

**DIVISION 23 - HVAC****SECTION 23 05 00 - STANDARD CONDITIONS FOR HVAC****PART 1 - GENERAL****1.01 REFERENCE**

- A. Requirements established within the portions of this project manual titled Division 1, General Requirements are collectively applicable to the work of this section.
- B. Instructions to Bidders, Special Conditions and addenda as issued are part of this specification.
- C. Mechanical, Plumbing, and HVAC drawings along with all other project drawings and specifications represent the work of this section.
- D. Drawings, Contract, General Conditions and Supplementary Conditions form a part of this section, by reference thereto and shall have the same force and effect as if printed herewith in full. Failure to review these sections shall not relieve the Contractor of his responsibility to fully comply with the terms therein.

**1.02 SCOPE**

- A. Provide all labor, material, equipment, and supervision necessary to disconnect and remove the existing heating system in its entirety including, but not limited to; radiators, hot water supply, and return piping, boilers, pumps, baseboard radiation, controls, supports, hangers, and all associated insulation, equipment pads, and accessories. Patch and repair openings in walls, floors, and ceilings, for piping and equipment that was removed. Pipe, conduit, ductwork, and wiring shall be cut back behind wall surfaces, above ceilings, and below floor levels so that a patch can be placed over the opening.
- B. Provide labor, material, equipment, and supervision necessary to install complete operating mechanical systems as indicated on the drawings and specified herein, including all work at the site and within the proposed construction areas to accomplish the required work.
- C. It shall be the contractor's responsibility to coordinate his work and the work of his subcontractors to insure that all the work is covered. He shall designate who is responsible for various portions of work which may overlap so that there is complete coverage of all required work. It is the position of the owner and the A/E that all work is the responsibility of the mechanical contractor within this Division of the work.
- D. Contractor shall provide all demolition necessary to remove and replace, repair, install new or modify existing work whether it be walls, floors, ceilings, structure, mechanical or electrical required to install his work. Contractor shall replace all work to leave in a finished condition.
- E. All work shown on the drawings and not expressly mentioned in the specifications and all work specified but not shown on the drawings, but necessary for the proper execution of same shall be performed by the contractor. It is not the intent of the drawings and specifications to describe every feature and detail of the work.
- F. No additions to the contract amount will be approved for any materials, equipment, or labor to perform additional work unless it can be clearly shown to be beyond the scope and intent of the drawings and specifications.
- G. HVAC contractor's scope of work shall include but not be limited to the following:
  - 1. Air distribution system, associated ductwork, devices, equipment, and insulation.

2. Heating hot water system and insulation. \* Dual temperature system and insulation.
3. Chilled water system, equipment, and insulation.
4. Condensate drainage system (air conditioner units). Condensate pumps.
5. Exhaust systems.
6. Humidification systems.
7. Demolition of existing work for new work.
8. Test Balance & Adjust.
9. Generator exhaust, ductwork, and exhaust insulation. Generator Room exhaust system.
10. Repair existing areas affected by the new construction. Patch, repair and finish to match existing.
11. Automatic Temperature Control System.
12. Building automation system (existing) and automatic temperature controls.
13. All other work identified in Division 23 and/or on the mechanical drawings except that identified as plumbing or fire protection work.
14. Contractor shall not utilize new HVAC equipment for temporary heating, cooling, and dehumidification purposes. Temporary HVAC is to be provided as described under the architect's general conditions. Contractor is to protect all HVAC equipment during construction and cover all ductwork openings.
15. Provide third party certification of all packaged systems by a Nationally Recognized Testing Laboratory (NRTL) in accordance with OSHA Federal Regulations 29CFR1910.303 and .399 as well as Pamphlet #70 and National Electrical Code Article 90-7.
16. Fire stopping of penetrations. (See Section 23 05 50)

#### 1.03 REGULATIONS, CODES, AND STANDARDS

- A. Work shall be performed in accordance with the latest adopted codes, amendments, regulations and ordinances of the authorities having jurisdiction. Observe all safety regulations including the requirements of OSHA.
- B. Obtain and pay for all permits, connection charges, inspections, and certificates required to complete the work.
- C. Latest editions of any referenced standards shall govern.
- D. Contractor shall arrange and pay for all tests and inspections specified herein or required by above agencies and furnish required certificate of inspection to owner.
- E. Where the contract documents are more stringent but not in conflict with the applicable codes, the more stringent requirements shall be followed.

