Section 23 84 13 - HUMIDIFIERS

## PART 1 General

### 1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

### 1.2 SUMMARY

A. This Section includes the following humidifiers:

1. SKE4 Electric steam humidifiers and accessories.

### 1.3 DEFINITION

A. Low Voltage: As defined in NFPA70 for circuits and equipment operating at less than 50V or for remote control, signalling power limited circuits.

### 1.4 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.

1. Wiring Diagrams: Power, signal, and control wiring.

C. Coordination Drawings: Detail humidifiers and adjacent equipment. Show support locations, type of support, weight on each support, required clearances, and other details, drawn to scale, on which the following items are shown and coordinated with each other, based on input from installers of the items involved:

1. Structural members to which humidifiers will be attached.

D. Instructions: Submit manufacturer's installation, operation and maintenance manuals.

E. Field quality control test reports.

### 1.5 QUALITY ASSURANCE

A. Electrical Components, Devices and Accessories: Listed and labelled as defined in NFPA70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked intended use.

B. Comply with ARI 640, “Commercial and Industrial Humidifiers.”

C. Quality management system shall comply with ISO 9001:2015 certification.

### 1.6 COORDINATION

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

### 1.7 DELIVERY, STORAGE AND HANDLING

A. Waste Management and Disposal:

1. Remove from site and dispose of packaging materials at appropriate recycling facilities.

### 1.8 WARRANTY

A. Product shall be warranted to be free from defects in materials and fabrication for a period of two years from the ship date.

## PART 2 PRODUCTS

### 2.1 SELF-CONTAINED HUMIDIFIERS

A. Manufacturer: Subject to compliance with requirements, provide products by

1. Neptronic

### 2.2 SKE4 ELECTRIC RESISTIVE STEAM HUMIDICATION SYSTEM

A. General:

1. Provide self-contained, microprocessor controlled, wall mounted, electric resistive steam humidifiers as indicated, of size and capacity as scheduled. Electrode technology is not acceptable.
2. Humidifier shall meet the requirements of UL 998 and CSA C22.2 No.104 standards to comply with ETL certification.

B. Humidifier cabinet:

1. The humidifier casing shall be constructed of cold roll steel and stainless steel base with baked enamel finish to prevent rust.
2. For safety and security reasons, all components, electrical wiring and plumbing connections will not be exposed and must be contained within the cabinet of the unit.
3. The compartmentalized enclosure shall separate the plumbing, controls, and high-voltage sections, preventing heat, humidity or water transfer to the electrical sections and ensuring that the evaporation chamber remains isolated.
4. The plumbing compartment shall be equipped with a drip tray.
5. The front of the unit and the high voltage compartment shall have a lockable door to restrict access by unauthorized personnel.

C. Evaporation chamber:

1. Steam shall be generated in a stainless steel cleanable evaporation chamber.
2. The evaporation chamber shall be easily serviceable and removable from the unit. No tools are required during servicing.
3. The electronic level sensing assembly remains permanently fixed and separate from the evaporation chamber.
4. The heating elements and manual reset high temperature safety cut-out switch remain fixed in place, even as the evaporation chamber is removed for service cleaning.
5. The evaporation chamber shall have a water port designed to minimize the risk of blockage caused by sediment build-up. The water port will be easily detachable for servicing by means of a single quick connect assembly.

D. Immersion heating element(s):

1. Steam shall be generated by self-cleaning 800/825 Incoloy electric heating immersion elements.
2. The heating elements shall have a high expansion factor, minimizing mineral deposits and enabling most of them to break off and fall to the bottom of the chamber.

E. Water level control:

1. The water level detection system shall be self-cleaning, self-calibrating and equipped with a redundancy system, consisting of a high-resolution capacitive sensor and two fail-safe resistive sensors.
2. The humidifier must have the ability to sense foam and take a corrective action by going into drain cycle.
3. For safe temperature operation, the humidifier must have both an electronic temperature sensor inside the evaporation chamber and an external bimetallic temperature cut-off.

F. Water requirements:

1. The humidifier shall operate under all types of water including tap, deionized and reverse osmosis water, with no additional parts required.

