospheric vacuum breaker, 2-1/2" vandal proof cross handles with index button.
1. Spout Style: 8 in rigid/swing gooseneck spout
2. Water Supply: 1/2" NPSM supply inlets and coupling nut for 3/8 or 1/2 flexible riser.
3. Laboratory nozzle with 10 serrations for laboratory hose.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify that walls and floor finishes are prepared and ready for installation of fixtures.

B. Confirm that millwork is constructed with adequate provision for the installation of counter top lavatories and sinks.

3.02 PREPARATION

A. Rough-in fixture piping connections in accordance with minimum sizes indicated in fixture rough-in schedule for particular fixtures.

3.03 INSTALLATION

A. Install each fixture with trap, easily removable for servicing and cleaning.

B. Provide chrome plated rigid or flexible supplies to fixtures with loose key stops, reducers, and escutcheons.

C. Install components level and plumb.

D. Install and secure fixtures in place with wall supports and bolts.

3.04 INTERFACE WITH WORK OF OTHER SECTIONS

A. Review millwork shop drawings. Confirm location and size of fixtures and openings before rough-in and installation.

3.05 ADJUSTING

A. Adjust stops or valves for intended water flow rate to fixtures without splashing, noise, or overflow.

3.06 CLEANING

A. Clean plumbing fixtures and equipment.

3.07 PROTECTION

A. Protect installed products from damage due to subsequent construction operations.

B. Repair or replace damaged products before Date of Substantial Completion.

3.08 SCHEDULES

A. Fixture Heights: Install fixtures to heights above finished floor as indicated.
   1. Water Closet:
      a. Standard: 15 inches to top of bowl rim.
      b. Accessible: 18 inches to top of seat.
   2. Water Closet Flush Valves:
      a. Standard: 11 inches min. above bowl rim.
   3. Lavatory:
      a. Standard: 31 inches to top of basin rim.
      b. Accessible: 34 inches to top of basin rim.

B. Fixture Rough-In
   1. Water Closet (Flush Valve Type):
      a. Cold Water: 1 Inch.
      b. Waste: 4 Inch.
      c. Vent: 2 Inch.
   2. Lavatory:
      a. Hot Water: 1/2 Inch.
      b. Cold Water: 1/2 Inch.
      c. Waste: 1-1/2 Inch.
      d. Vent: 1-1/4 Inch.
   3. Sink:
      a. Hot Water: 1/2 Inch.
      b. Cold Water: 1/2 Inch.
      c. Waste: 1-1/2 Inch.
      d. Vent: 1-1/4 Inch.

END OF SECTION