#### 1.04 SUBMISSIONS

- A. The procedure for submissions of shop drawings shall be as specified in Division 1, or as a minimum, as indicated below.
- B. Furnish submissions of shop drawings and samples of materials and equipment as indicated in these sections, on the drawings, or as directed by the A/E. Submissions will be made in a timely fashion such that adequate time exists to review the drawings, or material, and arrive at the site in accordance with the project schedule.
- C. Submissions will not be accepted with work defined as "By Others". Identify contractor by name and with his approval so indicated. Submissions are required prior to purchasing, fabrication, or installation of any material or equipment. Submissions shall be reviewed and certified by the submitting contractor that they are in accordance with the project documents.
- D. When requested by the engineer, shop drawings shall be required to be submitted to designated agencies for review and approval prior to submission to the engineer.
- E. Contractor shall arrange and pay for all tests and inspections specified herein or required by above agencies and furnish required certificate of inspection to owner.

- F. Contractor to forward a copy of submittals which have electrical requirements to the Electrical Contractor (EC) for coordination of voltage, amperage, and phase. Response to be received from EC prior to ordering of equipment by mechanical contractor.
- G. Submissions shall include warranties by the manufacturer for equipment being provided. Submissions for commonly related items such as fixtures, trim, carriers, drains shall be combined in a single brochure with all items being furnished clearly identified.
- H. Shop drawings and submittals shall be checked and stamped by the contractor before submitting. They shall conform to measurements made at the site, the contract requirements, and coordinated with all other trades.
- I. Specific models in catalog sheets must be identified as well as all options, voltages, phases, etc. identified so as to be clear on what is being provided.
- J. Contractor and manufacturers shall be responsible for all physical characteristics of the equipment and field verify with final locations, coordinate with floor plans, confirm service access, clearances, confirm equipment arrangements, electrical disconnect clearances, and pathways/travel/access to the final equipment installation locations. Submission of equipment shop drawing will be deemed evidence of compliance with this requirement. If no shop drawing is submitted, contractor shall be fully responsible for a complete installation and assumes all related costs that affects the contractor and other trades.

#### 1.05 SITE INSPECTION

- A. Visit site, inspect and become aware of all conditions which may affect the work. Investigate utilities, protection requirements for adjacent facilities, storage locations, and access to the construction area.
- B. Submission of bid will be deemed evidence of having complied with this request. Contractor may not request additional costs for existing conditions which were evident from inspection of the site.

#### 1.06 SUBSTITUTIONS

- A. Material and equipment specified shall be deemed as that which the bidder's quotation represents.
- B. Once bids are accepted only that material and equipment listed in the specifications or added by addenda shall be acceptable. Substitution information for inclusion in an addenda must be received by the A/E at least 10 days prior to bid opening. If acceptable, an addenda will be issued which will add the additional acceptable manufacturers or materials and be available for all contractors to consider. It shall be a basic premise that a contractor is a lowest bidder because he utilized substituted materials or equipment as opposed to specified materials or equipment.
- C. If the contractor submits alternate equipment, manufacturers, systems, methods, or materials, not specifically identified in the specifications, additional review and investigation time may be required by the engineer. If the engineer determines additional review time is required because of the substitution, then this will be a billable service by the engineer at the rate of \$150.00/hr. for such services. Also billable will be any redesign time and revisions to drawings should they be necessary for incorporation into the work. Services will be billable to the contractor making such substitutions and will be payable prior to approval or rejection.
- D. If the contractor elects to submit alternate equipment, manufacturers, systems, methods, or materials, not specifically identified in the drawings and specifications, it is the contractor's responsibility to coordinate the work with other trades and pay for any associated costs with the substitution or change.
- E. Contractor and manufacturers shall be responsible for all physical characteristics of the equipment and field verify with final locations, coordinate with floor plans, confirm service access, clearances, confirm equipment arrangements, electrical disconnect clearances, and pathways/travel/access to the final equipment installation locations. Submission of equipment shop drawing will be deemed evidence of compliance with this requirement. If no shop drawing is submitted, contractor shall be

