

## **23 00 00 – HEATING, VENTILATING & AIR-CONDITIONING**

The following is the HVAC outline specifications, which defines the scope of work of the HVAC system.

### **PART 1 – GENERAL**

#### **1.1 CODES**

- A. All work installed under the HVAC Section shall comply with the Town of Cohasset Building Code and all state, county, and federal codes, laws, statutes, and authorities having jurisdiction.

#### **1.2 DESIGN INTENT AND SYSTEM DESCRIPTION**

- A. The work of this Section is shown on the drawings. All work is new and consists of furnishing all materials, equipment, labor, transportation, facilities, and all operations and adjustments required for the complete and operating installation of the Heating, Ventilating and Air Conditioning work and all items incidental thereto, including commissioning and testing.
- B. Capacities of systems and equipment are indicated in the attached HVAC system narrative and/or as indicated on schematic drawings.

### **PART 2 - PRODUCTS**

#### **2.1 GENERAL**

- A. Materials and equipment furnished under this section shall be new, unused, first quality of a manufacturer of established reputation.

#### **2.2 PIPING AND FITTINGS**

- A. Hydronic piping shall be Schedule 40 ASTM A-53, black steel pipe with butt welded ends and fittings on 3" and above and threaded ends and fittings on 2-1/2" and smaller. At the contractor option type "L" copper may be used on all 2-1/2" and smaller. Use of mechanical coupling piping systems, equal to Victaulic is acceptable for piping 2 – 1/2" and larger and the use of Pro-press or equal piping system is acceptable for piping under 2-1/2" in size.
- B. Refrigerant Piping:
  - 1. General: Provide piping materials and factory-fabricated piping products of sizes, types, pressure ratings, temperature ratings, and capacities as indicated. Where not indicated, provide proper selection as determined by Installer to comply with installation requirements. Provide materials and products complying with ANSI B31.5 Code for refrigeration piping where applicable, base pressure rating on refrigerant piping system maximum design pressures. Provide sizes and types matching piping and equipment connections; provide fittings of materials which match pipe materials used in refrigerant piping systems. Where more than one type of materials and products are indicated, selection is Installer's option.
  - 2. Material: Provide pipes and pipe fittings in accordance with the following listing:  
Tube Size 4-1/8" and Smaller: Copper tube; Type ACR, hard-drawn temper; wrought-copper, solder-joint fittings; brazed joints.

3. Soldered Joints: Solder joints using silver-lead solder, ASTM B32, Grade 96 TS.
4. Brazed Joints: Braze joints using American Welding Society (AWS) classification BCUO-4 for brazing filler metal.
5. Piping Specialties: Provide piping specialties complying with Division-23 "Hydronic Piping" in accordance with the following listing:
  - a. Pipe escutcheons.
  - b. Drip pans.
  - c. Sleeves.
  - d. Sleeve seals.

### 2.3 VALVES

- A. All valves shall be bronze, brass, or cast iron as system design requires. Locate all valves so as to isolate all parts of the system and as required for normal system operation.
  1. Available Manufacturers: Subject to compliance with the requirements of the contract documents provide valves of the following manufacturer:
    - a. Milwaukee
    - b. Stockham
    - c. Nibco

### 2.4 SYSTEM IDENTIFICATION

- A. Provide markers on all piping and equipment. Tag all valves in system with corresponding valve lists.

### 2.5 INSULATION

- A. All hot water piping shall be insulated with snap-on fiberglass insulation with all service jacket. Fittings shall be insulated with snap on pre-molded covers with loose fill fiberglass insulation. All refrigerant piping shall be insulated with 1" closed cell foam insulation with vapor barrier.
- B. All AC supply ductwork shall be insulated with 1-1/2" thick fiberglass blanket with a foil vapor barrier. All outside air intake ductwork shall be insulated with 2" rigid fiberglass with foil vapor barrier.

