

SECTION 15015

HEATING, VENTILATING, AND AIR CONDITIONING: GENERAL

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Division 15000 pertains to Heating, Ventilating and Air Conditioning (HVAC) and Plumbing work. This section applies to and governs all Division 15000 HVAC sections.
- B. Refer to other Divisions for continuation of exterior and allied work.
- C. Field painting is specified in Division 9.

1.2 PERMITS, FEES, CODES, ORDINANCES AND REGULATIONS

- A. Obtain and pay for all permits, inspections, and connection fees required by governing bodies in connection with the work. Deliver Certificates of Inspection to the Architect.
- B. All work shall comply with governing codes, ordinances, and regulations of City, County and State having jurisdiction.

1.3 QUALITY ASSURANCE

- A. Industry Standards and Codes: Unless modified by these specifications, the design, manufacture, testing and method of installing all materials, apparatus and equipment shall conform to the following:
 - 1. ASME Code for Unfired Pressure Vessels
 - 2. ARI Code for Refrigeration Apparatus
 - 3. ANSI B9.1 Safety Code for Mechanical Refrigeration
 - 4. Standards of National Fire Protection Association
- B. Substitutions: See General Conditions.

1.4 SUBMITTALS

- A. Shop Drawings: Submit on all materials, products, equipment and systems as specified under each HVAC Section in this Division in accordance with the General Conditions.

- B. Product Data: Submit on all materials, products and equipment unless otherwise specified or acknowledged in writing.
 - C. Samples: Submit when specified or requested.
 - D. Test and Balance Report: Submit preliminary report upon substantial completion, final report at final inspection.
 - E. Control Manufacturer Certification: Submit at Final Inspection.
 - F. Operation and Maintenance Manuals: Upon completion of the job submit copies in compliance with Section 15010.
 - G. Shop Drawings and Manufacturer's Data for Heating, Ventilating and Air Conditioning submitted for approval shall follow the General Requirements. In addition, all such data submitted for approval shall be submitted in a single package, bound and indexed, with all data type written.
- 1.5 JOB CONDITIONS:** Protect materials, apparatus and equipment from damage, moisture, dirt, debris and work of other trades. Use of paper, cardboard or other flimsy material for protection will not be permitted. Replace damaged protective materials immediately. Do not install damaged materials and equipment; remove from site.
- 1.6 RECORD DOCUMENTS:** Refer to General Conditions and Division 1 for requirements concerning record documents. Furnish Architect with one set of neatly, accurately marked reproducible copies of the drawings, indicating all changes from the contract drawings and all HVAC work and controls as installed.
- 1.7 GUARANTEE AND SERVICE**
- A. Refer to General Conditions for Guarantee.
 - B. Where extended Guarantees are called for herein, furnish three copies to be inserted in Operation and Maintenance Manuals.
 - C. All preventative maintenance and normal service will be performed by the Owner's maintenance personnel after final acceptance of the work. This shall not alter the Contractor's guarantee of the work in any way.

PART 2 - PRODUCTS

2.1 GENERAL:

- A. All materials and equipment shall be new. Systems shall be provided complete, and each system as a whole, and in all its parts, shall function correctly up to the specified capacity. Should a system, or any part thereof

- fail to meet performance requirements, necessary replacements, alterations or repairs, as required by the Architect, shall be made to bring performance up to specified requirements and all building construction and finishes damaged or marred by such replacements, alterations and repairs shall be restored to prior condition, at no additional cost to the Owner.
- B. Where multiple items of equipment or materials are required, they shall be the product of a single manufacturer.
 - C. Before ordering any equipment, the size of all equipment shall be checked to easily fit spaces allotted on the drawings, allowing adequate space for maintenance.
 - D. Inserts, pipe sleeves, supports and anchorage of air conditioning equipment shall be provided as required and as specified herein. Where such items are to be set or embedded in concrete, masonry or similar work, the items shall be furnished and layout made at the proper time for the setting or embedment thereof so as to cause no delay in the work.
 - E. Piping assemblies of equipment shown on the drawings are diagrammatic. All piping and appurtenances required for the proper installation and operation of all equipment shall be provided.

