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**SECTION 23 74 13**  
**PACKAGED OUTDOOR CENTRAL-STATION AIR-HANDLING UNITS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Packaged roof top unit.
- B. Unit controls.
- C. Roof mounting curb and base.
- D. BACnet Communications Interface

**1.2 RELATED REQUIREMENTS**

- A. Section 07 72 00 - Roof Accessories: Placement and installation of factory fabricated roof mounting curbs.
- B. Section 23 05 48 - Vibration and Seismic Controls for HVAC.
- C. Section 23 09 13 - Instrumentation and Control Devices for HVAC: Control components, time clocks.
- D. Section 26 05 83 - Wiring Connections: Electrical characteristics and wiring connections.

**1.3 REFERENCE STANDARDS**

- A. AHRI 210/240 - Performance Rating of Unitary Air-Conditioning and Air-Source Heat Pump Equipment 2023.

**1.4 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
  - B. Listed manufacturers and series are for reference only and do not promote any single product. Series are provided for reference, and should not be used as an ordering model number. Accessories and options may be custom components purchased separately.
  - C. Product Data: Provide manufacturer's catalog sheet for equipment indicating rough-in size, finish, and accessories. Manufacturer's data sheets on each item of equipment and device, marked up to identify the items to be used on the project.
    - 1. Provide capacity and dimensions of manufactured products and assemblies required for this project. Indicate electrical service with electrical characteristics and connection requirements, and duct connections.
  - D. Start-up Report: Indicate start-up results.
    - 1. RTU (23 74 13.001 - A)
  - E. Product Data: Provide capacity and dimensions of manufactured products and assemblies required for this project. Indicate electrical service with electrical characteristics and connection requirements, and duct connections.
  - F. Shop Drawings: Indicate capacity and dimensions of manufactured products and assemblies required for this project. Indicate electrical service with electrical characteristics and connection requirements, and duct connections.
  - G. Manufacturer's Instructions: Indicate assembly, support details, connection requirements, and include start-up instructions.
  - H. Operation and Maintenance Data: Include manufacturer's descriptive literature, operating instructions, installation instructions, maintenance and repair data, and parts listing.
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- I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
  - 2. Extra Filters: One set for each unit.

#### **1.5 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section, with minimum three years of documented experience.
- B. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories Inc. as suitable for the purpose specified and indicated.

#### **1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Protect units from physical damage by storing off site until roof mounting curbs are in place, ready for immediate installation of units.

#### **1.7 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide a five year warranty to include coverage for refrigeration compressors.
- C. Provide 5 year warranty, including parts, materials and labor for defective parts, for the following:
  - 1. Include in Closeout Submittals Book.
  - 2. RTU.

### **PART 2 PRODUCTS**

#### **2.1 MANUFACTURERS**

- A. Trane, a brand of Ingersoll Rand.

#### **2.2 MANUFACTURED UNITS**

- A. General: Roof mounted units having electric heating elements and electric refrigeration.
- B. Description: Self-contained, packaged, factory assembled and prewired, consisting of cabinet and frame, supply fan, return fan, electric heating elements, heat recovery coil, controls, air filters, refrigerant cooling coil and compressor, condenser coil and condenser fan.
- C. Provide duct mounted Ultraviolet Light for each rooftop unit, Aerologic ADH018-4, same as specified for Modular Indoor Central-Station Air-Handling Unit. See specification Section 237313.

#### **2.3 FABRICATION**

- A. Cabinet: Steel with baked enamel finish, including access doors with piano hinges and locking handle.
- B. Insulation: A minimum of R-13 insulation with thermal breaks integral to the panel system.
- C. Supply and Return Fan: Forward curved centrifugal type, resiliently mounted and rubber isolated hinge mounted high efficiency motor or direct drive as indicated. Isolate complete fan assembly. Refer to Section 23 05 48.
- D. Filters:
  - 1. Unit shall include 2 inch thick, pleated panel filters with MERV rating of 8.
  - 2. Unit shall include a clogged filter switch.
- E. Roof Mounting Curb: 14 inches high galvanized steel, channel frame with gaskets, nailer strips.

#### **2.4 ELECTRIC HEATING COIL**

- A. Finned tube heating elements easily accessible with automatic reset thermal cut-out, built-in magnetic contactors, galvanized steel frame, control circuit transformer and fuse, manual reset thermal cut-out, airflow proving device, toggle switch (pilot duty), load fuses.
- B. Controls: Start supply fan before electric elements are energized and continue operating until air temperature reaches minimum setting, with switch for continuous fan operation.

## **2.5 EVAPORATOR COIL**

- A. Provide copper tube aluminum fin coil assembly with stainless steel drain pan and connection.
- B. Provide interlaced coil circuiting.
- C. Provide stainless steel drain pan and condensate overflow switch.

## **2.6 COMPRESSOR**

- A. Provide hermetic compressors, 3600 rpm maximum, resiliently mounted with positive lubrication, crankcase heater, high and low pressure safety controls, motor overload protection, suction and discharge service valves and gauge ports, and filter drier.
- B. Five minute timed off circuit to delay compressor start.
- C. Outdoor thermostat to energize compressor above 35 degrees F ambient.
- D. Variable capacity scroll compressor for lead compressor.
- E. Outdoor thermostat to energize compressor above 62 degrees F ambient.
- F. For heat pump units, provide reversing valve, suction line accumulator, discharge muffler, flow control check valve, and solid-state defrost control utilizing thermistors.

