

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

**PART 1 - GENERAL**

**1.1 WORK INCLUDED**

- A. NORTEC In-duct Atomizing Nozzles, HP HVAC Series 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.

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

## **PART 2 - PRODUCTS**

### **2.1 IN-DUCT HIGH PRESSURE NOZZLE HUMIDIFIER - HP HVAC**

- A. High-pressure pump modules will be fully factory built and tested; assembly consisting of the following principal components.
  1. Triplex ceramic plunger pump with brass heads.
  2. Direct connection to the drive motor using a resilient shaft coupling with bell housing.
  3. Variable frequency Drive (Optional): Allows for efficient multi-zone controls, and the pump to run at the minimum speed required to maintain outlet pressure, reducing wear and tear on pump, achieving higher efficiency, greater pump life expectancy, and less maintenance.
  4. Frame: Components to be mounted on a powder coated aluminium frame, with vibration isolators.
  5. Cover: Powder-coated aluminium with integral soundproofing to reduce ambient noise levels around the pump.
  6. Control panel: Built to a NEMA 12 rated enclosure standard, external to the pump and motor, includes a manual on/off/auto switch, fault light indicator, service light indicator, and connection glands for power and control wiring. A smart relay indicates service warning at 100 hours prior to scheduled maintenance due.
  7. Low-pressure cut-off switch: Protects pump against cavitations and running dry in the event of a low inlet water pressure, below 25 psig (1.7 bar). Unit will shut down pump module, and must be manually restarted after a fault. Maximum allowable water pressure is 70 psig (4.8 bar).
  8. Pressure regulating valve with external by-pass; manually regulates operating water pressure to 1000 psig (69 bar). Bronze construction with stainless steel valve and valve seat.
  9. High-pressure line drain: A 24 volt solenoid valve on the pump module will drain water on shutdown to ensure no residual water is left in the high-pressure piping between pump and nozzles. Systems not able to drain are not acceptable.
  10. Thermal relief valve: Valve will open if the re-circulated water in the pump reaches 110°F (43°C), which is then replaced by fresh (cool) water. Water is sent to drain or sent back to the reverse osmosis water reservoir.
  11. Low pressure gauge: Liquid filled, 0 to 100 psig (0 to 7 bar)
  12. High pressure gauge: Liquid filled, 0 to 2000 psig (0 to 138 bar)
  13. All wetted parts including piping: non-corrosive material (brass or stainless steel) provides all necessary dielectric isolation.
  14. Operating water pressure: 1000 psig (69 bar).

B. Nozzle Section:

1. MicroCool's ® patented design nozzles to be used in each application.
2. Nozzle: 316 Stainless Steel construction with a 0.008" (0.203 mm) or 0.005" (0.127 mm) machined orifice.
3. The median droplet size of the nozzle will be between 10 micron and 40 micron (95% of droplets at 15 micron) at 1,000 psig (70 bar).
4. The 316 stainless steel insert protrudes .04" (1 mm) above the nozzle face to shed collection of water around the nozzle orifice.
5. The nozzle includes a 316 stainless steel impeller inside the insert for special "rifling" to ensure continuous rotation. Impact pin nozzles are not acceptable.
6. The nozzle has a 12/24 UNC male thread.
7. Each nozzle includes an "anti-drip" valve with an integral spring and ball. This unit closes at pressures below 150 psig (10.5 bar) to prevent dripping from the nozzle orifice. Nozzles without "anti-drip" valves are not acceptable.
8. The nozzle manifold will be either 3/8" O.D. (9 mm) or 1/2" (13 mm) O.D. 304 stainless steel tubing as specified in the schedule.
9. Nozzle lines are 3/8" (9 mm) O.D. 304 stainless steel tube with 0.35" (1.24 mm) wall thickness or 1/2" (13 mm) 304 stainless steel tube with 0.29" (7.37 mm) wall thickness. Minimum burst pressure - 6,000 psig (420 bar).
10. Nozzle risers are TIG welded spacing required by the design specification. All welds and joints are factory pressure tested prior to shipping.
11. Stainless steel nozzle lines will be joined using 316 stainless steel double-ferrule type compression fittings.
12. Stainless Steel lines will be prepared and shipped in special containers to minimize damage during transport.
13. A non-corrosive drain pan must be installed between nozzle manifolds and mist eliminator or cooling coil. Provided by others.

