

SECTION 23 84 13
HUMIDIFIERS

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies boiler steam injection humidifiers for installation into packaged outdoor central station air handling unit.

1.2 RELATED WORK

- A. Section 01 00 00, GENERAL REQUIREMENTS: Requirements for pre-test of equipment.
- B. Section 23 05 11, COMMON WORK RESULTS FOR HVAC: General mechanical requirements and items, which are common to more than one section of Division 23.
- C. Section 23 22 13, STEAM AND CONDENSATE HEATING PIPING: Requirements for field steam and condensate piping.
- D. Section 23 09 23, DIRECT-DIGITAL CONTROL SYSTEM FOR HVAC: Requirements for controls and instrumentation.
- E. Section 23 05 93, TESTING, ADJUSTING, AND BALANCING FOR HVAC: Requirements for testing, adjusting and balancing of HVAC system.
- F. Section 23 08 00 - COMMISSIONING OF HVAC SYSTEMS: Requirements for commissioning, systems readiness checklists, and training.

1.3 QUALITY ASSURANCE

- A. Refer to the GENERAL CONDITIONS.
- B. Refer to specification Section 01 00 00, GENERAL REQUIREMENTS for performance tests and instructions to VA personnel.
- C. Refer to paragraph, QUALITY ASSURANCE, in specification Section 23 05 11, COMMON WORK RESULTS FOR HVAC.
- D. Unit(s) shall be provided by a manufacturer who has been manufacturing humidifiers and have been in satisfactory service for at least five (5) years.

1.4 SUBMITTALS

- A. Submit in accordance with specification Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.
- B. Manufacturer's Literature and Data:
 - 1. Technical data on design operating inlet and outlet conditions, air flows with diagram showing air volumes and conditions throughout the system, and humidification capacity.

2. A general arrangement diagram with overall dimensions showing all major components with overall dimensions, utility and installation details, operating weight and required service and equipment removal clearances.
 3. Control diagrams for electric circuits interface all control set points.
- C. Shop drawings shall indicate assembly, unit dimensions, weight loading, required clearances, construction details, and field connection details.
 - D. Certificate: Evidence of satisfactory performance on three similar installations.
 - E. Provide installation, operating and maintenance instructions, in accordance with Article, INSTRUCTIONS, in specification Section 01 00 00, GENERAL REQUIREMENTS.
 - F. Performance test report: In accordance with PART 3.
 - G. Completed System Readiness Checklists provided by the Commissioning Agent and completed by the contractor, signed by a qualified technician and dated on the date of completion, in accordance with the requirements of Section 23 08 00 COMMISSIONING OF HVAC SYSTEMS.

1.5 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. Air-conditioning, Heating and Refrigeration Institute (AHRI)
640.....Standard for Commercial and Industrial
.....Humidifiers
- C. American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)
62.1-10.....Ventilation for Acceptable Indoor Air
Quality (ANSI)
- D. National Fire Protection Association (NFPA)
90A-09.....Standard for the Installation of Air-
Conditioning and Ventilating Systems

1.6 QUALITY ASSURANCE

- A. Product of manufacturer regularly engaged in production of humidification equipment who issues complete catalog data on total product.
- B. Humidifier is to be manufactured in an ISO 9001-2000 certified facility.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Accept products on site in factory-fabricated protective containers, with factory-installed shipping skids and lifting lugs. Inspect for damage.
- B. Store in clean dry place and protect from weather and construction traffic. Handle carefully to avoid damage to components, enclosures and finish.
- C. Comply with manufacturer's rigging and installation instructions.

1.8 PROJECT CONDITIONS

Do not operate humidifier for any purpose, temporary or permanent, until ductwork is clean, filters are in place, bearings lubricated, fan has been test run, all piping is connected and controls are complete and tested.

PART 2 - PRODUCTS**2.1 HUMIDIFIER**

- A. General: Units shall be complete, factory assembled, and tested; and of sizes, arrangements, capacities, and performance as scheduled and as specified in the schedules shown on the drawings; and for outdoor installation into packaged outdoor central station air handling unit for humidifying air using boiler steam.

2.2 STEAM INJECTION HUMIDIFIER

- A. Steam injection humidification using a boiler steam generator as a steam source.
- B. Humidifier is to be pre-engineered for air handler application, complete with steam control valve, valve actuator, steam distributors, and steam separator. Coordinate valve operation with Digital Control System.
- C. System to be complete with:
 1. Operating and safety controls to ensure an automatic and fail-safe system.
 2. System to shut down automatically on loss of control signal even when steam pressure is maintained to system.
 3. Normally closed steam control valve with equal percent flow characteristics and positive shut off against steam.
 4. Stainless steel jacketed distributor(s), allowing pressurized steam through the length of the distributor, to pre-heat the internal dispersion tube.
 5. Stainless steel, lightweight steam separator with internal baffle(s) to ensure dry condensate free steam supply to the control valve.

D. Steam Distributor to Include:

1. Stainless steel tube in tube construction to maximize jacketing of internal dispersion tube (rectangular jacketing with partial internal dispersion tube coverage, requiring plastic inserts, are not acceptable).
2. Internal dispersion tube orifices sized to provide even distribution of the discharged steam across the entire length of the assembly.
3. End bracket to allow parallel, perpendicular or diagonal support.
4. Tube adapter for connection to controlled steam supply.
5. Two piece duct plate to seal air handler/duct wall penetration(s).
6. Important: Steam distribution must provide complete absorption within the confines of the humidifier section of the air handling unit. No moisture accumulation will be permitted downstream of that section.

E. Control valve to be:

1. Compliant with ANSI B 16.15 class 250 pressures and temperature rating B 16.104 class IV control shut off leakage and ANSI/ISA-575.11 flow characteristics standards.
2. Complete with stainless steel seat, stem and plug.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine air handling unit 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 and steam dispersion panels per manufacturers' instructions.
- B. Seal humidifier dispersion-tube duct penetrations with flange.
- C. Install with required clearance for service and maintenance.

3.3 TESTING

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect field-assembled components and equipment

installation, including piping and electrical connections. Report results in writing.

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 unit operation. Remove malfunctioning units, replace with new units, and retest.
3. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.4 INSTRUCTIONS

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain humidifiers.
 1. Train Owner's maintenance personnel on procedures and schedules for starting and stopping, troubleshooting, servicing, and maintaining equipment and schedules.
 2. Review data in maintenance manuals.
 3. Schedule training with Owner, with at least seven days advance notice.

3.5 COMMISSIONING

- A. Provide commissioning documentation in accordance with the requirements of Section 23 08 00 - COMMISSIONING OF HVAC SYSTEMS for all inspection, start up, and contractor testing required above and required by the System Readiness Checklist provided by the Commissioning Agent.
- B. Components provided under this section of the specification will be tested as part of a larger system. Refer to Section 23 08 00 - COMMISSIONING OF HVAC SYSTEMS and related sections for contractor responsibilities for system commissioning.

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