### 2.6 FIN TUBE RADIATION AND RADIANT HEATING PANELS

- A. Commercial slope top fin-tube with steel tube and steel fin. Cover shall be 14 ga. with baked enamel factory finish. All units shall be provided with full backplate, damper, end covers, and splice pieces for a complete installation.
  1. Available Manufacturers: Subject to compliance with the requirements of the contract documents provide fin-tube radiation of the following manufacturer:
    - a. Sterling
    - b. Vulcan
    - c. Ritling

B. Radiant Heating Panels:

1. Radiant heating panels shall be designed to create natural convection to heat the conditioned space. Units shall be designed for ceiling installation with factory supplied trim. Contractor shall provide all hanger supports.
2. Available Manufacturers: Subject to compliance with requirements, provide radiant heating panels of one of the following:
  - a. TWA
  - b. Sterling
  - c. Rittling
  - d. Or equal

2.7 UNIT HEATERS

A. Horizontal or cabinet type with exact location to be determined. All units shall be provided with fan and aquastat control.

1. Available Manufacturers: Subject to compliance with the requirements of the contract documents provide unit heaters of the following manufacturer:
  - a. Trane
  - b. Sterling
  - c. Ritling

2.8 HYDRONIC COILS

A. General: Provide coils of size and in location indicated, and of capacities and having performance data as scheduled. Certify coil capacities, pressure drops, and selection procedures in accordance with ARI 410.

1. Manufacturer: Subject to compliance with requirements, provide coils of one of the following:
  - a. McQuay Inc.
  - b. Trane (The) Co.
  - c. Greenheck
  - d. Precision Coil

2.9 PUMPS & ACCESSORIES

A. Base mounted bronze fitted with high efficiency electric motor. Provide primary and stand-by pump for each system with manual alternator and pilot lights.

1. Available Manufacturers: Subject to compliance with the contract documents provide pumps of the following manufacturer:
  - a. Bell & Gossett
  - b. Taco
  - c. Armstrong

- B. Provide expansion tanks, air separators, end-suction diffusers as manufactured by:
  - 1. Bell & Gossett
  - 2. Taco
  - 3. Armstrong

#### 2.10 BOILERS

- A. High efficiency gas fired condensing hot water boiler.
- B. Power burners shall be fully modulating (min 5:1 turndown).
- C. Provide complete boiler exhaust venting and combustion air intake system.
- D. Boiler venting shall be provided by Div 22 00 00.
- E. Provide boiler neutralization tunes and associated piping. Provide all code required boiler safeties and controls.
- F. Manufacturer: Subject to compliance with the above, provide high efficiency gas fired condensing boiler of one of the following:
  - 1. Viessmann
  - 2. Burderus
  - 3. Lochinvar

#### 2.11 ROOFTOP AIR HANDLING UNITS (HVAC 100% O.A.)

- A. All units shall be of the draw thru 100% outdoor air design and shall be provided with direct expansion cooling coil, hot water heating coil, energy recovery wheel with VFD, filters (MERV-13), dampers, and centrifugal supply and return air fan with motor.
  - 1. Available Manufacturers: Subject to compliance with the requirements of the contract documents provide rooftop air handling units of the following manufacturer:
    - a. Greenheck
    - b. Aaon
    - c. Innovent/Valent

#### 2.12 AIR HANDLING UNITS (HVAC Recirculation)

- A. All units shall be of the draw thru type provided with direct expansion cooling coil, filters (MERV-13), hot water heating, energy recovery wheel with VFD, dampers, and centrifugal supply and return air fan with motor.
  - 1. Available Manufacturers: Subject to compliance with the requirements of the contract documents provide air handling units of the following manufacturer:
    - a. Greenheck
    - b. Haakon
    - c. Aaon

## 2.13 VARIABLE REFRIGERANT FLOW (VRF) SYSTEM

- A. The basis of design Heat Recovery Variable Refrigerant Flow system is a three pipe system consisting of a single or multiple outdoor units, multiple indoor units of various types and capacities, multiple zone control boxes, individual or central indoor unit controls with on/off temperature settings, all connected by fully insulated refrigerant lines utilizing factory supplied, fully insulated, branching kits. Indoor units are connected to condensate piping that shall be terminated to the nearest drain point. The system shall be fully capable of simultaneous heating and cooling operation as requested by the individual indoor zones that can consist of single or multiple indoor units.
1. Manufacturer: Subject to compliance with requirements, provide variable refrigerant flow (VRF) system of one of the following:
    - a. Mitsubishi
    - b. LG
    - c. Toshiba/Carrier
    - d. Or Equal

## 2.14 DUCTWORK

- A. All ductwork shall be galvanized steel with all seams sealed. Entire ductwork system shall be fabricated and installed per SMACNA LOW PRESSURE DUCT CONSTRUCTION STANDARDS.