fully responsible for a complete installation and assumes all related costs that affects the contractor and other trades.

#### 1.07 DRAWINGS AND SPECIFICATIONS

- A. The drawings are generally diagrammatic and necessary field coordination and adjustment must be provided by the contractor prior to installation. Such deviations to the work to allow for coordination shall be kept to a minimum and any such deviations shall be at no extra cost.
- B. When a conflict or contradiction exists either between drawings and specs or between specs or between different drawings or details, the more stringent shall apply.
- C. Drawings and specifications are intended to be taken as a whole and each is to supplement the other. It is not intended that all work must be both shown on drawings and specified in the specifications.
- D. An item shown on the drawings and not indicated in the specifications is to be understood to be required for the project. An item specified and not shown on the drawings is to be understood to be required for the project.
- E. The architects or engineer's interpretation of the documents shall be binding upon the contractor. If a question arises, the contractor shall ask for an interpretation prior to bidding and an answer shall be issued as an addendum to all bidders.
- F. If a question arises after bidding the A/E interpretation shall govern.

#### 1.08 MEASUREMENTS

- A. Before ordering materials or commencing with any work, the contractor shall verify all measurements at the building. Coordination of equipment, materials, spaces, and dimensions are the responsibility of the contractor.

#### 1.09 PROGRESS SCHEDULE

- A. Provide a project schedule which shall show start, sequence of each type of work, milestone schedule, and completion of each type of work, with overall completion date.

#### 1.10 COST SCHEDULE

- A. Provide a detailed cost breakdown indicating labor and material amounts for various types of work.
- B. AIA forms are required for this submission.

#### 1.11 COMPLETION

- A. The contractor shall deliver to the owner, with his request for final payment, copies of all manufacturer's guarantees, equipment instructional manuals, a complete set of all final shop drawings, catalog cuts, service contracts, and other items as may be required elsewhere in the documents.

#### 1.12 OFFICE

- A. The contractor shall set up his job office (desk) where directed by the owner.

#### 1.13 STORAGE

- A. Material shall be stored only where directed by the owner.

## 1.14 SANITARY

- A. The contractor will at his own expense, provide and maintain in a sanitary condition, a portable chemical toilet.
- B. Toilet will be located where directed by the owner.

## PART 2 - PRODUCTS

### 2.01 GENERAL

- A. All material shall be new and of present day manufacture.
- B. All material and equipment shall be in conformance with accepted trade standards.
- C. Whenever equipment or material is referred to in the singular, such as "the fan", it shall be deemed to apply to as many such items as may be necessary to complete the installation.
- D. The word "provide" means "furnish and install complete, tested, and adjusted as necessary with all accessories, covers, escutcheons". The word "piping" means pipe, fitting, controls, valves, and hangers as required for a complete system.

### 2.02 MOTORS

- A. Incorporate latest IEEE and NEMA standards.
- B. All copper windings with ball bearings.
- C. Indoors; drip proof, 40 degree C rise.
- D. Outdoors; totally enclosed 55 degree C rise.
- E. Motors over 10 HP to be high efficiency with PF in excess of 0.9.