G. Feed water:

1. The supply water to the unit shall be controlled by a quiet three port solenoid valve equipped with flow regulators, to supply water into the evaporation chamber, temper the hot water during a drain and clean the water level sensors.
2. To conserve energy, any hot water skimming during normal FILLING cycle is not acceptable.
3. The humidifier shall have a check valve in the fill water line to prevent backflow of hot contaminated water into the water supply system.
4. The humidifier shall have a pulsed fill mode to ensure that boiling does not stop while the humidifier is refilling, in order to maintain a constant steam output.

H. Drain:

1. The humidifier shall have a drain pump which provides a quick drain cycle, minimizing the down time.

2. The humidifier shall have four draining strategies: periodic full drain cycle, water dilute system, AFEC and configurable drain schedule, ensuring maximum energy efficiency, optimal steam output stability and minimal steam output interruptions.
3. To enhance safety and minimize energy consumption, the humidifier shall vary the drain time periods according to variations in water conditions.
4. After 72 hours of no demand, the humidifier will go into "Tank Rinse" or end of season mode, completely draining the unit to eliminate stagnant water.

I. Manual drain valve:

1. The humidifier shall be supplied with a manual drain valve which ensures that the unit can be drained even during a power failure.

J. Disconnect switch:

1. For safety reasons and to conform to local regulations, the humidifier shall have a built-in factory wired disconnect switch, to easily turn off the power without opening any access doors, ensuring that the power is off when accessing the electrical panels. An external disconnect switch is not required.

K. Controller:

1. The humidifier shall have an alphanumeric display and control module with 8 function buttons for fast configuration and operation.
2. The Idle Screen shall display common information including humidity demand, actual steam output and state of operation. It will also indicate special diagnostic parameters such as abnormal operation, time delays, etc.
3. The humidifier shall be programmable using the menu buttons to view and configure settings including control method, %R.H. set point, control signal type, and indication on number of actual service hours.
4. After the maximum number of hours of operation before servicing is due has been exceeded, the unit will display a need for servicing and the Status Display LED on the control panel will turn red.

L. SD card:

1. The unit shall be equipped with an SD card slot, to allow for simplified troubleshooting, by storing a history log of all humidifier trends and alarms.
2. The SD card shall allow for on-site firmware upgrades.

M. USB connection:

1. The unit shall be equipped with a USB port, to allow on-site firmware upgrades.

N. Scheduling system:

1. The humidifier shall be equipped with a configurable and independent scheduling system for unit operation and drain cycle, ensuring that the unit does not operate or drain when not necessary.

O. User rights management:

1. The electronic controller shall be equipped with a user rights management system, which simplifies operation and protects the humidifier from unwanted access by displaying only the features associated to the type of user logged in.

P. Building automation systems:

1. The humidifier shall be equipped with communication protocols, including BACnet MS/TP, Modbus RTU, LonWorks, BACnet UDP/IP, or Modbus TCP/IP, for integration with a building management system (BMS).
2. These protocols shall be available via a plug-in module for simple upgrade of units already in the field.

Q. Web services:

1. The humidifier shall be equipped with web services enabling humidifier parameter configuration, and access to diagnostics and other functions remotely using the internet.

R. Modulating control:

1. The control modulating signal shall be 0-10 VDC or 2-10 VDC, 4-20 mA or 0-20 mA to modulate 0-100% of the capacity.
2. The maximum output (SPAN) can be minimized by using the electronic "MAX OUTPUT" setting.

3. Modulation of all elements shall be achieved using silent SSR's with zero voltage crossing detection and firing. The SSR's will be backed up by an electro-mechanical contactor.
4. To avoid harmonics and peak electrical loads, Time Proportioning modulation using only electro-mechanical relays will not be acceptable.

S. Space distribution unit (SDU):

1. Stainless steel manifold with integral fan to discharge vapour directly into occupied space.

T. Steam distribution manifold (S.A.M.):

1. Type 304 stainless steel manifold with brass nozzle inserts which provide uniform steam distribution over entire length.

U. Steam distribution manifold (S.A.M.E2):

1. Type 304 stainless steel manifold with brass nozzle inserts which provide uniform steam distribution over entire length, used in applications with restricted duct dimensions.