## 2.15 DIFFUSERS REGISTERS GRILLES

- A. All devices shall be steel welded construction with diffusing vanes and baked enamel finish.
1. Available Manufacturers: Subject to compliance with the requirements of the contract documents provide diffusers, registers, and grilles of the following manufacturer:
    - a. Tuttle & Bailey (RC)
    - b. Price
    - c. Nailor Industries (vaned)
    - d. Metalaire (IV)

## 2.16 EXHAUST FANS

- A. Roof mounted exhaust fans shall be galvanized steel construction with centrifugal fan and belt drive motor. Each roof unit shall be provided with 18" high pre-fab curb with motor operated damper in curb. Inline roof fans shall be provided as shown on the drawings or as indicated in the narrative.
1. Available Manufacturers: Subject to compliance with the requirements of the contract documents provide exhaust fans of the following manufacturer:
    - a. Greenheck
    - b. Cook
    - c. Twin City

## 2.17 AUTOMATIC TEMPERATURE CONTROLS

- A. System shall be a direct digital control and building energy management system to provide complete automatic temperature control and monitoring of newly installed HVAC system.
  - 1. Available Manufacturers: Subject to compliance with the requirements of the contract documents provide automatic temperature controls of the following manufacturer:
    - a. Honeywell
    - b. Johnson Controls
    - c. Delta
    - d. Or equal

## PART 3 - EXECUTION

### 3.1 WORKMANSHIP AND INSTALLATION METHODS

- A. All work shall be installed in a first-class manner consistent with the best current practices.
  - 1. All piping shall be installed with slope for proper drainage shall be grouped together, and be parallel to each other. Utilize gang hangers wherever feasible. Group all valves together where feasible.

### 3.2 CLEANING AND PROTECTION

- A. Protect all materials and equipment during shipment and installation, and properly handle and store at the job site so as to prevent damage, and upon completion of this work, clean all fixtures and equipment and replace damaged parts.

### 3.3 SLEEVES AND ESCUTCHEONS

- A. Furnish and install in masonry walls and floors, galvanized steel sleeves as required. Provide escutcheons where sleeves and pipe penetrations are exposed to view.

### 3.4 FIRESAFING

- A. At all sleeved walls and floors provide firesafe caulking, packing, blanket etc., for a completely tight system to prevent the passage of smoke and fire.

### 3.5 TESTING, ADJUSTING, COMMISSIONING AND BALANCING

- A. Requirements include measurement and establishment of the quantities of the mechanical systems as required to meet specifications and recording and reporting the results. Test, adjust and balance the following mechanical systems:
  - 1. Supply air systems.
  - 2. Return air systems.
  - 3. Exhaust air systems.
  - 4. Outside air systems.
  - 5. Hydronic heating and cooling systems.
  - 6. Verify temperature control system operation.

- B. Report forms shall be those standard forms prepared by the referenced standard for each respective item and system to be tested, adjusted, and balanced. Bind report forms complete with schematic systems diagrams and other data in reinforced, vinyl, three-ring binders.
- C. An independent testing, adjusting, and balancing agency certified by the AABC or NEBB as a Test and Balance Engineer in those testing and balancing disciplines required for this project.

3.6 OPERATION MANUALS AND MAINTENANCE MANUALS

- A. Refer to the contracts specifications for a complete outline of all requirements of operations and maintenance data.

3.7 RECORD DRAWINGS AND CONTROL DOCUMENTS

- A. Refer to the contracts specifications project record documents for a complete description of all requirements of recording as built record documents.

END OF SECTION