### 2.03 MOTOR STARTERS AND CONTACTORS

- A. Fractional with horsepower up to ½ HP; electrical contract.
- B. Polyphase and single phase above ½ HP: this contract.
- C. Electrical contractor shall install all starters except for those provided as an integral part of equipment.
- D. Polyphase starters shall be magnetic combination type, across-the-line electrically operated, electrically held, three pole assemblies, with arc extinguishing characteristics, silver to silver renewable contacts, 3 pole thermal bi-metallic, red run pilot light, individual phase protection, with overload heaters matched to motors installed and with 4 auxiliary contact, Hand-off-Auto switch, and control transformer.
- E. For single phase motors above ½ HP provide magnetic combination single phase motor starters with overloads, non-fusible disconnect switch, red run pilot light, integral 120 volt control transformer with dual primary fusing auxiliary contacts.
- F. Starters shall be as manufactured by G. E., Siemens, Square "D", Cetus or Cutler-Hammer.

### 2.04 EQUIPMENT START UP

- A. Verify that equipment is operating within warranty requirements.
- B. Advise owner and A/E at least two days prior.
- C. Verify proper operation. Obtain signed statement by manufacturer or his representative that equipment is operating within warranty requirements. Submit statement to A/E.

**2.05 LUBRICATION**

- A. Lubricate all equipment in accordance with manufacturer's instructions.
- B. Lubricate prior to start up.
- C. Provide one year's supply of lubricants to the owner.

**2.06 OPERATING INSTRUCTIONS AND MANUALS**

- A. Properly and fully instruct owner's personnel in the operation and maintenance of all systems and equipment.
- B. Insure that the owner's personnel are familiar with all operations to carry on required activities.
- C. Such instruction shall be for each item of equipment and each System as a whole.
- D. Manual shall include all instructions on operation, maintenance, repair parts list, lubrication requirements, brochures, catalogue cuts, wiring diagrams, control sequences, service requirements, piping diagrams, names, and addresses of vendors, suppliers and emergency contacts. Three manuals shall be provided.
- E. Provide to the owner any special tools necessary to operate any of the equipment.

**2.07 DRAIN PANS**

- A. Provide auxiliary galvanized steel condensate drain pan with 1" MPT drain connection for all interior fan coil units, cooling coils, heat pumps, and any other cooling equipment requiring condensate removal. Drain to suitable discharge point acceptable to owner and A/E. Drain lines shall be separate and independent of A/C unit drain system unless provided with interlocked water sensing switch.
- B. All water heaters mounted above the floor shall be provided with drain pans. Drain to suitable discharge point acceptable to owner and A/E. To be visible outfall.
- C. Drains shall slope down in direction of flow at 1" per 10 feet.

**PART 3 - EXECUTION****3.01 PROTECTION**

- A. Cover duct openings during construction.
- B. Plug or cap open ends of piping systems and conduit.
- C. Stored materials shall be covered to prevent damage by inclement weather, sun, dust, or moisture.
- D. Protect all installed work until accepted in place by the owner. Cover plumbing fixtures and lighting fixtures.
- E. Do not install plates, polished metal escutcheons, thermostats, and other finished devices until masonry, tile, and painting operations are complete or protect otherwise.
- F. Protect all existing or new work from operations which may cause damage such as hauling, welding, soldering, painting, insulating, and covering.

**3.02 WORKMANSHIP**

- A. Install all work neat, trim, and plumb with building lines.
- B. Install work in spaces allocated.
- C. Cutting and patching shall be performed by skilled tradesmen normally employed for the work involved.

