SECTION 15812 – HUMIDIFIER

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. Dri-Steem Corp., Ultra-sorb steam dispersion panel.

1.3 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, sections, details of components, manifolds, and attachments to other work.

C. Field quality-control test reports.

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

1.4 QUALITY ASSURANCE

A. Comply with ARI 640, "Commercial and Industrial Humidifiers."

1.5 WARRANTY

A. Product shall be warranted to be free from defects in materials and fabrication for a period of two years after installation or 27 months from ship date.

1.6 COORDINATION

B. 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.

PART 2 - PRODUCTS

2.1 STEAM-DISPERSION PANEL HUMIDIFIERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   1. Armstrong International, Inc.
   2. Carel USA, LLC.

3. DRI-STEEM Humidifier Company.
4. Herrmidifier.
5. Hygromatik; Spirax Sarco, Inc.
6. Nortec Industries Inc.
7. Pure Humidifier Company.

B. The Ultra-sorb Model XV steam dispersion panel shall directly inject pressurized boiler steam (5 psi minimum) into ducted air for humidification and return pressurized condensate to the steam boiler.

C. The Ultra-sorb Models LH and LV steam dispersion panel shall directly inject pressurized boiler steam or evaporative, non-pressurized steam into ducted air for humidification.

D. Model XV: The factory-assembled steam dispersion panel shall include the following components:
1. Steam supply header/separator with integral condensate heat exchanger that provides condensate vaporizing and pressurized condensate return.
    a. All dispersion tube-generated condensate that falls to the heat exchanger in the header shall be vaporized into humidification steam.
    b. As condensate is vaporized in the header, pressurized condensate created in the heat exchanger shall return to main without additional pumps, valves, or controls.
2. Closely-spaced steam dispersion tubes spanning the distance between the supply header and the top portion of the assembly frame
3. High-efficiency dispersion tubes:
    a. Dispersion tubes shall be insulated with a plenum-approved insulating material for in-duct installation and have an R-value not less than 0.5 at a thickness not more than 0.125" (3.2 mm), for minimal increase in dispersion tube diameter.
    b. Airstream heat gain shall not exceed the values as scheduled; the values shall be supported by the manufacturer's published data.
    c. Insulating material shall meet the following criteria at 0.125" (3.2 mm) thickness:
        1) Fire/smoke index shall be 0/0 per any of the following test procedures:
        - UL 723 fire/smoke index (Test for Surface Burning Characteristics of Building Materials)
        - NFPA 255 (Standard Method of Test of Surface Burning Characteristics of Building Materials)
        - ASTM E84 (Surface Burning Characteristics for Materials Used in Plenums)
        2) Stable up to 300 °F (148 °C) continuous — to prevent material degradation, hardening, or crumbling at high temperatures
        3) Closed-cell construction does not absorb water or support microbial growth — to negate the need for vapor barriers and jackets
        4) Non-toxic and pure as documented in manufacturer's data — to prevent off-gassing and to facilitate use in clean rooms, pharmaceutical applications, and food industries
        5) Will not degrade when exposed to UVC light — to negate the need for UV wraps
        6) Continuous, seam-welded, and held in place without bands or clamps — to minimize surfaces for the accumulation of particulate matter
4. Insulated supply header

E. Models LH and LV: The factory-assembled steam dispersion panel shall include the following components:
   1. Steam supply header/separator
   2. Condensate collection header
   3. Closely-spaced steam dispersion tubes spanning the distance between the two headers

F. Each dispersion tube shall be fitted with two rows of steam discharge tubelets inserted into the tube wall, centered on the diametric line, and spaced 1.5" (38 mm) apart. Each tubelet shall be made of a thermal-resin material designed for high steam temperatures. The two rows of tubelets in each dispersion tube shall discharge steam in diametrically opposite directions, perpendicular to airflow.

G. Each tubelet shall extend through the wall of and into the center of the dispersion tube and contain a steam orifice sized for its required steam capacity.

H. The humidifier shall provide absorption characteristics that preclude water accumulation on any in-duct surface within _____" (_____ mm) of the humidifier tube panel while maintaining conditions of _____% maximum relative humidity (RH) at a minimum of _____°F (_____°C) in the duct airstream.

I. Air pressure loss across the humidifier panel shall not exceed _____" water column (_____ Pa) at a duct air velocity of _____fpm (_____m/s).

