CAREL USA

CAREL heaterSteam

Electric Element Steam Humidifiers

1. GENERAL

SCOPE

1. Furnish and install as indicated on the drawings and plans, in-duct [space] electric element steam humidifiers.

2. Furnish owner's manuals and blueprints covering installation, start up, maintenance and operating instructions, complete in every way to permit efficient operation and maintenance of the system.

3. Manufacturer shall warrant the system to be free from defects in materials and workmanship for a period of 2 years after the sale.

4. Capacities are as shown on the drawings and plans.

2. PRODUCT

HUMIDIFIERS

1. The humidifiers shall be of the self-generating electric element type, electrically producing atmospheric steam in a 316 stainless steel heli-arc welded steam generator, and capable of operating on normal or demineralized water without modification.

2. The humidifier cabinet shall be constructed of 16 gauge steel, painted or coated inside and out to protect against corrosion and to be aesthetically pleasing. Electrical and steam generating compartments shall be separated, but contained in the same cabinet to minimize field wiring.

3. The electric elements shall be corrosion resistant Titanium and shall be able to be operated dry without burning out. Heater elements that cannot operate dry without burning out are unacceptable. Electrical connection to the elements shall be by screw down connectors. Spark plug type connectors can loosen and are therefore unacceptable.

4. The electric elements shall have embedded temperature sensors for high temperature shut down and stand-by preheating capability.

5. The steam generator shall be constructed of 316 stainless steel with a drain strainer for ease of maintenance. The steam generator shall be able to be removed from the cabinet for cleaning. The top shall be removable by a clamp and sealed with a gasket.

6. The steam generator shall have an external insulation jacket, and on smaller units, a Kevlar internal liner to increase efficiency and make cleaning easier.

7. The humidifier shall have thermal shock feature, removing lime scale from the heating elements, extends the cleaning intervals and make maintenance easier.

8. The steam generator water level control shall be by two float switches housed in an external, pressure-equalized electronic capsule with level indicator LEDs. Electrodes float switches or valves located inside the steam generator are subject to mineral build-up and therefore are not acceptable for water level control.

9. The steam generator shall also have twin sensing electrodes for detection of water foaming. The humidifier shall have the AFS anti-foaming system.

10. Units shall incorporate a power drain pump instead of drain solenoid to provide for more efficient flushing of the steam generator.

11. All internal electrical controls and components shall be prewired to appropriately marked terminals for field connection. All internal components and the cabinet shall be properly grounded and shielded to prevent any line or radiative interference.

12. The humidifier shall incorporate a true microprocessor control providing the following functions:

    a. Start-up wizard with simple step by step machine configuration during first commissioning.
    b. Automatic flushing of the steam generator based on feed water conductivity, not just time, to extend the life of the elements and reduce maintenance cycles. The humidifier shall read the incoming water conductivity to establish drain patterns and eliminate the need for a surface skimmer.
    c. Master – slave capability to extend the capacity with automatic rotation.
    d. Integrated backup of the unit for applications that require continuous service and non-stop operation.
    e. Digital LCD Display of:

    - Incoming water conductivity
    - Electric current draw in Amps
    - Output of the humidifier
    - Selected output limit
    - Model No. and unit configuration
    - Display of sensed %RH on unit
    - Display of %RH setpoint
    - Display of differential

13. The humidifier microprocessor control shall incorporate complete diagnostics, including the following alarms and pre-alarms which shall be shown on the LCD display:

    - Safety thermostat shut down
    - Element overheat
    - Low water level
    - High supply water conductivity
    - Power failure
    - Lack of water
    - Humidity sensor defective
    - Water foaming in steam generator

- Improper steam generator fill rate
- Improper steam generator drain rate
- Diagnostic memory test fail
- Steam generator maintenance required
- All pre-alarms shall be self-correcting.

14. Humidifier shall operate on/off from an external dry contact (humidistat). Manufacturer shall supply a [wall mounted] [duct mounted] control humidistat, duct hi-limit humidistat and duct mounted airflow switch.