### 3.03 FASTENERS, HANGERS, AND SUPPORTS

- A. Furnish and install all hangers and supports required to suspend, mount, or hang the work.
- B. Furnish and install all miscellaneous steel angles, channels, beams, clips, brackets, and anchors to hang or support the work. Provide submissions for review.
- C. Install concrete inserts before concrete is poured.
- D. Drilled inserts shall not be loaded to more than 1/4 rated capacity with a minimum of 200 lbs.
- E. Powder driven fasteners shall not be allowed for piping larger than 2", or for equipment. When used they shall not be loaded more than 1/8 rated capacity with a minimum of 200 lbs.
- F. All hangers, miscellaneous steel, braces, and supports shall be galvanized, cadmium plated, or painted with corrosion resistant primer and finish coat of epoxy enamel.
- G. Piping shall be supported from adjustable clevis type hangers with insulation pipe saddles as indicated in the piping system specification sections. Piping shall not support other piping.
- H. Support vertical piping and ductwork at floor levels. Piping shall have split rings. Ductwork shall have 1 1/2" angle iron frames.
- I. Provide and install lintels where required for mechanical work and not indicated on architectural or structural drawings.
- J. Furnish steel framing for roof openings and floor openings. Submit details for review.

### 3.04 SLEEVES

- A. All piping passing through floors or walls shall have sleeves unless holes are cored. Sleeves shall be 16 gage galvanized steel in non-bearing walls, 10 gage galvanized steel for bearing walls, and schedule 40 galvanized pipe in floors. Sleeves shall accommodate insulation. This shall not apply to sprinkler piping.
- B. Sleeves passing through foundation walls not exposed to interior spaces or sleeves passing through slab on grade may be schedule 40 PVC.
- C. Wall sleeves shall finish flush with wall.
- D. Floor sleeves shall extend 1 inch above floor.
- E. Sleeves in walls between interior spaces and unexcavated, exterior, crawl, or backfilled spaces shall be made watertight with "Link-Seal" modular wall and casing seal. Casing shall be schedule 40 galvanized pipe with anchor flange.

### 3.05 PLATES

- A. Furnish and install chrome plated plates wherever piping passes into finished areas.
- B. Plates shall be securely fastened to piping or building construction.
- C. Floor plates shall cover one inch floor extension.

### 3.06 OFFSETS, TRANSITIONS, MODIFICATIONS

- A. Furnish and install all offsets necessary to install the work and to provide clearance for the other trades.
- B. Maintain adequate headroom and clearance as directed by the A/E.
- C. Ductwork transitions necessary to accommodate available space or clearance requirements shall be contract requirements.
- D. Incidental modifications necessary to the installation of the systems shall be made as necessary and at the direction of the A/E.
- E. Rises and drops of piping systems shall be provided as required and where directed to allow for clearances to other construction. Drains shall be installed at no additional cost to the owner. The

contractor shall allow for such occurrences in his bid.

- F. Ductwork, piping, conduit, and equipment shall be so arranged as to not pass in front of windows, doors, access panels, access doors, coil removal or filter removal space or service clearance areas. Do not install within 3'-0" clearance of electrical panel fronts.

### 3.07 RECESSES

- A. Furnish information to the general contractor as to sizes and locations of recesses required to install panels, boxes, grilles, and other equipment or devices which are to be recessed into walls.
- B. Make offsets or modifications as required to suit final locations.

### 3.08 EQUIPMENT SETTING

- A. Furnish and install as a minimum, a 4" thick concrete pad beneath all floor mounted equipment in mechanical rooms, boiler rooms, or equipment rooms, or outside on grade. This shall not apply to residential installations of water heaters and air handling units or furnaces unless detailed on drawings or specified elsewhere.
- B. Furnish and install as a minimum, spring vibration isolators under any equipment 5 HP and over and rubber-in-shear vibration isolation under all equipment less than 5 HP. This shall apply to residential installations.
- C. Reinforce concrete with No. 4 rods 12" on centers both ways.
- D. Pad to have 3/4" dowels into concrete at 1 per 4 square feet.

### 3.09 LABELING

- A. All equipment, panels, controls, safety switches, and devices shall be provided with permanent black laminated white core labels with 3/8" letters.
- B. This shall also apply to all controllers, remote start/stop push buttons, equipment cabinets, and where directed by the A/E.
- C. This shall not apply to local room thermostats and light switches.