C. Soft charge valve assembly allows the system to reduce water hammer effects and drain out nozzle manifolds when there is no call for humidity. Each valve assembly has 1, 2 or 3 block valves and a dump valve:

1. All Stainless steel construction.
2. Block Valve: A 3/2 way valve with 2 solenoids, one normally closed and one normally open. Allows to drain the nozzle manifolds when not operated as the normally open valve remains open when the solenoid is not operated. The "Soft Charge" functionality allows operation of the valve as a flow divider when charging the line and thereby reduces the risk of water hammer and surge. This function requires a time delay between the activation of the Normally Closed and Normally Open solenoid. Each zone valve has a maximum flow rate of 8 gpm (144 lpm).
3. Dump Valve: A normally closed 2/2 way valve allows for a purge of the whole valve assembly and nozzle manifolds when activated to avoid bacteria growth. The valve is internally connected to the valve assembly and requires no external piping. Maximum flow rate of 8 gpm (144 lpm).
4. Trigger points for block valve activation from a 0-10 Vdc signal from building management system or humidistat:

\*ONE OF THE THREE VALVES MUST BE SELECTED PER AHU\*

1 stage soft charge valve assembly: (One block valve and one dump valve).

|         |                            |
|---------|----------------------------|
| Stage 0 | Valve 1 "OFF" - 0% Output  |
| Stage 1 | Valve 1 "ON" - 100% Output |

3 stage soft charge valve assembly: (Two block valves and one dump valve).

|         |                                  |
|---------|----------------------------------|
| Stage 0 | Valve 1,2 "OFF" - 0% Output      |
| Stage 1 | Valve 1 "ON" - 33% Output        |
| Stage 2 | Valve 2 "ON" - 66% Output        |
| Stage 3 | Valve 1 and 2 "ON" -100 % Output |

6 stage soft charge valve assembly: (Three block valves and one dump valve).

|         |                                      |
|---------|--------------------------------------|
| Stage 0 | Valve 1,2,3 "OFF" - 0% Output        |
| Stage 1 | Valve 1 "ON" - 17% Output            |
| Stage 2 | Valve 2 "ON" - 33% Output            |
| Stage 3 | Valve 3 "ON" - 50% Output            |
| Stage 4 | Valve 1 and 3 "ON" - 67% Output      |
| Stage 5 | Valve 2 and 3 "ON" - 83% Output      |
| Stage 6 | Valve 1, 2, and 3 "ON" - 100% Output |

D. Valve controller regulates output by opening and closing magnetic valves, which switch the various nozzle manifolds on and off. It also processes all standard sensor and controller output signals.

1. Receives a 0-10 VDC signal from the humidistat or building management system, converts the analog 0-10 VDC demand signal to a output percentage requirement, and controls the output of the system in 6 stages, 3 stages, or 1 stage (on/off). See soft charge valve assembly section for trigger points.
2. Sends a 24V signal to enable the pump to operate when there is a demand for humidity.
3. Every 24 hours, the pump and all the valves activate for 2 minutes to flush the potential standing water in the system to drain. (Optional)
4. 120 volts to 24 volts control transformer.
5. Full frontal access with keyed door.
6. Powder coated, Sandtex finish cabinet [inside and out].
7. Green lamp to indicate power to control panel.
8. 3 amber lamps to indicate: Stage 1, 2, and 3.
9. Terminal strip connection for soft charge valve assembly.

E. Mist eliminator.

1. Patented offset design of two droplet filters gives a 30 to 50% reduction in duct static pressure, single mist eliminator panel not acceptable.
2. Pressure drop: Must not exceed 0.30 inches (0.75 cm) of water column at 500 fpm (254 cm/sec) when media is wet.
3. Installed at a minimum length of 4 ft (121 cm) from nozzle manifold to ensure a reasonable rate of efficiency.
4. Media: Quadrafoam ½" open cell polyurethane foam specially coated to provide improved fire retardation and fungi resistance. It features deep loading, and low air resistance for use in extremely wide climatic conditions, ensuring a long service life and easy cleaning.
5. Frame: Roll formed into a strong sturdy one-piece channel, using .025 gauge, 3000 series aluminum. The frame is tightly fitted to the media and fastened with an aluminum rivet. The UL listing, model number and airflow direction is roll imprinted into the frame. Part number is metal stamped into frame for quick, accurate identification.
6. Uni-Grid Support: Specially designed Uni-Grid equipment, using .040 gauge, 3000 series aluminum. Droplet filters use the Uni-Grid support on one side only.
7. Must meet the following standards & classifications UL 900 Class 2, UL 94 HF-1.
8. Must meet the following standards & classifications Telcordia NEBS GR-78-CORE.
9. Must meet the following standards & classifications Telcordia NEBS GR-63-CORE
10. Must meet the following standards & classifications FMVSS 302

- F. Standard of acceptance: Nortec HP HVAC.

## **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.

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- 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.

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- 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**