

SECTION 230500 - COMMON WORK RESULTS FOR HVAC

PART 1-GENERAL

1.1 SECTION INCLUDES

- A. Pipe and pipefittings.
- B. Dielectric fittings.
- C. N/A
- D. Piping specialties.
- E. Lintels
- F. Installation requirements common to piping systems and specification sections.
- G. Installation requirements common to equipment specification sections.
- H. Testing and repair.
- I. Final completion.
- J. Coordinating drawings
- K. Record drawings.
- L. Maintenance and operating manuals.
- M. Lubrication and packing.
- N. Training

1.2 SUBMITTALS

- A. Submit shop drawings and product data per applicable Division I Specification.
- B. Submittal data is required for dielectric fittings, flexible connectors, mechanical sleeve seals, and piping specialties.

1.3 QUALITY ASSURANCE

- A. Any manufacturer other than basis of design shall be responsible for any additional requirements for electrical service, physical space limitations, and capacities at no additional cost to the project.
- B. Materials and installation shall comply with requirements of governing regulations and controlling agencies.

- C. All materials used shall be finest grade of their kind and shall be new and in first-class condition when installed.
- D. Work done by the Contractor shall include the services of an experienced superintendent.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Piping and tubing shall include factory-applied end caps.
- B. All piping and tubing shall be elevated from grade for on site storage.
- C. Protect flanges, fittings, and piping specialties from moisture and dirt.
- D. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.5 SEQUENCING AND SCHEDULING

- A. Coordinate mechanical equipment installation with other building components.
- B. Arrange for pipe spaces, chases, slots, and openings in the building structure during progress of construction.
- C. Coordinate installation sleeves and supporting devices with concrete and structural components.
- D. Coordinate connection of mechanical systems with underground and overhead utilities and services.
- E. Coordinate requirements for access panels and doors.
- F. Coordinate installation of identifying devices.

1.6 PROJECT CONDITIONS

- A. Mechanical support shall only be permitted at steel joist panel points.
- B. Any supplemental steel required for support between building structural members or for the reinforcement at roof openings shall be the responsibility of the Mechanical Contractor, and shall be coordinated with the G.C.
- C. All trades shall note areas of the project that utilize the ceiling area as a return air plenum. All material, cables, piping, etc. shall be suitable for plenum installations.

1.7 WARRANTY

- A. Contractor shall warranty entire systems and equipment for a period of one (1) year unless noted otherwise in other sections.

PART 2-PRODUCTS**2.1 PIPE AND PIPE FITTINGS**

- A. Pipe threads shall meet ASME B1.20.1 for factory-threaded pipe and pipe fittings.
- B. Pipe-flange gasket materials shall meet ASME B16.21, nonmetallic, flat, asbestos-free.
- C. Pipe Flanges
 - 1. Full face shall be Class 125, cast iron and cast-bronze material.
 - 2. Narrow face shall be Class 250, cast-iron and cast steel material.
- D. Flange bolts and nuts shall meet ASME B18.2.1.
- E. Solder filler materials shall meet ASTM B 32.
 - 1. Alloy Sn95 and Sn94 shall be used.
- F. Brazing filler materials shall meet AWS A5.8.
- G. Welding filler metals shall comply with AWS D10.12.
- H. Solvent materials shall meet standard solvent cement requirements.
 - 1. CPVC piping shall meet ASTM F 493.
 - 2. PVC piping shall meet ASTM D 2564. Include primer according to ASTM F 656.
 - 3. Plastic pipe seals shall meet ASTM F 477
 - 4. Flanged, ductile-iron gasket, bolts, and nuts shall meet AWWA C 110.

2.2 DIELECTRIC FITTINGS

- A. Fittings shall be zinc plated with a thermoplastic liner, rated for 250 degrees F maximum.

2.3 N/A**2.4 PIPING SPECIALTIES**

- A. Piping sleeves shall be constructed of galvanized sheet metal or steel pipe. Steel pipe shall meet requirements of ASTM A 53, Type E, Grade A, Schedule 40. Sleeves for copper piping shall be of compatible material to prevent interaction of piping materials.
- B. Escutcheons shall be manufactured wall, ceiling, and floor plates, split-type, and of heavy chrome-plated construction.

