

SECTION 238416.13 - OUTDOOR, MECHANICAL DEHUMIDIFICATION UNITS

GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Outdoor, mechanical dehumidification units.
- B. Related Requirements:

1.2 ACTION SUBMITTALS

- A. Product data.
- B. Shop Drawings: For each outdoor, mechanical dehumidification unit.

1.3 INFORMATIONAL SUBMITTALS

- A. Seismic Qualification Data: For outdoor, mechanical dehumidification units, accessories, and components, from manufacturer.
- B. Product test reports.
- C. Field quality-control reports.
- D. Sample warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An NRTL

1.6 COORDINATION

- A. Coordinate sizes and locations of concrete bases. Cast anchor-bolt inserts into bases.
- B. Coordinate installation of roof curbs, equipment supports, and roof penetrations.

1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of outdoor, mechanical dehumidification units that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period for Compressors: Manufacturer's standard, but not less than two 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 PERFORMANCE REQUIREMENTS

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- B. Seismic Performance: Dehumidification units shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. The term "withstand" means "the unit will remain in place without separation of any parts when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."
 - 2. Component Importance Factor: 1.0.
 - 3. Component Amplification Factor and Component Response Modification Factor: See Basis of Design.
- C. ASHRAE/IES 90.1 Compliance: Applicable requirements in ASHRAE/IES 90.1.
- D. ASHRAE 62.1 Compliance: Section 5, "Systems and Equipment" and Section 7, "Construction and System Start-up."
- E. ASHRAE 15 Compliance: "Safety Standard for Refrigeration Systems."
- F. Capacities and Characteristics:
 - 1. See Mechanical Dehumidification Unit Schedule on mechanical drawings.

2.2 OUTDOOR, MECHANICAL DEHUMIDIFICATION UNITS

- A. Manufacturer: Nortek or approved equal.
- B. Casings:
 - 1. Casing: Double-wall construction with exterior steel or aluminum, stainless steel fasteners, knockouts for electrical and piping connections, condensate drain connection, and lifting lugs.
 - a. Access: Hinged access doors with neoprene compression gaskets and cam latches.

- b. Insulation: Minimum 2-inch-thick, glass-fiber-insulation fill or closed cell foam, with thermal breaks.
 - c. Fully weatherproof with cross-broken roof for drainage, rain hood or louver for outside air, and relief/exhaust air openings.
 - 2. Drain Pan and Connection: Stainless steel; insulated.
- C. Fans:
- 1. Supply Fans:
 - a. Blades: Forward curved or Backward inclined.
 - b. Type: Unhoused plenum type, centrifugal.
 - c. Blade and Housing Material: Galvanized steel with baked-enamel or powder-coated finish.
 - d. Drive: Direct-driven with keyed motor shaft.
 - 2. Fan Motor: Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Section 230500 "Common Work Results for HVAC."
 - a. Enclosure Type: Totally enclosed, fan cooled or open drip proof.
 - 3. Variable-frequency motor controller complies with Section 262923 "Variable-Frequency Motor Controllers."
- D. Filters:
- 1. Pleated:
 - a. Thickness: 2 inches
 - b. MERV Rating: See schedule
- E. Heating Coils:
- 1. Electric-Resistance Heating Coil: Comply with UL 1995.
 - a. Heating Element:
 - 1) Open-coil resistance wire of 80 percent nickel and 20 percent chromium; supported and insulated by floating ceramic bushings recessed into casing openings; fastened to supporting brackets and mounted in galvanized-steel frame.
 - b. Coatings: None
 - c. Overtemperature Protection: Disk-type, automatic-reset, thermal-cutout safety device; serviceable through terminal box without removing heater from unit.
 - d. Thermal Cutouts: Load carrying, manual reset or replaceable, and factory wired in series with each heater stage.
 - e. Control: Disconnecting means, overcurrent protection, and airflow proving switch.

F. Cooling Coils:

1. Chilled-Water Coil: Continuous circuit coil.
 - a. Tubes: Copper.
 - b. Fins:
 - 1) Material: Aluminum
 - 2) Fin Spacing: Maximum 12fins per inch.
 - c. Fin and Tube Joints: Mechanical bond.
 - d. Headers: Cast iron with drain and air vent tappings.
 - e. Frames: Galvanized-steel channel, minimum 0.052 inch
 - f. Coatings: None
 - g. Ratings: Designed, tested, and rated according to ASHRAE 33 and AHRI 410.
 - 1) Working-Pressure Ratings: 200 psig, 325 deg F.
 - h. Source Quality Control: Test to 300 psig.

G. Dampers:

1. Outdoor-Air Dampers: Opposed-blade, galvanized-steel dampers with zinc-plated-steel operating rod rotating in sintered bronze or nylon bearings. Provide blade gaskets and edge seals, and mechanically fasten blades to operating rod. Size for 0 to 100 percent outdoor air, with motorized operator and filter.

H. Heat Wheel:

1. Type: Dessicant
2. Dessicant: Fiberglass silica gel
3. Purge angle: No purge
4. Configuration: 75% primary air, 25% regeneration air
5. Capacities and characteristics: See Mechanical Dehumidification Unit Schedule on mechanical drawings.

