

SECTION 238413 - HUMIDIFIERS

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. This Section includes the following humidifiers:

- 1. Outdoor electrode type.

1.3 DEFINITION

- A. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

1.4 ACTION SUBMITTALS

- A. Product Data: Include rated capacities, operating characteristics, furnished specialties, and accessories.
- B. Shop Drawings: Detail fabrication and installation of humidifiers. Include piping details, plans, elevations, and sections, details of components, manifolds, and attachments to other work.
 - 1. Wiring Diagrams: Power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

- A. Field quality-control test reports.

1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For humidifiers to include in operation and maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Supply one replacement electrode cylinder with each self-contained humidifier.

1.8 QUALITY ASSURANCE

- A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

- B. Comply with ARI 640, "Commercial and Industrial Humidifiers."

1.9 COORDINATION

- A. Coordinate location and installation of humidifiers with manifolds in ducts and air-handling units or occupied space. Revise locations and elevations to suit field conditions and to ensure proper humidifier operation.

PART 2 - PRODUCTS

2.1 SELF-CONTAINED ELECTRODE STEAM HUMIDIFIERS

- A. Provide outdoor electrode humidifier generating mineral-free, sterile steam from a potable water supply packaged unit, stand-mounted, atmospheric steam generation using an electrode steam cylinders.
- B. Unit to be complete with: Factory assembled and tested.
 - 1. Touchscreen controller with standard building automation:
 - a. Intuitive touchscreen control with color graphic user interface.
 - b. Standard building automation communication protocols BACnet IP, BACnet MSTP (Slave) and Modbus. Additional hardware required for building automation communication not acceptable.
 - c. Embedded web interface for easy configuration and remote monitoring from any computer with a web browser over a local area network (LAN) connection.
 - d. USB interface for new software/feature upload and download of operational information.
 - e. Single or dual channel analog signal acceptance, supporting both demand and transducer control. Ability to control setpoint from humidifier control when using transducer controls.
 - 2. Packaged system suitable for outdoor installation with Nortec electrode cylinder technology:
 - a. Cylinder optimized for humidifier capacity and supply voltage. Cylinder must have welded seam to ensure watertight and have high water sensor to prevent overfilling.
 - b. Weatherproof, durable, powder coated steel cabinet integrated to the unit.
 - c. Insulating air gap between plumbing and electrical compartment for increased electronic reliability.
 - d. Standard internal drain water tempering to ensure maximum 140° F drain water. External drain water cooler not acceptable.
 - e. Integral fill cup with minimum 1-inch air gap to prevent back siphoning.
 - f. Full cylinder indication and pre-notification of automatic shutdown at end of cylinder life.
 - g. Automatic pulse feature to clean any obstruction from the drain solenoid valve if required.

- h. Automatic off-season shut-down will completely drain the cylinders and automatically restart on call for humidity. Adjustable on/off and time sequence. Provides extended cylinder life, while ensuring stagnant water does not remain in the system.
 - i. Internal transformers to power all components from a single electrical connection to the unit. Multiple power supplies to humidifier are unacceptable.
- 3. Auto-Adaptive Control water management:
 - a. Advanced water management utilizing the patented Proportional plus Integral Auto-Adaptive Control system for optimal energy efficiency, water usage and cylinder life.
 - b. 98% thermal efficiency from startup until end of cylinder life.
 - c. Drains automatically optimized to water conditions to maximize cylinder and reduce water usage.
 - d. Modulating output between 20% and 100% of rated capacity.

C. Headers:

- 1. The header shall distribute 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 shall be kept dry as condensate is drained through the main header.
- 2. The stainless steel headers shall be installed horizontally (10 deg. incline from horizontal) for vertical airflow applications.
- 3. Manufactured from 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, allowing maximum flexibility, and simplification of installation. Specialized synthetic grommets form an air and water-tight seal around the base of the steam tubes, simplifying installation and ensuring reliable leak-free operation.
- 4. Headers shall be provided with 304 stainless steel insulation. This metal shielding creates an insulating air-gap around the header which minimizes heat transfer by conduction and convection, while the reflective surface minimizes heat transfer by radiation. Insulating the header in this manner increases energy efficiency by up to 70%, and results in significantly reduced airstream heat gain and steam condensate loss.
- 5. Features:
 - a. Steam tubes with end support bracket for easy installation.
 - b. All stainless steel distributors and nozzles ensure permanent bond.
 - c. Stainless steel header with rubber grommet seals for easy installation of steam tubes.
 - d. Includes hose cuffs and clamps for steam line connections.
 - e. Adjustable mounting frame available for quick and easy installation.
 - f. Available with 3", 6", 9" or 12" center to center steam tube spacing.
 - g. Available insulated for increased energy efficiency and reduced airstream heat gain.
 - h. High capacities.

- i. Ten year limited warranty.
- D. Distributors:
 - 1. Compatible with headers. Construct from high quality 304 stainless steel, this shielding provides an insulating air gap around the header. The insulating air-gap shall significantly reduce energy losses from hot distributor headers. Insulation factory installed.
 - 2. Provide inlet adapter enabling pipe steam line from a humidifier directly to short absorption manifold. Steam outlet shall come with a 1 ft long flexible steam hose and 2 clamps for a connection to the hard pipe between the humidifier and manifold.
 - 3. Features:
 - a. Aerodynamic design.
 - b. Fiberglass free and non-hygroscopic for hygienic operation.
- E. Controls: Single Channel Demand Signal by Others accepts a varying 2-wire output signal from a modulating humidity controller supplied by others. Controller shall have built-in adjustable %rH set point circuitry. Signal from the controller must increase with a drop in sensed %rH below set point. Humidifier will respond by controlling unit output between 0% - 100% of capacity to match load requirements. Percentage of control signal (demand) will be shown on the humidifier display.
- F. Capacities and Characteristics:
 - 1. Refer to schedule on design drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine ducts, air-handling units, and conditions for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine roughing-in for piping systems to verify actual locations of piping connections before humidifier installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install humidifiers with required clearance for service and maintenance.
- B. Seal humidifier manifold duct or plenum penetrations with flange.
- C. Install humidifier manifolds in metal ducts and casings constructed according to SMACNA's "HVAC Duct Construction Standards, Metal and Flexible."
- D. Install manifold supply piping pitched to drain condensate back to humidifier.
- E. Equipment Mounting: Install steam generator on stand anchored to cast-in-place concrete equipment base.

1. Coordinate sizes and locations of concrete bases with actual equipment provided.
2. Construct concrete bases 6-inch high and extend base not less than 6 inches in all directions beyond the maximum dimensions of steam generator.
3. Minimum Compressive Strength: 4000 psi at 28 days.
4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base, and anchor into structural concrete floor.
6. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
7. Install anchor bolts to elevations required for proper attachment to supported equipment.

3.3 CONNECTIONS

- A. Piping installation requirements are specified in other Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
 1. Install piping adjacent to humidifiers to allow service and maintenance.
 2. Install shutoff valve, strainer, backflow preventer, and union in humidifier makeup line.
- B. Install electrical devices and piping specialties furnished by manufacturer but not factory mounted.
- C. Install piping from safety relief valves to nearest floor drain.
- D. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."
- E. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.4 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections. Report results in writing.
- B. Perform tests and inspections and prepare test reports.
 1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.
- C. Tests and Inspections:
 1. Leak Test: After installation, charge system and test for leaks. Repair leaks and retest until no leaks exist.
 2. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
 3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

- D. Remove and replace malfunctioning units and retest as specified above.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain humidifiers. Refer to Section 017900 "Demonstration and Training."

END OF SECTION 238413