### 3.10 FLASHING AND COUNTERFLASHING

- A. Piping and conduit through the roof shall be flashed by the General Contractor. This contractor shall furnish counterflashing.
- B. Ductwork through the roof and roof mounted duct connected equipment shall be provided with prefabricated roof curbs. General contractor shall flash. This contractor shall counterflash.
- C. Structural dunnage for roof mounted equipment shall be flashed and counterflashed. Prefabricated roof curbs may be utilized.

### 3.11 ACCESS

- A. Locate all equipment, valves, devices, and controllers which may need service in accessible places.
- B. Where access is not available; access panels shall be provided. Furnish prime painted steel access doors to the General Contractor for installation.
- C. Access doors shall be 16 gauge frames and 22 gauge steel door. Access doors in fire rated walls shall have a "B" label for 1 ½ hours.
- D. Maintain clearances for tube removal, coil pulls, and filter removal.

### 3.12 WIRING

- A. Power wiring shall be provided by the Division 26 Electrical Contractor. This contractor shall furnish



all 3 phase starters, pushbuttons, and controllers necessary to operate the equipment. The Electrical Contractor shall store and install the electrical devices and furnish and install the power wiring.

- B. Control wiring shall be furnished and installed under Division 23 portion of the work. Wiring for controls is control wiring whether it is line voltage or low voltage.
- C. All wiring shall be in accordance with the NEC.
- D. Pushbuttons shall be maintain-contact type.
- E. Refer to the electrical specifications for wiring methods.
- F. Plenum rated cable is required for control wiring.

### 3.13 UTILITIES

- A. Do not interrupt any utility or service without adequate previous notice and scheduling with the owner.
- B. Refer to Division 1 for requirements for providing temporary utilities.

### 3.14 GUARANTEE

- A. All work shall be guaranteed to be free from defects for a period of one year of operation from date of acceptance by the owner unless otherwise specified. Material and labor for first year warranty is to be provided.
- B. Guarantee shall be extended for all non-operational periods due to failure within the guarantee period.
- C. Compressors and refrigeration system components shall be provided with a 5 year factory warranty. Material only for years 2 through 5 is required.

### 3.15 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver material and equipment in manufacturer's original cartons or on skids.
- B. Store material in dry enclosures or under protective coverings out of way of work progress.
- C. Handle so as to prevent damage to product or any surrounding material.

### 3.16 MANUFACTURERS' NAMES

- A. Manufacturers' names are included herein to establish those suppliers who may provide products for this project subject to the requirements of the specifications. Although a manufacturer's name may appear as an acceptable supplier it is not understood that a standard product is acceptable. Products must also meet the technical, performance, and physical requirements of the project as well as being named in the specification. Any deviations from this must be acknowledged at bid time by the supplier and he shall be solely responsible for any and all costs associated with the application of his product in the project.
- B. A design cannot be prepared which accommodates the installation of all suppliers and is not intended to do so. If certain modifications must be made to accommodate one particular supplier's equipment it shall be considered the contractor's responsibility to arrange for such accommodations and be financially responsible for same.

### 3.17 AS-BUILT DRAWINGS

- A. At the completion of the work the contractor shall furnish a reproducible as-built drawings to the A/E for approval. The drawings shall indicate all work installed and its actual size and location. If acceptable, the A/E will submit the as-built drawings to the owner as record drawings. If not acceptable, the A/E will return the drawing to the contractor to make corrections as required. The contractor will resubmit for approval.

- B. The as-built drawings shall indicate measured dimensions of underground lines and other concealed work.