I. Heat Wheel Regeneration:

1. Unit will contain a regeneration section consisting of electric resistance heating coil with SCR control upstream of wheel and a fan downstream. See Mechanical Dehumidification Schedule for capacities, characteristics, and accessories.

J. Humidifier Grid

1. Capacity: See Mechanical Dehumidification Unit Schedule on mechanical drawings
2. Components: Steam valve, separator, actuator/linkage and steam distributor(s).
3. Configuration: Configured to operate with regular boiler steam, up to 50 psig.
4. Materials: Standard bronze and stainless steel components

5. Features:

- a. Stainless steel separators
- b. Bronze steam valves with stainless steel seat, stem, and plug
- c. Pneumatic or electric actuator/linkage
- d. Stainless steel steam distributors
- e. On/Off or modulating control
- f. Two-year limited warranty

6. Steam Headers:

- a. Delivers clean steam, precisely controlled, uniformly into the entire air stream, and void of any condensate spray. Steam distribution takes place via steam tubes with integrated nozzles. The steam is kept dry as condensate is drained through the main header.
- b. The stainless steel headers are typically installed with vertical tubes for horizontal airflow applications, but can also be mounted horizontally for vertical airflow applications. The headers can be ordered 3, 6, 9, or 12 inch center to center tube spacing for maximum flexibility and optimal steam distribution.
- c. Manufactured out of high grade 304 stainless steel, the header features welded inlet and condensate connections to ensure leak-free operation. Stainless steel inlet adapter is factory supplied for connection to steam supply line. Specialized synthetic grommets form an air and water-tight seal around the base of the steam tubes.
- d. Additional Features:
 - 1) Steam tubes with end support bracket
 - 2) Ten year limited warranty

K. Controls:

- 1. Comply with requirements in Section 230923 "Direct Digital Control (DDC) System for HVAC" for control equipment and in Section 230993.11 "Sequence of Operations for HVAC DDC."

L. Accessories:

- 1. Electrical Convenience Outlet: 125 V ac, duplex, straight-blade receptacles, separately fused and located inside control panel.

2.3 MATERIALS

A. Steel:

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

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.

2.4 SOURCE QUALITY CONTROL

- A. Verification of Performance: Factory test and rate dehumidification units according to AHRI 910.
- B. Sound-Power-Level Ratings: Factory test and rate dehumidification units according to AHRI 575.

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 roughing-in for chilled-water piping systems to verify actual locations of piping connections before equipment installation.

3.2 INSTALLATION OF OUTDOOR, MECHANICAL DEHUMIDIFICATION UNITS

- A. Equipment Mounting:
 - 1. Install dehumidification units on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."
 - 2. Comply with requirements for vibration isolation and seismic control devices specified in Section 230548 "Vibration and Seismic Controls for HVAC."

3.3 PIPING CONNECTIONS

- A. Where piping is installed adjacent to dehumidification units, allow space for service and maintenance of dehumidification units.
- B. Connect piping to dehumidification units mounted on vibration isolators with flexible connectors.
- C. Connect condensate drain pans using minimum NPS 1-1/4 copper tubing. Extend to nearest equipment or floor drain. Construct deep trap at connection to drain pan, and install cleanout at changes in direction.

- D. Chilled-Water Piping: Comply with requirements in Section 232113 "Hydronic Piping" and Section 232116 Hydronic Piping Specialties." Connect to supply coil tapplings with shutoff valve, return coil tapplings with balancing valve, and union or flange at each connection.
- E. Duct installation requirements are specified in Section 233113 "Metal Ducts. Drawings indicate the general arrangement of ducts.

3.4 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 high.
 - 2. Locate nameplate where easily visible.

3.5 CONTROL CONNECTIONS

- A. Install control and electrical power wiring to field-mounted control devices.
- B. Connect control wiring between control devices.
- C. Connect control wiring according to Section 260523 "Control-Voltage Electrical Power Cables."
- D. Connect smoke detector to fire alarm system.

3.6 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections:
 - 1. Leak Test: After installation, fill water coils with water, and test coils and connections for leaks. Repair leaks and retest until no leaks exist.
 - 2. Charge refrigerant coils with refrigerant and test for leaks. Repair leaks and retest until no leaks exist.
 - 3. 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.

3.7 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.

3.8 ADJUSTING

- A. Adjust damper linkages for proper damper operation.
- B. Adjust initial temperature and humidity set points.

3.9 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 piping, ducts, and 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. Disconnect fan drive from motor, verify proper motor rotation direction, and verify free fan wheel rotation and smooth bearing operations. Reconnect fan drive system, align belts, and install belt guards.
 - 5. Check lubrication of bearings, pulleys, belts, and other moving parts.
 - 6. Set outside- and return-air mixing dampers to minimum outside-air setting.
 - 7. Install clean filters.
 - 8. Verify that manual and automatic volume control and fire and smoke dampers in connected duct systems are in fully open position.
- 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.
 - 3. Manually operate dampers from fully closed to fully open position and record fan performance.
- 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.

3.10 DEMONSTRATION

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

END OF SECTION 238416.13