J. Each packaged humidifier panel assembly of tubes and headers shall be contained within a galvanized metal casing to allow convenient duct mounting, or to facilitate the stacking of and/or the end-to-end mounting of multiple humidifier panels in ducts or air handler casings. When so designated, the humidifier panel shall be shipped unassembled.

K. All tubes and headers shall be 304 stainless steel, and welded joints shall be Heli-arc welded.

L. Model XV: Tubes shall be gasketed and spring-loaded to ensure a tight seal to the supply header and to facilitate easy removal.

M. Modulating pneumatic humidification steam control valve and actuator: Valve shall be a normally closed modulating type with modified linear flow. Valve trim shall be stainless steel and valve maximum flow rate shall not exceed specified humidifier capacity by more than 20%. Actuator shall be a pneumatic type to modulate the steam valve in response to a variable pneumatic signal demand and be direct acting.

N. Model XV: Temperature switch, electric. Electric temperature switch shall be field installed to work in conjunction with a pneumatic, electric, or electronic operated humidification steam control valve to prevent heat exchanger cold start-up. Field set at 210 °F (99 °C).

O. Model XV: Heat exchanger steam valve and actuator: Valve shall be a two position, normally closed, solenoid operated, on-off steam valve. Valve shall respond to a signal from a compatible humidistat. Control voltage 24, 120, 240 VAC.

P. Steam trap(s): Humidifier shall have one or two float/thermostatic trap(s) for applications equal to or below 15 psi steam, or one or two inverted bucket steam trap(s) for applications above 15 psi steam.

2.2 HUMIDIFIER OPTIONS

A. Stainless steel options:
   1. Casing assembly shall be 304 stainless steel.

B. Valve options:
   1. On-off electric humidification steam control valve: Valve shall be a two-position, normally closed solenoid operated, on-off steam valve. Valve shall respond to a signal from a compatible humidistat (and temperature switch for Model XV). Control voltage 24, 120, 240 VAC.
   2. Modulating electronic humidification steam control valve: Valve shall be a normally closed modulating type with an electronic actuator. Actuator shall respond to a variable electronic signal. Available signal inputs: 4 to 20 mA, 2 to 10 VDC.
   3. Pilot positioner: The valve pneumatic actuator shall be equipped with an adjustable pilot positioner.

C. Model XV: Time delay relay. Heat exchanger shall remain on after no call for humidity to evacuate all condensate for a period of time not less than 5 minutes, adjustable up to 100 minutes.

2.3 HUMIDIFIER CONTROL OPTIONS

A. Control input accessory options:
   1. Humidistat, on-off, room: Electric humidistat control shall be on-off style and room-mounted with a control range of 10% to 90% RH. Compatible with 24, 120, and 240 VAC. Operating temperature range 40 to 125 °F (4 to 52 °C).
   2. Humidistat, electronic, room: Electronic humidistat shall be room-mounted and produce a modulated DC signal output, field-selectable 0 to 10 VDC or 6 to 9 VDC with control action field-selectable to be direct or reverse acting. Set point range 20% to 80% RH, supply voltage 24 DC or 24 AC. Maximum ambient temperature 122 °F (50 °C).
   3. Airflow proving switch, pressure type: Airflow proving switch shall be diaphragm-operated with pitot tube for field installation. Switch shall have an adjustable control point range of 0.05" to 12" wc (12.5 to 2988 Pa). Operating temperature range -40 to 180 °F (-40 to 82 °C). Compatible with 24, 120, and 240 VAC.
   4. Airflow proving switch, sail type: Airflow proving switch shall be a sail-operated electric switch for field installation. Switch makes at 250 fpm (1.3 m/s), and breaks at 75 fpm (0.4 m/s). Maximum operating temperature for sail: 170 °F (77 °C). Maximum operating temperature for switch: 125 °F (52 °C)

B. Capacities and Characteristics:
   1. See schedule on the 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 per manufacturer’s printed instruction and as indicated on drawings with required clearance for service and maintenance. Maintain path, downstream from humidifiers, clear of obstructions as required by ASHRAE 62.1-2004.

B. Install manifold supply piping pitched to drain condensate back to humidifier.

C. Install drip leg upstream from steam trap a minimum of 12 inches (300 mm) tall for proper operation of trap.

3.3 CONNECTIONS

A. Piping installation requirements are specified in other Division 15 Sections. Drawings indicate general arrangement of piping, fittings, and specialties.
   1. Install piping adjacent to humidifiers to allow service and maintenance.

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.

END OF SECTION 15812