2.5 LINTELS

- A. All Lintels associated with HVAC work shall be furnished and installed by Mechanical Contractor. Mechanical Contractor shall coordinate all opening requirements with the information provided on the Structural drawings, see "Lintel Size & Details".

2.6 FIRESTOPPING

- A. Firestop all HVAC/mechanical work as required for the project, refer to section 23 05 30.

PART 3-EXECUTION

3.1 MECHANICAL/PIPING SYSTEMS - COMMON REQUIREMENTS

- A. Division 23 piping/ductwork sections specify unique installation requirements.
- B. Install components with pressure rating equal to or greater than system operating pressure.
- C. Install all piping and ductwork at right angles or parallel to the building walls. Diagonal runs are prohibited.
- D. Install piping and ductwork tight to slabs, beams, joists, columns, walls, and other building elements. Allow sufficient space above removable ceiling panels to allow for panel removal.
- E. Install all piping specialties to meet manufacturers requirements.
- F. Install pipe sleeves at all wall penetrations.
 - 1. PVC pipe sleeves are not permitted.
 - 2. Do not install sleeves through structural members.
- G. Maintain fire rating at fire wall penetrations through the use of approved fire sealant materials installed in pipe sleeve.
- H. Install unions in piping 2 inch and smaller at final connection to each piece of equipment.
- I. Install flanges in piping 2-1/2 inch and larger adjacent to flanged valves and at final connections to equipment with flanged pipe connections.
- J. Valves shall never be installed with stems in less than horizontal position.

3.2 INSTALLATION REQUIREMENTS

- A. Contractor shall be governed by the Architectural, Mechanical, Electrical and Structural drawings, as well as drawings associated trades, in the installation of HVAC work. The location of the piping, equipment, ducts, etc. on the drawings is diagrammatic; indicated positions shall be subject to building construction and interferences with electrical work. Should difficulties prevent the installation of any part of the work as indicated, such shall be called to the attention of the Architect, who will determine locations and changes, and the Contractor shall install the work accordingly. The Architect reserves the right to make minor changes in the location of any part of the work up to the time of roughing-in without additional cost.
- B. Coordinate work to avoid interference of work indicated and to secure maximum headroom. Particular attention is directed to spaces such as Mechanical Equipment Rooms. Furnish complete, in place, all necessary offsets in piping, ducts, etc., as close as possible to ceilings, walls, columns, etc., so as to take up minimum amount of space.

Furnish and install all offsets, fittings, etc., required without additional expense to the Owner.

- C. All piping, ducts, etc. located in pipe spaces must be located to insure maximum accessibility. Where necessary to cross pipe spaces, crossings must be made near the floor or 6 ft. or more above floor.
- D. The specifications indicate special conditions to be adhered to in making the installation of all equipment; however, the Contractor shall also follow the specific instructions and directions furnished by the equipment manufacturer for the proper installation and connection of all individual equipment.
- E. All equipment shall be installed with full consideration of future maintenance. Equipment, which is installed such that it cannot be readily accessible for repair or maintenance shall be removed and installed correctly as the Architect, may direct to facilitate servicing.
- F. If equipment, other than that which the drawings were designed around, does not properly adapt itself to space allotted or lend itself readily accessible for repair or maintenance, this Contractor is responsible to provide additional access panels, pipe fittings, ductwork, etc. to insure same end results.
- G. Contractor shall take all measurements and determine all elevations at the building.
- H. In all cases where a device or part of the equipment is herein to in the singular number (such as diffuser), it is intended that such items as are required to complete the installing.
- J. Install equipment to facilitate service, maintenance, and repair or replacement of components.
- K. Maintain lubrication gaskets and packing during construction and assure that at time of acceptance by the Owner, equipment is in first-class operating condition.

3.3 TESTING AND REPAIR

- A. All piping and ductwork systems shall be thoroughly cleaned and flushed prior to final testing.
- B. Supply, return, and exhaust air ductwork systems shall be pressure tested to a minimum leakage rate as defined by the in-force edition of ASHRAE 90.1.
- C. Pressure testing shall be completed for the following piping systems:
 - 1. Heating water and chilled water.
 - 2. Refrigerant piping
- D. All testing must be witnessed and accurately recorded noting methods of testing, times, dates, and results.
- E. Any damage as a result of tests shall be repaired or damaged materials replaced at no cost to the Owner.

