SECTION 23 84 13

Ultra-sorb® Model XV Steam Dispersion Panel Humidifier

PART 1 – GENERAL

#### 1.1 Summary

##### Section includes:

###### DriSteem Corporation, Ultra-sorb Model XV steam dispersion panels

#### 1.2 References

##### Certifications

###### OSHPD Special Seismic Pre-approval

###### IBC 2015 Seismic Qualification

##### Related items:

###### Pressurized steam connections: Division 23

###### Electrical service and connections: Division 26

#### 1.3 Submittals

##### Comply with Submittal Procedures and Execution and Closeout Requirements in General Requirements.

##### Submit product data (manufacturer’s specifications and technical data including performance, construction, and fabrication) for each manufactured component.

#### 1.4 Warranty

##### 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.

### PART 2 – PRODUCTS

#### 2.1 Humidifier shall be DriSteem Ultra-sorb Model XV Steam Dispersion Panel or engineer-approved equal.

##### The Ultra-sorb Model XV steam dispersion panel shall directly inject pressurized boiler steam (5 psi minimum – refer to humidifier schedule for pressure) or evaporative, non-pressurized steam (STS only) into ducted air for humidification, and return pressurized condensate to the steam boiler.

##### (Optional) Alternate. Condair model SAM-e or Armstrong HumidiPack or \_\_\_\_\_\_\_\_\_\_ steam panels accepted only if approved by Engineer, and all the following additional components and installation are included in this specification section, and performance specifications are met as listed and noted on drawings and schedules.

###### Provide electric condensate pump for each steam dispersion panel of adequate capacity to lift panel condensate back to low-pressure boiler return piping.

###### Provide additional costs of condensate pump venting, with piping to approved outdoor vent location

###### Provide installation labor and wiring costs associated with electric condensate pump.

###### Include parts and labor warranty for additional components noted in this specification section.

##### The humidifier shall meet the following performance requirements:

###### **Performance:**

Dispersion assembly shall disperse evaporative, non-pressurized humidification steam into ducted air and return pressurized condensate to the steam boiler.

Dispersion assembly shall directly inject pressurized boiler steam into ducted air for humidification.

###### **Condensate management:**

Steam supply header/separator with integral condensate heat exchanger shall provide atmospheric condensate vaporizing, and pressurized condensate return.

All dispersion tube-generated condensate that falls to the heat exchanger in the header shall be vaporized into humidification steam.

As condensate is vaporized in the header, pressurized condensate created in the heat exchanger shall return to steam main without need for additional pumps, valves, or controls.

###### **High-efficiency dispersion:**

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.

Airstream heat gain shall not exceed the values as scheduled; the values shall be supported by the manufacturer's published data.

Air pressure loss across the humidifier panel shall not exceed \_\_\_\_\_" water column (\_\_\_\_\_ Pa) at a duct air velocity of \_\_\_\_\_fpm (\_\_\_\_\_m/s).

Insulating material shall meet the following criteria at 0.125" (3.2 mm) thickness:

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)

Stable up to 300 °F (148 °C) continuous, to prevent material degradation, hardening, or crumbling at high temperatures

Closed-cell construction that does not absorb water or support microbial growth, to negate the need for vapor barriers and jackets

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

Material shall not degrade when exposed to UVC light, to negate the need for UV wraps

Continuous seam-welded, and held in place without bands or clamps, to minimize surfaces for the accumulation of particulate matter

Steam supply header shall be insulated to reduce airstream heat gain when steam header is installed internal to *AHU or duct.*

###### ***Absorption:***

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.

###### **Seismic Certification**

Humidifier shall meet OSHPD Special Seismic Pre-approval for a SDS = 2.0 g for AHU applications and SDS = 2.5 g for duct applications

Humidifier shall meet IBC 2015 Seismic Qualification by shake table testing for a SDS = 2.0 g for AHU applications and SDS = 2.5 g for duct applications.

Air pressure loss across the dispersion assembly shall not exceed \_\_\_\_\_" water column (\_\_\_\_\_ Pa) at a duct air velocity of \_\_\_\_\_fpm (\_\_\_\_\_m/s).

##### Fabrication and components:

###### Dispersion panel shall be factory assembled, of a metal frame with vertical steam dispersion tubes spanning the distance between a steam supply header and a top frame assembly.

