SECTION 23 84 16.16 - INDOOR, MECHANICAL DEHUMIDIFICATION UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes packaged, factory-assembled and -tested, refrigerant-type, indoor, mechanical dehumidification units designed for indoor installation.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of indoor, mechanical dehumidification unit.

1. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: For each indoor, mechanical dehumidification unit.

1. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Detail fabrication and assembly of dehumidification units.
3. Vibration Isolation Base Details: Detail fabrication including anchorages and attachments to structure and to supported equipment. Include adjustable motor bases, rails, and frames for equipment mounting.
4. The units may be provided with wheel assemblies bases for portable locations.
5. Include diagrams for power, signal, and control wiring.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For dehumidification units to include in emergency, operation, and maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Filters: One set(s) of each type of filter specified.

1.6 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of indoor, mechanical dehumidification units that fail in materials or workmanship within a 2 year warranty period.

1. Warranty Period for Compressors: Manufacturer's standard, but not less than five years from date of Substantial Completion.
2. Warranty Period for Refrigerant Coils: Manufacturer's standard, but not less than five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 INDOOR, MECHANICAL DEHUMIDIFICATION UNIT

2.2 PERFORMANCE REQUIREMENTS

A. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1.

B. ASHRAE 62.1 Compliance: Section 5, "Systems and Equipment" and Section 7, "Construction and System Start-up."

C. ASHRAE 15 Compliance: "Safety Standard for Refrigeration Systems."

D. Capacities and Characteristics:
   a. See schedules on drawings

2.3 CASINGS

A. Casing: Single-wall construction with interior corrosion-resistant coating and exterior baked-enamel steel or aluminum, stainless-steel fasteners, knockouts for electrical and piping connections, condensate drain connection, and lifting lugs.

1. Access: Removable panels with neoprene compression gaskets and cam latches.
2. Insulation: Minimum 2-inch- (50-mm-) thick, glass-fiber-insulation fill or closed cell foam, with thermal breaks.
3. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

B. Drain Pan and Connection: Stainless steel; insulated and complying with ASHRAE 62.1.

2.4 FANS

A. Supply Fans:

1. Blades: Forward curved.
2. Type: Unhoused plenum type, centrifugal.
3. Blade and Housing Material: Galvanized steel with baked-enamel finish.

4. Drive: Direct-driven with keyed motor shaft easily accessible inside the casing of the dehumidification unit.

B. Fan Motor: Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."

2.5 FILTERS

A. Pleated:

1. Thickness: Manufacturer's standard depth.

2.6 REFRIGERATION SYSTEM

A. Energy Efficiency: Equal to or greater than prescribed by ASHRAE/IES 90.1.

B. Refrigerant Coils with Multiple Refrigerant Circuits:

1. Tubes: Copper.
2. Fins:

   a. Material: Aluminum or Copper.
   b. Fin Spacing: Maximum 10 fins per inch (mm).

3. Fin and Tube Joints: Mechanical bond.
4. Headers: Seamless-copper headers with brazed connections.
5. Frames: Stainless-steel frame.
6. Coatings: Corrosion-resistant coating.
7. Ratings: Designed, tested, and rated according to ASHRAE 33 and AHRI 410.
8. Source Quality Control: Factory test to minimum 450-psig (3105-kPa) internal pressure and to minimum 300-psig (2070-kPa) internal pressure while underwater.

C. Compressors: Hermetic, scroll compressors with integral vibration isolators and crankcase heaters that de-energize during compressor operation; with thermal-expansion valves, filter-dryers, sight glasses, compressor service valves, and liquid- and suction-line service valves.

1. Minimum Number of Refrigerant Circuits: Two for compressor capacities of more than 7-1/2 tons (26.4 kW).
2. Capacity Control:
   a. Cycle compressor.

3. Low-Pressure Cutout: Manual reset after three automatic-reset failures.
4. High-Pressure Cutout: Manual reset.
5. Compressor Motor Overload Protection: Manual reset.
6. Antirecycling Timing Device: Prevent compressor restart for five minutes after shutdown.

2.7 CONTROLS

A. Control Panel: Integral service compartment containing fan-motor thermal and overload cutouts, compressor thermal and overload cutouts, 115-V control transformer if required, magnetic contactors for fan and compressor motors, and a non fused factory-mounted and -wired disconnect switch for single external electrical power connection.

