

**SUGGESTED ENGINEERING SPECIFICATIONS**  
**CAREL *GaSteam Gas-Fired Steam Humidifier*****15781 HUMIDIFIERS****I. GENERAL****A. Scope**

1. Furnish and install as indicated on the drawings and plans, in-duct [space] Gas fired 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.

**II. PRODUCT****A. Humidifiers**

1. The humidifiers shall be of the self generating gas fired type producing atmospheric steam in a 316 stainless steel heli-arc welded reservoir, 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 humidifier shall be constructed with combustion air and flue gas venting inlets and outlets on both the top and rear of cabinet.
4. The humidifier shall be constructed with a modulating gas valve that can be field calibrated for Natural Gas and Propane, without changing out any parts.
5. The heat exchanger shall be constructed of an aluminum alloy casting with a non-stick coating, to provide maximum surface area for maximum steam production efficiency, which shall be 89% without condensing.
6. The steam generating reservoir shall be constructed of 316 stainless steel with a full top access panel and a front access panel for ease of cleaning. The reservoir shall be provided with an external insulation jacket to increase efficiency.
7. The steam generator water level control shall be by three float switches housed in an external, pressure-equalized transparent capsule. 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.

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8. The humidifier shall have the patented AFS Anti-Foaming System that senses and eliminates water foaming.
9. The humidifier shall incorporate a power drain pump instead of a drain solenoid to provide for more efficient flushing of the reservoir.
10. All internal electrical controls and components shall be pre-wired 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.
11. The humidifier shall incorporate a dedicated microprocessor control providing for all control functions including automatic flushing of the steam generating reservoir based on feed water conductivity, modulation of the gas valve and air blower, monitoring of the burner, heat exchanger, flue and intake air, self-test and run time hour counter.
- 12a. [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.]
- 12b. [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.]
- 12c. [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.]
13. 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. This preheat programming function shall be differential sensitive for increased efficiency.
14. Each humidifier shall have a built in serial adapter connection allowing future interface to computer or BMS 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 interface gateways for ModBus, BacNet, LonWorks and graphic monitoring/control software capable of running in Windows.
15. The humidifier controller shall have a dry contact for coordination of an external dehumidifier to prevent fighting between the systems.
16. [Optional] The humidifiers shall be provided with a remote mount Room Distribution Unit for direct discharge of humidifying steam into the area to be humidified.
17. [Optional] The humidifier shall be supplied with an outdoor reset temperature sensor and will automatically reset the relative humidity set point based on outside temperature conditions to prevent building condensation.
18. [Optional] The humidifier will 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.

## **SUGGESTED ENGINEERING SPECIFICATIONS**

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19. [Optional] The humidifier shall be provided with the HumiVisor remote control panel capable of linking up to 4 humidifiers.
20. Humidifier shall be ETL, cETL, or UL, cUL listed.

#### **B. 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. All wiring shall be in accordance with national and local electrical codes. All gas piping shall be in accordance with national and local gas appliance codes.
2. Manufacturer shall supply a duct-mounted airflow-proving device to prevent system operation on loss of airflow.
3. Manufacturer shall supply a duct mounted high limit humidistat to prevent condensation in the duct.

#### **C. 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 heat exchanger in the steam generator to indicate when the steam generator is approaching its maintenance time, but without shutting down the humidifier.

### **III. EXECUTION**

#### **A. 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.

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**CAREL *GaSteam Gas-Fired Steam Humidifier***

3. Humidifiers shall be the Carel GaSteam series gas-fired steam humidifiers as manufactured and distributed by:

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