3.4 FINAL COMPLETION

- A. All work shall be cleaned prior to issuance of Substantial Completion.
- B. Retouch or repaint factory painted prime and finish coats where scratched or damaged.
- C. Deliver filters, belts, and equipment, as required by this Specification, to Owner and obtained signed receipts of delivery.
- D. Clean equipment, restore damaged materials, and leave the Work in acceptable condition.
- E. Remove all site tools, equipment, surplus materials and rubbish continuously at no additional cost to the Owner.
- F. Contractor shall submit written certificates warranting each item of equipment.

3.5 COORDINATION DRAWINGS

- A. Preparation of and coordination of the coordination drawings shall be the responsibility of the Prime HVAC contractor as follows:
 - 1. The HVAC Prime contractor shall do the coordination with all other sub trades to distribute and transfer the interim coordination CAD files, supervise the adjustments to each trade and provide the final set of coordinated drawings.
 - 2. Prime and each (General Trades) sub-contractor (Sheet-Metal, Piping, Plumbing and Fire protection) shall prepare his installation drawing. He shall then review all conflicts and coordinate with other trades to make proper adjustments for his work.
 - 3. Following final coordination each contractor shall provide his REVIT or CAD drawings to the HVAC contractor to produce a “working” set for the field and the owner.
- B. Prepare coordination drawings at a scale not less than 1/4” – 1’-0” and submit them to Architect. Coordination drawings shall be produced by CAD based software on “AutoCAD” vs. 2002 or higher or REVIT (BIM). Prepare and deliver one set of electronic media of the coordination drawings for owner’s use.
- C. Coordination drawings to show relation of all items of heating, ventilating and air conditioning equipment, ductwork and piping, plumbing equipment and piping and Fire Protection. Also, to be shown are such items of electrical systems which affect location of heating, ventilating, air conditioning and plumbing equipment, piping, ductwork and air outlets. Show existing items affecting new installation at remodeled areas.
- D. Provide coordinated set of wiring diagrams for motors, equipment items and temperature control, showing line diagrams, power diagrams and terminal connections to ensure proper operation of mechanical systems and to conform to system operation specified. Include provisions to accommodate equipment which is specified as acceptable equipment manufacturer but is not specified as base of design, so that if the other equipment is accepted, there will be no change in the Contract Sum.
- E. Secure approval of coordination drawings from other trades affected, prior to submittal to

architect. Each trade must indicate acceptance of illustrated conditions by attaching his endorsement to each drawing.

- F. Contractors for other trades (Acoustical Ceiling, Electrical, etc.) will provide Mechanical Contractor with necessary and sufficient information and/or drawings as required and/or as requested by Mechanical Contractor to permit development of coordination drawings. This information shall include but is not limited to the following:
 - 1. Framing and suspension details for ceilings.
 - 2. Location and size of electrical pull boxes, conduit, bus ducts, lighting fixtures, etc.
- G. Issue copies of coordination drawings through General Contractor to all other contractors concerned and obtain their agreement and approval prior to submittal to Architect.
- H. Proceed with installation only after review and approval by other trades affected.

3.6 RECORD DRAWINGS

- A. The Contractor shall keep a running record of each change and deviation from the Drawings on a clean and undamaged set of Drawings.
- B. The final Project Record Drawings shall be submitted to the Architect for approval at the completion of the project.
- C. Record Drawings shall include the location of concealed piping, ductwork, valves and dampers.

3.7 MAINTENANCE AND OPERATING MANUALS

- A. The Maintenance and Operating Manuals shall comply with other Sections of this Specification. Submit in triplicate for inclusion in Maintenance and Operating Manuals.

3.8 TRAINING

- A. Startup and training to be provided by a factory-trained service technician for the required amount of hours per the individual specification. A minimum of four (4) hours shall be required where not specified. These hours of training are to be "bankable hours" used within one full warranty year.
- B. All training and start-up shall be videotaped with a professional videographer and present the required number of copies per the individual specification of the training on DVD format to the Construction Manager within one (1) week of the training session. This DVD will be provided to the owner.

END OF SECTION 230500

THIS PAGE IS INTENTIONALLY LEFT BLANK