## **2.7 CONDENSER COIL**

- A. Provide copper tube aluminum fin coil assembly with subcooling rows and coil guard.
- B. Provide direct drive propeller fans, resiliently mounted with fan guard, motor overload protection, wired to operate with compressor. Provide high efficiency fan motors.

## **2.8 ELECTRICAL**

- A. Unit shall be provided single point power connection with factory installed and factory wired, non-fused disconnect switch.
- B. Unit shall be provided with an unpowered factory installed 115V, 13 amp GFI outlet.
- C. Variable frequency drives shall be factory wired and mounted in the unit.

## **2.9 ECONOMIZER**

- A. Unit shall have 0-100% economizer with motor operated dampers, intake hoods and pathways size for 100% airflow for both supply and exhaust airflow paths.

## **2.10 MIXED AIR CASING**

- A. Dampers: Provide outside, return, and relief dampers with damper operator and control package to automatically vary outside air quantity. Outside air damper to fall to closed position. Relief dampers may be gravity balanced.

## **2.11 OPERATING CONTROLS**

- A. Provide rooftop unit with BACnet Communication Interface.

- B. Provide terminal strip on unit for connection of operating controls to remote panel by others. Control shall allow for ONE stages of heating and VARIABLE stages cooling.
- C. Provide clogged filter/ fan failure switch.
- D. Provide barometric relief damper.
- E. Provide with through the base electrical connection with disconnect switch.
- F. Provide low limit thermostat in supply air to close outside air damper and stop supply fan.
- G. Provide night control energized by central time clock to maintain lower thermostat setting, lock out refrigeration, close outside air damper and open return air damper, stop supply air fan, for night and unoccupied operation. Provide time delay to maintain outside air damper closed and return air damper open after switching to day and occupied operation.

## **2.12 OPERATING CONTROLS - VARIABLE VOLUME UNITS**

- A. Temperature transmitter located in supply air shall signal electronic logic panel to control mixing dampers and cooling in sequence. Mixing section shall operate as first stage of cooling and revert to minimum outside air above approximately 75 degrees F as determined by enthalpy of return and outdoor air.
- B. Provide unit with factory installed Multiple Zone VAV.
- C. Provide two stage morning warm-up thermostat to hold outdoor dampers closed and energize heat until return air temperature reaches set point.

## **PART 3 EXECUTION**

### **3.1 INTERFACE WITH WORK OF OTHER SECTIONS**

- A. Confirm framing and support members.
- B. Confirm rough-in and framing of walls and partitions with supports for equipment and accessories.
- C. Confirm rough-in locations and power requirements before rough-in installation. Refer to Section 26 27 17 - Equipment Wiring.
- D. Confirm rough-in location and signals before rough-in installation. Refer to section 23 09 13 - Instrumentation and Control Devices for HVAC.

### **3.2 EXAMINATION**

- A. Verify that roof is ready to receive work and opening dimensions are as indicated on shop drawings.
- B. Verify that proper power supply is available.
- C. Verify that surfaces are suitable for installation.
- D. Examine areas to receive equipment for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- E. Verify that piping and equipment are ready to receive work.
- F. Verify field measurements are as shown on shop drawings.
- G. Electrical:
  - 1. Verify electrical power, voltage, phase and current is available and of the correct characteristics.
  - 2. Verify rough-in for electrical connections to verify actual locations before installing.
  - 3. Verify motor type and VFD or disconnect type for compatibility prior to ordering equipment.
- H. Controls:
  - 1. Verify signal power, voltage, phase and current is available and of the correct characteristics.
  - 2. Verify rough-in for control connections to verify actual locations before installing.

- 3. Verify motor type and VFD or disconnect type for compatibility with control sequence and control devices prior to ordering equipment.
- I. Maintain clearances to combustibles and service clearances.
- J. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.3 INSTALLATION**

- A. Install in accordance with following:
  - 1. Manufacturer's instructions.
  - 2. Federal, State and Local codes.
  - 3. Install in accordance with NFPA 90A.
- B. Mount units on factory built roof mounting curb providing watertight enclosure to protect ductwork and utility services. Install roof mounting curb level.

### **3.4 SYSTEM STARTUP**

- A. Unit shall be factory tested including leak testing of the coils and run testing of the complete unit. Furnish factory testing report.
- B. Prepare and start equipment. Adjust for proper operation.

### **3.5 CLOSEOUT ACTIVITIES**

- A. Demonstrate operation to Owner's maintenance personnel.

### **3.6 MAINTENANCE**

- A. See Section 01 70 00 - Execution and Closeout Requirements, for additional requirements relating to maintenance service.
- B. Provide service and maintenance of packaged roof top units for one year from Date of Substantial Completion.
- C. Provide routine maintenance service with a two month interval as maximum time period between calls.
- D. Include maintenance items as outlined in manufacturer's operating and maintenance data, including minimum of six filter replacements, minimum of one fan belt replacement, and controls check-out, adjustments, and recalibration.
- E. After each service call, submit copy of service call work order or report that includes description of work performed.

### **3.7 CLOSEOUT ACTIVITIES**

- A. See Section 01 78 00 - Closeout Submittals for closeout submittals.

**END OF SECTION 23 74 13**