### 3.18 PENETRATION SEALING

- A. All penetrations of Natatorium walls, fire walls, smoke walls, and floors by ducts, pipes, conduit, or wiring shall be sealed to prevent the flow of gasses or smoke.
- B. The sealant shall be foamed in place between the penetrant and the adjacent floor or wall with DOW Corning RTV foam or equivalent by 3M, Hilti, or Chase foam.
- C. The installation shall meet the approval of the authority having jurisdiction.
- D. Penetrations through rated surfaces shall have a UL rating equivalent to the adjacent surfaces.
- E. All other penetrations of walls either above ceilings or exposed shall be closely sealed around the penetration with caulking or packing to prevent flow of air or sound through the wall.

### 3.19 CUTTING AND PATCHING INTERIOR SURFACES

- A. Respective contractor shall install all hangers, supports, pipe sleeves in floors, walls, partitions, ceilings, and roof slabs as construction progresses to permit their work to be built into place and to eliminate unnecessary cutting of construction work.
- B. All cutting of concrete, or other material for the passage of piping and ductwork through floors, walls, partitions, and ceiling shall be done by the respective contractor where necessary to install his work. Respective contractor will close all such openings around piping, ductwork, and conduit with materials equivalent to that removed. All exposed surfaces shall be left in suitable condition for refinishing without further work.
- C. Contractor shall patch and repair any existing openings created by the demolition work in floors, walls, partitions, and ceilings not being reused for the new construction.

### 3.20 INVERTS AND ELEVATIONS

- A. Indicated inverts and elevations of existing utilities are approximate and based on the best information available.
- B. Upon award of contract, contractor shall verify in the field all such information and report any discrepancies before proceeding with work. Contractor shall be responsible for extra work caused by his failure to verify inverts and elevations.

### 3.21 CONNECTIONS TO EQUIPMENT FURNISHED BY OTHERS

- A. Furnish and install final connections to equipment furnished in other parts of the specification or furnished by the owner. Provide drainage connections, vent connections, water connections, fuel gas connections, duct connections, gas connections to the fixtures or equipment. Plumbing connections shall include valved supplies and trapped waste connections.

### 3.22 CONNECTIONS TO EXISTING SYSTEMS

- A. The contractor shall be responsible for connecting new systems to existing systems.
- B. Arrange for outages with the owner.
- C. Contractor shall shut down and drain existing systems.
- D. Contractor shall cut in, weld, solder, or thread, and make connections compatible with existing systems.
- E. Provide new valves at connections to existing systems.
- F. Contractor shall refill existing and fill new systems.
- G. Contractor shall purge air from systems, both new and existing.

- H. Contractor shall place existing systems back into operation.
- I. Contractor shall repair and replace any insulation damaged or removed during connection procedures.

### 3.23 COORDINATION DRAWINGS

- A. Provide 3/8" = 1'-0" scale drawings showing all coordinated ductwork, piping, conduit, and equipment of all trades.
- B. The sheet metal shop drawings may be used as the basis of these drawings.
- C. Show ductwork, walls, beams, steel, drainage piping, domestic water piping, HVAC piping, sprinkler piping, light fixtures, electrical conduit, and equipment.
- D. Contact other disciplines and obtain information to identify fully coordinated systems.
- E. Submit for review and approval to the A/E.
- F. Provide all dimensional data and necessary clearances to other trades for installation of fixtures and equipment within casework and counter tops.
- G. Work shall not proceed until coordination is completed and all conflicts, issues, sequences etc., are resolved.

### 3.24 WELDING

- A. All electric power for arc welding shall be supplied by the contractor performing the work.

### 3.25 VEHICLES

- A. Vehicle access to the site will be as directed by the owner.

### 3.26 RUBBISH DISPOSAL

- A. Burning of debris on the site shall not be permitted. All debris, refuse, and waste shall be removed from the premises at regular intervals. No accumulation shall be permitted.

### 3.27 PROTECTION

- A. Maintain all public walks and access ways.
- B. Erect and maintain barricades, warning signs, and other protective means as may be directed by the owner for protection of all persons and property from injury or damage.