B. Operating Control: Space humidistat cycles the compressor. Humidistat shall incorporate fan on-off-auto switch.

C. Operating Control: Factory-installed microprocessor controller, capable of being remotely mounted.

1. Display the following on the face of controller:

   a. System on.
   b. System dehumidifying mode.
   c. Unit requires service.

2. Indicate the following sensor failures on panel:

   a. Airflow: Dirty air filter, blocked airflow, and fan failure.
   b. Refrigerant high and low pressure.
   c. High and low evaporator temperature.
   d. System off.
   e. Antishort cycle delay.
   f. Power failure.

3. Provide access to the following set points on panel:

   a. Space temperature.
   b. Space relative humidity.
   c. Airflow alarm.

4. Provide the following displays on panel:

   a. Space temperature.
   b. Space relative humidity.
   c. Service codes.

5. Provide the following controls on panel:

   a. System on-off, fan continues to run.
   b. Fan on-off.
   c. Service code access.
   d. System dehumidifying mode.
   e. Alarm digital display.

2.8 MATERIALS

A. Steel:

1. ASTM A36/A36M for carbon structural steel.
2. ASTM A568/A568M for steel sheet.

B. Stainless Steel:

1. Manufacturer's standard grade for casing.
2. Manufacturer's standard type, ASTM A240/240M for bare steel exposed to airstream or moisture.

C. Galvanized Steel: ASTM A653/A653M.

D. Aluminum: ASTM B209.

E. Comply with Section 230546 "Coatings for HVAC" for corrosion-resistant coating.

F. Corrosion-Resistant Coating: Coat with a corrosion-resistant coating capable of withstanding a 3,000-hour salt-spray test according to ASTM B117.

1. Standards:

a. ASTM B117 for salt spray.
b. ASTM D2794 for minimum impact resistance of 100 in/lb (11.3 N/m).
c. ASTM B3359 for cross hatch adhesion of 5B.

2. Application: Immersion or Spray.
3. Thickness: 1 mil (0.025 mm).
4. Gloss: Minimum gloss of 60 on a 60-degree meter.

2.9 SOURCE QUALITY CONTROL

A. Verification of Performance: Factory test and rate dehumidification units according to AHRI 910.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine walls, for suitable conditions where dehumidification units will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ELECTRICAL CONNECTIONS

A. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

C. Install nameplate for each electrical connection, indicating electrical equipment designation and circuit number feeding connection.
   1. Nameplate shall be laminated acrylic or melamine plastic signs with a black background and engraved white letters at least 1/2 inch (13 mm) high.
   2. Locate nameplate where easily visible.

3.3 FIELD QUALITY CONTROL

A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
   1. Charge refrigerant coils with refrigerant and test for leaks. Repair leaks and retest until no leaks exist.
   2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

B. Dehumidification unit will be considered defective if it does not pass tests and inspections.

C. Prepare test and inspection reports.

3.4 CLEANING

A. Clean dehumidification units internally, on completion of installation, according to manufacturer's written instructions. Clean fan interiors to remove foreign material and construction dirt and dust. Vacuum clean fan wheels, cabinets, and coils' entering-air face.

B. After completing system installation, testing, and startup service of dehumidification units, clean filter housings and install new filters.

3.5 ADJUSTING

A. Adjust initial temperature and humidity set points.

3.6 STARTUP SERVICE

A. Perform startup service.

   1. Complete installation and startup checks according to manufacturer's written instructions.

B. Perform the following final checks before startup:

   1. Verify that shipping, blocking, and bracing are removed.
   2. Verify that unit is secure on mountings and supporting devices and that connections to electrical systems are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
   3. Perform cleaning and adjusting specified in this Section.

4. Install clean filters.

C. Starting procedures for dehumidification units include the following:

1. Energize motor; verify proper operation of motor, drive system, and fan wheel. Adjust fan to indicated rpm. Replace malfunctioning motors, bearings, and fan wheels.
2. Measure and record motor's electrical values for voltage and amperage.

D. Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing of dehumidification unit.

E. Startup Report: Report findings during startup. Identify startup steps, corrective measures taken, and final results.

3.7 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain dehumidification units.

END OF SECTION 238416.16