2.2 MANUFACTURER'S NAMES AND CATALOG NUMBERS

- A. Specific references have been made to one or more manufacturer's names and model or catalog numbers. This does not indicate that the material and equipment specified is necessarily an "off the shelf" item; requirements for specific finishes, materials or other modifications may introduce variances from manufacturer's standards. Contractor shall ascertain that such modifications are fully considered.

2.3 DIAGRAMS, NAMEPLATES AND LABELS

- A. Each major component of equipment shall have the manufacturer's name, address and catalog number of a plate securely affixed in a conspicuous place. The nameplate of a distributing agent will not be accepted.
- B. In all areas having equipment, valves and control devices, provide single line diagrams framed under glass and mounted on equipment room wall. Diagrams shall give name, number designation, and location of each piece of equipment, valve, and control device.
- C. All pieces of equipment, valves, starters, disconnects, and all pneumatic and electrical control instruments and apparatus shall be identified with 1/16 inch thick black laminated plastic nameplates with 3/16" high white laminated letters corresponding to the nomenclature in paragraph b above. Similar equipment shall be designated with numerical suffix (example: THERMOSTAT, T-1). The nameplate identification shall coincide with items appearing on diagrams.
- D. All labels shall be securely affixed.

2.4 PAINTING AND IDENTIFICATION OF PIPING

- A. Identify all piping with appropriate piping identification markers, as required by ANSI standard A13.1, latest addition, except as indicated herein.
- B. Provide directional arrows when appropriate, indicating direction of flow.
- C. Piping markers shall be installed to pipe at minimum 20 foot intervals, with directional arrows at all branches and markers. Piping may be stenciled paint or proprietary pipe markers. Titles shall be on block letters, sized as follows:

<i>Diameter (Inches)</i>	<i>Length x Width (Inches)</i>	<i>Height (Inches)</i>
3/4 to 1	3 x 1-1/2	1/2
1-1/2 to 3	6 x 1	3/4
4 to 8	12 x 2	1-1/4

- D. All piping shall be identified, and shall include but not be limited to chill water, chill water return, domestic hot water, domestic hot water return, cold water, sprinkler water, sewer, storm drainage.
- E. Paint all interior and exterior piping above grade, not in concealed spaces, not insulated, not in mechanical rooms as per Division 9.

PART 3 - EXECUTION

3.1 INSTALLATION AND WORKMANSHIP

- A. The work shall be performed by qualified mechanics and all materials, apparatus and equipment shall be installed in neat, workmanlike manner. Any material, apparatus or equipment which, in the opinion of the Architect, is improperly installed shall be removed and re-installed in an approved manner at no additional cost to the Owner.
- B. The work shall be coordinated with the work of other trades. Where the work is dependent upon work of other trades or work already in place, such other work and work in place shall be examined and shall be in proper condition and state of completion before continuing the installation.
- C. The installation of the systems shall, in general, be in accordance with the drawings with regards to location of equipment, ducts, pipes, and the like. Piping and ductwork indicated shall be followed as accurately as actual construction will permit and any deviations therefrom shall be called to the attention of the Architect. Where necessary, make deviations from the plans as required to accommodate field conditions. This may involve rerouting of pipe,

changing the aspect of duct, reorientation of equipment. Where such changes are required, these will be done at no additional cost to the Owner. Where necessary, as determined by the Architect, Contractor shall furnish drawings showing proposed changes.

3.2 CUTTING AND PATCHING

- A. Layout openings for cutting by other trades as required.
- B. Cutting of steel, concrete, timber, or any other structural part must be approved in writing by Architect prior to cutting.
- C. Equipment locations may be shown without indication of how clearance is provided to access or install such equipment. It shall be the Contractors responsibility to locate such equipment at the locations indicated on the drawings, and perform the necessary coordination, cutting and patching, assembly and disassembly as required to install the equipment in the location indicated. This work shall be considered in the scope of work, and provided without additional cost to the Owner.

3.3 WATERPROOFING: Do not cut or penetrate waterproofed surfaces, or waterproofing membranes, without first making arrangements for repair by a method approved by the Architect.