###### Dispersion tubes and headers:

All tubes and headers shall be 304 stainless steel, and welded joints shall be Heli-arc welded. Tubes shall be gasketed and spring-loaded to ensure a tight seal to the supply header and to facilitate easy removal.

Closely-spaced steam dispersion tubes shall span the distance between the supply header and the top portion of the assembly frame.

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.

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.

###### Dispersion panel casing:

Each packaged humidifier panel assembly shall be contained within a galvanized metal casing to allow 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.

###### Steam trap(s):

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

#### 2.2 Humidifier Options

##### Fabrication options:

###### Casing assembly shall be 304 stainless steel.

###### Casing assembly shall be 316 stainless steel.

###### Tube and header shall be 316 stainless steel.

##### Condensate lift kit:

###### When required, an inverted bucket trap shall be included to lift condensate to a maximum height of 20 feet.

#### 2.3 Humidifier Control Options

##### Vapor-logic® microprocessor controller with the following features or functions:

###### Web interface and server, included standard on all models:

Web interface shall have same functionality as Vapor-logic keypad/display

Web interface shall allow multiple remotely located users to simultaneously view system operation and/or change system parameters.

Web interface shall have password-protected secure access.

Web interface shall be compatible with standard Internet browsers.

Web interface shall connect directly to a personal computer or through a system network via Ethernet cable.

Automatic cable configuration shall allow straight-through or crossover cables.

###### Interoperability using BACnet MS/TP.

###### USB port on the control board for software updates, data backups, and data restoration

###### Real-time clock to allow time-stamped alarm/message tracking, and scheduled events

###### Factory commissioning of humidifier and control board, including system configuration as-ordered

###### Keypad/display operable within a temperature range of 32 to 158 °F (0 to 70 °C), and that provides backlighting for viewing in low light

###### Remote keypad option: Provide a keypad with cable for remote mounting. Available cable lengths: 5’ (1.5 m), 10’ (3 m), 25' (7.6 m), 50' (15 m), 100' (30 m), or 500' (152 m)

###### Alarms, unit configuration, and usage timer values shall remain in nonvolatile memory indefinitely during a power outage.

###### The capability to monitor, control, and/or adjust the following parameters:

Relative humidity (RH) set point , actual conditions in the space (from humidity transmitter), RH offset

Dew point set point, actual conditions in the space (from dew point transmitter), dew point offset

Relative humidity (RH) duct high limit set point (switch) and actual conditions

Relative humidity (RH) duct high limit set point, actual conditions (from transmitter), high limit span, and high limit offset

Total system demand in % of humidifier capacity

Total system output in lbs/hour (kg/h)

Air temperature or other auxiliary temperature monitoring with programmable offset (using sensor ordered as an option)

System alarms and system messages, current and previous

Programmable outputs for remote signaling of alarms and/or messages, device activation (such as a fan), or for signaling tank heating and/or steam production

System diagnostics that include:

Test outputs function to verify component operation

Test humidifier function, by simulating demand to validate performance

Data collection of RH, air temperature, water use, energy use, alarms, and service messages for viewing from the keypad/display or Web interface

##### Humidification steam control valve options (Specifier: Choose option 1, 2 or 3 in this section)

###### Modulating electronic humidification steam control valve: Valve shall be a normally closed with an electronic actuator. Valve trim shall be stainless steel, and sized to meet humidification requirements. Actuator shall respond to a variable electronic signal of 2 to 10 VDC.

###### 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 sized to meet humidification requirements. Actuator shall be a pneumatic type to modulate the steam valve in response to a variable pneumatic signal demand, and be direct acting.

Pilot positioner: The valve pneumatic actuator shall be equipped with an adjustable pilot positioner.

###### Dispersion panel is provided atmospheric steam for humidification. Steam control is provided from and controlled by a steam-to-steam (STS) converter with integral controls including steam control valve.

##### Steam supply shutoff valve: (Specifier: Include this section with heat exchanger control option C1 below)

###### A 2-position shutoff valve shall be provided, to be installed upstream of the humidification steam control valve as shown on drawings, to control steam flow to the dispersion panel internal heat exchanger. Valve shall be 2-way ball type with stainless steel ball and stem. Provide stainless steel body above 35psi operating steam pressure. Actuator shall be 2-position, spring return closed electronic type, with auxiliary end switch to confirm full open position.

