

**SECTION 15XXX**  
**HUMIDIFIERS**

**PART 1 - GENERAL**

**1.1 WORK INCLUDED**

- A. NORTEC Boiler Steam Injection - LS Series Humidifier[s] as indicated on drawing[s] and as indicated on schedule[s].

**OR**

- A. NORTEC Short Absorption Manifold (Humidifier Steam Dispersion Panel) - SAM-e Humidifier[s] as indicated on drawing[s] and as indicated on schedule[s].
- B. Complete and operable humidification system [which meets applicable building codes].
- C. Equipment start-up and project inspection by qualified factory trained representative.

**1.2 QUALITY ASSURANCE**

- A. Manufacturer: For each product specified, provide components by same manufacturer throughout.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authority having jurisdiction, and marked for intended use.
- C. Comply with ARI 640, "Standard for Commercial and Industrial Humidifiers."
- D. Products shall be supported with a warranty that ensures the product will be free from defects in materials and workmanship for a period of two years after shipment.
- E. Commissioning of a system or systems specified in this section is part of the construction process. Documentation and testing of these systems, as well as training of the Owner's operation and maintenance personnel, is required in cooperation with the Commissioning Authority. Project Closeout is dependent on successful completion of all commissioning procedures, documentation, and issue closure. Refer to Project Closeout, Section 01700, for substantial completion details. Refer to Section 01810, Commissioning, for detailed commissioning requirements.
- F. Products specified below are to be manufactured in an ISO 9001-2000 certified facility.

**1.3 SUBMITTALS**

- A. Submit product data under provisions of Section 15010. Include product description, model, dimensions, component sizes, rough-in requirements, service sizes, and finishes. Include rated capacities, operating weights, furnished specialties, and accessories.
- B. Submit manufacturer's installation instructions.
- C. Submit operation and maintenance data.
- D. Submit coordination drawings. Detail fabrication and installation of humidifiers. Include piping details, plans, elevations, sections, details of components, and dispersion tubes. Detail humidifiers and adjacent equipment. Show support locations, type of support, weight on each support, and required clearances.

- E. Submit wiring diagrams including power, signal, and control wiring. Differentiate between manufacturer-installed and field-installed wiring.
- F. Submit minimum water quality requirements and water pressure requirements.

#### **1.4 EXTRA MATERIALS**

- 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.

#### **1.5 REFERENCES**

- A. ANSI/NFPA 70 - National Electrical Code.

#### **1.6 COORDINATION**

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

XXXXX OR XXXXX

- A. Coordinate location and installation of humidifier in the space it serves with the electrical, mechanical, and plumbing contractors.

### **PART 2 - PRODUCTS**

#### **2.1 STEAM INJECTION HUMIDIFIER**

- A. Steam injection humidification using a boiler steam generator as a steam source.
- B. Pre-Engineered system, for air handler/duct application, complete with steam control valve, valve actuator, steam distributor[s], and steam separator.
- 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].

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.

F. Standard of acceptance: Nortec LiveSteam.

## **OR**

### **2.1 SHORT ABSORPTION MANIFOLD (Humidifier steam dispersion panel) - SAM-e**

A. Short Absorption Manifold designed for atmospheric steam humidifiers or pressurized steam from a boiler, to directly inject the steam into ducted air for humidification.

1. Absorption distance characteristic shall prevent water accumulation on any in-duct surfaces beyond \_\_\_in (\_\_\_mm) downstream of the steam dispersion panel.
2. Steam dispersion panel consisting of a (one) horizontal stainless steel header/separator supplying steam to a bank of closely spaced 3" (7.6 cm) OR 6" (15.2 cm) OR 9" (22.9 cm) OR 12" (30.5 cm) vertical tubes, as necessary to meet absorption distance requirements.
3. Single horizontal stainless steel header/separator to provide steam to vertical distributor tubes and to reduce condensation losses. Dual header systems creating unnecessary condensation, or systems needing to be installed on a partition or requiring blank off plates are not acceptable.
4. Header/separator design is primarily round tube to minimize pressure drop. Square headers are not acceptable.
5. Steam inlet and condensate return located on the same side and at the bottom of the header to allow single point entry and floor mounting.
6. Header/separator is 304 stainless steel construction.
7. Vertical stainless steel distribution tubes to promote condensate evacuation. Horizontal distribution tubes are not accepted.
8. All tubes are stainless steel construction.
9. Stainless steel nozzle inserts ensure condensate free steam is discharged from the center of the distribution tubes.
10. Nozzles of dissimilar metals are likely to dislodge due to inconsistent rates of expansion, and are not acceptable.
11. Stainless steel nozzle inserts shall have metered orifices, sized to provide even distribution of the discharged steam, spaced for optimum steam absorption.
12. Adjustable mounting frame available for quick and easy installation.

B. Standard of acceptance: Nortec SAM-e

## **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 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. System verification testing is part of the commissioning process. Verification testing shall be performed by the Contractor and witnessed and documented by the Commissioning Authority. Refer to section 01810, Commissioning, for system verification tests and commissioning requirements.

XXXXX OR XXXXX

- 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 TRAINING**

- A. Training of the Owner's operation and maintenance personnel is required in cooperation with the Commissioning Authority. Provide competent, factory authorized personnel to provide instruction to operation and maintenance personnel concerning the location, operation, and troubleshooting of the installed systems. The instruction shall be scheduled in coordination with the Commissioning Authority after submission and approval of formal training plans. Refer to System Demonstrations, section 01670, for contractor training requirements. Refer to section 01810, Commissioning, for further contractor training requirements.

XXXXX OR XXXXX

- 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. Refer to Division 1 Section "Contract Closeout."
  - 3. Review data in maintenance manuals. Refer to Division 1 Section "Operation and Maintenance Data."
  - 4. Schedule training with Owner, through Architect, with at least seven days advance notice.

**END OF SECTION**