3.4 ELECTRICAL WORK

- A. Power wiring from panels to motor controllers and from controllers to motors is specified in Division 16.
- B. Submit wiring diagrams for approval and provide approved diagrams so that the electrical work may be properly accomplished.
- C. Electrical control wiring for connection of temperature controllers, push buttons, interlocks in motor controllers, pneumatic switches and like items is specified in the control section in this Division.
- D. Furnish all equipment with complete internal control wiring.
- E. Electrical work specified in this Division shall conform to applicable provisions of Division 16. All control wiring shall be in conduit, unless specified otherwise in other sections of this specification. Control wiring may be installed without conduit above accessible ceilings, and in control panels and NEMA enclosures where allowed by prevailing codes.
- F. Provide motors conforming to characteristics shown on electrical drawings. All electrical motors shall be high efficiency type. When used with inverter drives, insulation class F shall be used.

3.5 SUPPORTS FOR PIPING AND EQUIPMENT: Shall be supported from structural members with an approved anchoring system. Consult structural engineer prior to supporting any heavy equipment from structural members, and obtain necessary details if not indicated in the documents.

3.6 ACCESS DOORS (ACCESS PANELS)

- A. Provide access required for maintenance, adjustment, removal and repair of valves, controls, dampers, equipment and like items furnished hereunder.
- B. Provide access doors conforming to requirements. Panels shall be located to make all items easily accessible. Unless otherwise indicated, access doors shall be 18 ga. steel, with hinged doors, and keyed locking device. Doors shall be of a design suitable for the surface upon which they are installed, and shall maintain the fire rating and insulating values of the members which they are installed.

3.7 SLEEVES, ESCUTCHEONS, AND PIPE PENETRATIONS

- A. Provide sleeves at all wall and floor penetrations as follows:
 - 1. Ordinary partitions and non-rated smoke partitions, provide 20 gage galvanized sheet metal sleeve completely penetrating the wall, one pipe size larger than the O.D. of the pipe or pipe insulation. Pack annular space with a listed fire stop foam, Dow Corning FS 2000 or equal, to prevent the spread of smoke on smoke partitions.
 - 2. Rated partitions, provide listed fire stopping system, Dow Corning, or equal, in accordance with the type of wall and rating required, as per details in Dow Corning Fire Stop System Installation and Estimating Guide, latest edition.
 - 3. Masonry walls, provide schedule 40 sleeve completely penetrating the wall, one pipe size larger than the o.d. of the pipe or pipe insulation. Grout exterior annular space. Firestop as per paragraph 2, if wall is rated.
 - 4. Floors, provide schedule 40 sleeve completely penetrating the floor, one pipe size larger than the O.D. of the pipe or pipe insulation. Extend pipe 1/2" above floor. Grout exterior annular space. Fire stop as per paragraph 2.
 - 5. Provide chrome plated escutcheons in all finished areas at all pipe penetrations of walls, floors, or ceilings.

3.8 FINAL INSPECTION

- A. With notice to the Architect that the work is ready for final inspection, the Contractor shall:
 - 1. Submit final test and balance report and complete requirements as noted.

2. Submit letter from Contractor certifying that controls have been checked for operation and calibration and that system is operating as intended.
 3. Submit letter indicating that the Contractor has checked all mechanical systems, and that they are properly functioning.
 4. Complete and approved operation and maintenance manuals.
- B. Please be aware that final inspection will not take place until these documents are furnished to the Architect.
- C. Contractor shall furnish necessary mechanics to operate system, make necessary adjustments and assist with final inspection. Be prepared to operate all mechanical equipment at this time.

3.9 INSTRUCTION OF OWNER'S OPERATING PERSONNEL

- A. The Contractor shall include the cost of the services of qualified instructor(s) to instruct the Owner's operating personnel in the operation, adjustments, care and maintenance of all HVAC equipment and systems.
- B. Instruction shall be performed at a time approved by the Owner after all HVAC equipment and systems are installed, complete, adjusted and operating to specified requirements. Contractor shall notify the Architect when instructions will be given.
- C. Qualification of instructor(s) shall be subject to approval of the Owner and equipment manufacturer.
- D. Additional requirements concerning operation and maintenance of mechanical equipment and systems may be specified in other sections.
- E. Two copies of acknowledgment of all required instructions to Owner's operating personnel, signed by the Owner or his authorized representative, shall be submitted to the Architect prior to submitting application for final payment.

END OF SECTION