### 3.28 SCAFFOLDING

- A. The contractor shall at his own expense, install, operate, protect, and maintain temporary services such as scaffolding, material hoists, access walks, etc., as may be required.

### 3.29 UTILITIES (Applies only to existing facilities)

- A. The contractor may use the existing water and electric power for temporary construction needs.
- B. The owner will direct where these services may be tapped.
- C. Those services that are used during construction, but are to remain, shall be refurbished to as new condition before turning back to the owner.

### 3.30 CLEANUP

- A. Remove all visible temporary tags or labels as well as any protective coverings and wrappings from

fixtures and equipment.

- B. Remove all spots, stains, soil, paint, spackle, and other foreign matter from all finished work.
- C. Clean and polish all plumbing fixtures.
- D. Remove all trash and debris from the premises.

### 3.31 MOUNTING HEIGHTS

- A. Contractor to coordinate all mounting heights with all trades and architect prior to rough-in.
- B. Maximum thermostat mounting height (top of thermostat) in accordance with ADA.
  - 1. Side reach: 48" A.F.F.
  - 2. Forward reach: 48" A.F.F.

### 3.32 WORK COMPLETION

- A. The contractor shall promptly correct work rejected by the engineer failing to conform to the requirements of the contract documents, whether discovered before or after substantial completion and whether or not fabricated, installed or completed. Costs of correcting such rejected work, including additional testing and inspections and compensation for the engineer's services and expenses made necessary thereby, shall be at the contractor's expense.

### 3.33 REQUEST FOR INFORMATION (RFI) REQUIREMENTS

- A. All RFI's shall include the following information based on AIA Document G716:
  - 1. To, From, Project Name, Issue Date, RFI number in sequential order with all other trades, Requested Reply Date.
  - 2. Provide a description with specification and/or drawing references.
  - 3. Provide the senders recommendation including cost and/or schedule considerations.
  - 4. Provide receiver's reply space.
  - 5. Note an RFI reply is not an authorization to proceed with the work involving additional cost/time.

### 3.34 SHOP DRAWING REQUIREMENTS

- A. The following is a list of required shop drawings for the project. Not all items may be identified, and it is the responsibility of the contractor to submit additional shop drawings where indicated in the specifications.

HVAC	DATE REC'D	ACTION	DATE REC'D	ACTION
COORDINATION DRAWINGS				
PUMPS				
PUMP BASES				
PIPING FLEX CONNECTION				
SUCTION DIFFUSER				
TRIPLE DUTY VALVE				
AIR SEPARATOR				

<b>HVAC</b>	<b>DATE REC'D</b>	<b>ACTION</b>	<b>DATE REC'D</b>	<b>ACTION</b>
EXPANSION TANK				
GAUGES				
THERMOMETERS				
AUTOMATIC CONTROL VALVES				
VALVES - ALL TYPES				
STRAINERS				
CHECK VALVES				
PRESSURE REDUCING VALVE				
PIPING				
VIBRATION ISOLATION				
INSULATION A. Piping B. Ductwork C. Equipment				
SHEET METAL DRAWINGS				
UNIT HEATERS (HW)				
CONVECTORS (HW)				
FAN COIL UNITS				
FANS				
SPLIT SYSTEMS				
FIRE DAMPERS/RADIANT DAMPERS				
VOLUME DAMPERS				
GRILLES, REGISTERS, DIFFUSERS				
LOUVERS				
AUTOMATIC TEMPERATURE CONTROL A. DEVICES B. WIRING DIAGRAMS C. SEQUENCES				
TEST, BALANCE AND ADJUST REPORT				
AS-BUILT DRAWINGS				
WARRANTIES AND GUARANTEES				

<b>HVAC</b>	<b>DATE REC'D</b>	<b>ACTION</b>	<b>DATE REC'D</b>	<b>ACTION</b>
OPERATIONS AND MAINTENANCE MANUALS				
INSTRUCTIONS				

END OF SECTION