V. Steam dispersion panel (Multi-Steam SD):

1. Type 304 stainless steel non-insulated tubes and header, with brass insertion nozzles to prevent condensate from escaping.
2. All tubes shall be completely factory assembled with welded connections requiring no gaskets.
3. Each dispersion tube shall be fitted with one or two rows of dispersion brass nozzles.
4. The brass nozzles shall discharge steam in diametrically opposite directions, perpendicular to airflow.
5. The nozzles extend into the interior of the steam tube, preventing condensed droplets from being dropped into the duct.

W. Steam dispersion panel (Multi-Steam HD):

1. Type 304 stainless steel insulated tubes and header, with 304 stainless steel eyelets to prevent condensate from escaping.
2. All tubes shall be completely factory assembled requiring no gaskets.
3. Each dispersion tube shall be fitted with one or two rows of dispersion stainless steel eyelets.
4. The stainless steel eyelets shall discharge steam in diametrically opposite directions, perpendicular to airflow.
5. The eyelets extend into the interior of the steam tube, preventing condensed droplets from being dropped into the duct.

X. OSHPD:

1. The humidifier shall conform to the requirements of the OSHPD seismic certification.

Y. Accessories: Include the following:

1. HRO20 humidity controller: Wall mounted, modulating device with electronic display and adjustment buttons that measures from 0-100% RH and provides selectable output signals, with a control range of 10% to 90% RH.
2. HRL24 humidity transmitter: Wall mounted, programmable device with electronic display and adjustment buttons that measures from 0-100% RH, with a control range of 10% to 90% RH.
3. SHR10 wall humidity sensor: Wall mounted device that measures from 0-100% RH range and provides a 0-10VDC output.
4. SHC80 duct humidity sensor: Duct mounted device that measures from 0-100% RH range and provides a 0-10VDC output.
5. SHS80 duct humidity sensor: Duct mounted device with high limit that measures from 0-100% RH range and provides a 0-10VDC output, with a high limit control range of 20% to 90% RH.
6. SHS20 high limit humidistat: Wall mounted, ON/OFF device with a control range of 20% to 90% RH, having a built-in humidity sensor.
7. HRC20 wall humidity controller: Wall mounted, ON/OFF device with a control range of 10% to 60% RH, having a built-in humidity sensor.
8. STO2-11 outdoor temperature sensor: Set point reset from an external temperature sensor to prevent condensation on windows.
9. SHW0-11 window temperature sensor: Set point reset from an external temperature sensor to prevent condensation on windows.

10. APS-ADJ: Air pressure switch shall be diaphragm operated with pitot tube for field installation. Switch shall have an adjustable set point range of 0.05"WC (1.3mmWC) to 2.0”WC (50mmWC).
11. APS: Air pressure switch shall be diaphragm operated with pitot tube for field installation. Switch shall have a fix control of 0.05” WG (1.3mmWC).
12. IDC: Provide an Internal Drain Cooler (IDC) to automatically limit drain discharge temperature. The drain water must not exceed 140°F (60°C) during normal operation.
13. Drain Cooler: Provide an External Condensate Cooler (with thermostatic valve) to automatically limit drain discharge temperature. The drain water must not exceed 140˚F (60˚C) during normal operation.
14. PUMP404CV condensate pump: High temperature device used to collect and automatically remove drain water produced by the humidifier.
15. BACnet MS/TP: BACnet Master Slave/Token Passing (MS/TP) network interface shall be provided to connect BACnet client devices with Neptronic humidifier devices.
16. BACnet IP: BACnet IP interface shall be provided to allow for data transfer to and from devices over Ethernet using the BACnet IP Protocol.
17. Modbus RTU: Modbus communication protocol shall be provided over serial line in the RTU mode, to provide a Modbus network interface between client devices and Neptronic humidifier devices.
18. Modbus IP: Modbus communication protocol shall be provided with a TCP interface running on Ethernet and to provide a Modbus network interface between client devices and Neptronic humidifier devices.
19. LonWorks: Echelon LonWorks FTT 2 wires communication network protocol shall be provided for use in building automation applications.

Z. Duct distribution manifold complete with supply hose.

## PART 3 EXECUTION

### 3.1 MANUFACTURER'S INSTRUCTIONS

A. Compliance: comply with manufacturer's written recommendations or specifications, including product technical bulletins, handling, storage and installation instructions, and datasheet.

**END OF SECTION 238413**