15. Humidifier shall operate modulating from an external demand signal provided by either an external controller or DDC system. Manufacturer shall supply a duct mounted hi-limit humidistat and duct mounted airflow switch.

16. Humidifier shall operate stand-alone and modulating from the internal controller and an external [wall] [duct] humidity sensor provided by the manufacturer. Manufacturer shall supply a [wall mounted] [duct mounted] humidity sensor, duct mounted hi-limit humidistat and duct mounted airflow switch.

17. Humidifier shall have RS485 serial port ready to communicate on Modbus, BacNet or Carel protocol with no additional devices.

18. Humidifier shall have Ethernet port ready to communicate on Modbus, BacNet protocol with no additional devices.

19. Humidifier shall have a integrated web server is used to configure and monitor the main unit parameters directly from a PC. In fact, using the Ethernet port on the humidifier controller, the unit can be accessed via a local network by simply entering its IP address in the browser.

20. Humidifier shall have Tera cloud or encrypted VPN connection remote access only via a secure connection.

21. If modulating, modulation of steam output shall be controlled by a microprocessor controlling an SSR to pulse the power to the electrodes. The SSR shall be protected with a cooling fan and thermal overload switch requiring manual reset.

22. Humidifier shall have the ability to maintain a set water temperature during periods of no humidification demand in order to keep restart times at a minimum.

23. Each humidifier shall have a built in serial adapter connection allowing future interface to computer or EMS systems if required. This shall be complete serial communication of all set-points, status and alarms, not just acceptance of a modulating signal. Manufacturer shall have available graphic monitoring/control software capable of running in Windows.

24. The humidifier controller shall have a built in USB port to be used for software updates, log file and alarm history extraction.

25. [Optional] The humidifiers shall be provided with a direct [remote] mount Room Distribution Unit for direct discharge of humidifying steam into the area to be humidified.

26. [Optional] The humidifier shall be able to accept an outdoor reset temperature sensor and automatically reset the relative humidity set point based on outside temperature conditions to prevent building condensation.

27. The humidifier must be able to accept a second humidity sensor input for use in the supply air duct, and incorporate control logic to reduce the capacity of the humidifier in response to approaching the high limit sensor set point. This feature is necessary for VAV operation.

28. Humidifier shall be ETL, cETL or UL, cUL listed.

3. Installation

1. The humidifiers shall be installed as per the plans and drawings, connected to a cold water feed line, and a hot water drain line and electrical service sized appropriately for the maximum current draw of the unit. All wiring shall be in accordance with national and local electrical codes.

2. Manufacturer shall supply a duct mounted air flow proving device to prevent system operation on loss of air flow.
3. Manufacturer shall supply a duct mounted high limit humidistat to prevent condensation in the duct.

GENERAL OPERATING SEQUENCE AND CONTROL

1. All humidity sensors shall continuously send their signals to the humidifier for processing and indication.

2. On a signal indicating a requirement for humidity, the humidifier shall read the feed water conductivity and initiate the diagnostic sequence. Upon completion, the conductivity shall be entered into memory to control the steam generator flushing cycle and the power contactor shall be energized. The fill valve shall be activated as required to reach output and replenish water being boiled off or drained.

3. If the humidifier is operating on modulating control, it shall track with the control signal; adjust capacity as required to supply the humidity requirements. Tracking with the signal shall be immediate, without delay.

4. The humidifier shall incorporate "adaptive intelligence" to prevent it from hunting and reduce fluctuations to minimum automatically zeroing to the setpoint.

5. The humidifier shall automatically monitor the heating elements in the steam generator to indicate when the steam generator is approaching its maintenance time, but without shutting down the humidifier.

4. EXECUTION

GENERAL

1. Install the humidifiers as detailed in the installation drawings and schedules and/or as recommended by the manufacturer.

2. Manufacturer to furnish complete submittal drawings before installation and operating manuals after.

3. Humidifiers shall be the Carel HeaterSteam series electric element steam humidifiers as manufactured and distributed by:

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