##### Heat exchanger control options:

###### Control Cabinet with time delay

###### Vapor-Logic microprocessor controller to operate heat exchanger and steam control valve based on humidity demand from BAS/control device, duct RH high limit, air flow proving switch, and heat exchanger float switch. Applicable to electric actuator steam valve only.

Control cabinet with Vapor-logic shall open 2-position shutoff valve to enable heat exchanger upon humidification demand, and shall maintain operation 15 minutes after no call for humidity to ensure clearance of all steam header condensate.

Electric modulating humidification steam control valve shall modulate based on 4-20 mA or 2-10 VDC demand signal from BAS or humidistat, wired to control cabinet input.

Float switch in header shall activate condensate management sequence in event of excess condensate in header, closing modulating humidification control valve. Controller alarm point shall be activated if condensate clearing is unsuccessful.

Control status, humidification demand and diagnostics shall be shown via LED diagnostic codes on control board. Dry contacts in control cabinet shall provide alarm point to BAS/control system. (wiring by BAS).

Control cabinet and float switch.

###### Temperature switch only with continuous heat exchanger operation (100%):

Temperature switch shall work in conjunction with the electronic humidification steam control valve to close the modulating steam valve in the event of steam return trap failure.

Electric temperature switch should be used if steam control valve uses an electric actuator. Shall be field installed downstream from the heat exchanger outlet. Field set temperature switch at 210 °F (99 °C).

Pneumatic temperature switch should be used if steam control valve uses a pneumatic actuator. Shall be field installed downstream from the heat exchanger outlet Pneumatic air signal shall vent below 215 °F (102 °C).

###### BAS Control

######  Controls by BAS/Controls contractor. Contractor to provide and follow control sequence of Control option #1 (a-d). Applicable to electric actuator steam valve only.

###### BAS controller shell control the sequence of the following: the 2-position shutoff valve, and modulating steam control valve based on humidity demand from BAS, duct RH high limit, air flow proving switch, and heat exchanger float switch.

###### Control by STS steam-to-steam humidifier.

######  Steam valve controlled by Vapor-logic on STS humidifier.

Electric or Pneumatic modulating valve for inlet to STS. Float switch in header wired to STS Vapor-logic controller. Optional temperature switch at heat exchanger outlet. DriSteem control cabinet is included with STS humidifier

##### Control input accessories:

###### 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).

###### Humidistat, pneumatic, room: The pneumatic room humidistat shall provide a pneumatic modulating output in response to humidity changes, approximate range 10% to 95% RH, maximum inlet pressure 25 psi (172 kPa). Operating temperature range 40 to 150 °F (4 to 66 °C). Provided with mounting bracket and cover.

###### Humidistat, pneumatic, duct: The pneumatic duct humidistat shall provide a pneumatic modulating output in response to humidity changes. Preset at 35% RH set point. Maximum inlet pressure 25 psi (172 kPa). Maximum air velocity 2000 fpm (10 m/s). Operating temperature range 20 to 150 °F (-7 to 66 °C).

###### Humidistat, pneumatic high limit, duct: The pneumatic duct high limit humidistat shall provide a pneumatic modulating output in response to humidity changes. Preset at 85% RH set point. Maximum inlet pressure 25 psi (172 kPa). Maximum air velocity 2000 fpm (10 m/s). Operating temperature range 20 to 150 °F (-7 to 66 °C).

###### 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" w.c. (12.5 to 2988 Pa). Operating temperature range -40 to 180 °F (-40 to 82 °C). Compatible with 24,120, and 240 VAC.

###### 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)

###### Airflow proving switch, pneumatic type: The pneumatic airflow switch shall detect the presence or absence of airflow. Field-installed in duct. Maximum air velocity 2000 fpm (10 m/s). Switch action vents air on no-flow. Maximum pneumatic inlet pressure 20 psi (138 kPa). Operating temperature range 32 to 180 °F (0 to 82 °C).

### PART 3 – EXECUTION

#### 3.1 Installation

#####  Install per manufacturer's printed instructions and as indicated on drawings.

##### Coordinate with control wiring specified in 230923 control systems for HVAC

##### Coordinate with electrical connections specified in Division 26.

END OF SECTION