



SUGGESTED ENGINEERING SPECIFICATIONS
DSO – UltimateSteam
Single Pipe Direct Injection Steam Humidifiers

SECTION 23 84 13

I. GENERAL

A. Scope

1. Furnish and install as indicated on the drawings and plans, in-duct direct injection steam humidifiers.
2. Furnish owner's manuals and drawings covering installation, start up, maintenance and operating instructions, complete in every way to permit efficient operation and maintenance of the system.
3. Humidifier shall be warranted by the Manufacturer for a period of two (2) years from the date of installation or 2 years and 1 month from date of shipment, whichever comes first.

II. PRODUCT

B. Humidifiers

1. The humidifiers shall be of the direct discharge type, using steam from existing steam lines or boilers to be injected into the air plenums for humidification.
2. Each humidifier shall consist of single or multiple, horizontal steam discharge pipe(s), supported by integral duct mount plates. Each humidifier shall be sized to match the air plenum width for maximum contact of the discharging steam to the air passing over the horizontal steam discharge pipe.
3. The horizontal steam discharge pipe shall be constructed of all 304 stainless steel or equivalent, having a full-length slot on top for steam discharge at 100% air to steam contact. Nozzles and holes are unacceptable as they have less than 15% air to steam contact, which will result in longer evaporation distances.
4. A full-length feed pipe shall be placed inside the discharge pipe to evenly distribute the incoming steam over the length of the top discharge slot, resulting in full separation of condensate from the steam and dried steam discharge without spitting.

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5. The steam discharge pipe shall be coated with a thin, non-toxic insulative coating capable of reducing surface temperature to no more than 120°F during operation, to reduce condensate losses and heat gain to the air stream. The insulative coating shall have an insulating value at 30 mils equal to 8" of R-40 foam. The insulative coating shall have a flame spread and smoke developed rating of 5 under ASTM E-84 with a cross-hatch adhesion of 100% under ASTM D-3359, acceptable for use in air ducts.
6. The steam humidifier shall be designed (with the exception of the traps, strainer, valve and actuator) for zero maintenance, having no plastic nozzles, collars, o-rings or gaskets.
7. Each humidifier shall be controlled by a modulating DDC signal from the BAS system.
8. Each humidifier shall be supplied with an electronic [pneumatic] actuated linear discharge plug-type steam control valve, sized for the required capacity and steam pressure.
9. Each humidifier shall be supplied with all necessary steam specialty items including strainer and traps as required by the manufacturer.

C. Installation

1. The humidifiers shall be installed as per the plans and drawings, manufacturer's installation manuals, and in accordance with national and local codes.
2. Manufacturer shall supply a duct mounted differential pressure air flow proving switch to prevent humidifier operation on loss of air flow.
3. Manufacturer shall supply a duct mounted high limit humidistat to prevent condensation in the duct.

III. EXECUTION

D. 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 UltimateSteam series direct steam humidifiers as manufactured and distributed by:

CAREL USA

385 South Oak Street · Manheim, PA 17545

Ph: 717-664-0500 · FAX: 717-664-0449

Email: sales@carelusa.com

www.humidifynow.com



SUGGESTED ENGINEERING SPECIFICATIONS
DSB, DST – UltimateSteam
Multi-Pipe Direct Injection Steam Humidifiers

SECTION 23 84 13

I. GENERAL

A. Scope

1. Furnish and install as indicated on the drawings and plans, in-duct direct injection steam humidifiers.
2. Furnish owner's manuals and drawings covering installation, start up, maintenance and operating instructions, complete in every way to permit efficient operation and maintenance of the system.
3. Humidifier shall be warranted by the Manufacturer for a period of two (2) years from the date of installation or 2 years and 1 month from date of shipment, whichever comes first.

II. PRODUCT

A. Humidifiers

1. The humidifiers shall be of the direct discharge type, using steam from existing steam lines or boilers to be injected into the air plenums for humidification.
2. Each humidifier shall consist of multiple, vertical steam discharge pipes, supported on horizontal header manifolds, spaced to provide the optimum of steam to air contact while minimizing pressure drop. Each humidifier shall be sized to nominally match the air plenum width and height for maximum contact of the discharging steam to the air passing around the vertical steam discharge pipes.
3. The vertical steam discharge pipes shall be constructed of all 304 stainless steel or equivalent, each having a full-length, inverted slot on each side, for steam discharge at 100% air to steam contact. Nozzles and holes are unacceptable as they have less than 15% air to steam contact, which will result in longer evaporation distances and possible wetting.
4. A full-length stainless steel fishbone shaped baffle shall be used inside the vertical discharge pipe to wick condensate away from the discharge slots and back to the center of the pipe for re-evaporation.
5. The feeder manifolds shall be constructed of all 304 stainless steel or equivalent, sized to move the steam in a specific mass-flow speed range, for maximum condensate separation. Final condensate separation shall occur inside the feeder manifolds, after the control valve, with the dried steam then injected directly into the vertical discharge pipes.
6. The vertical steam discharge pipes and horizontal feeder manifolds shall be coated with a thin, non-toxic insulative coating capable of reducing surface temperature to no more than

SUGGESTED ENGINEERING SPECIFICATIONS
2DSB, DST – UltimateSteam
Multi-Pipe Direct Injection Steam Humidifiers

7. 120°F during operation, to reduce condensate losses and heat gain to the air stream. The insulative coating shall have an insulating value at 30 mils equal to 8” of R-40 foam. The insulative coating shall have a flame spread and smoke developed rating of 5 under ASTM E-84 with a cross-hatch adhesion of 100% under ASTM D-3359, acceptable for use in air ducts.
8. The steam humidifier shall be designed with slip fittings for easy assembly and (with the exception of the traps, strainer, valve and actuator) shall be designed for zero maintenance, having no plastic nozzles, collars, o-rings or gaskets.
9. Each humidifier shall be controlled by a modulating DDC signal from the BAS system.
10. Each humidifier shall be supplied with an electronic [pneumatic] actuated linear discharge plug-type steam control valve, sized for the required capacity and steam pressure.
11. Each humidifier shall be supplied with all necessary steam specialty items including strainer and traps as required by the manufacturer.

B. Installation

1. The humidifiers shall be installed as per the plans and drawings, manufacturer’s installation manuals, and in accordance with national and local codes.
2. Manufacturer shall supply a duct mounted differential pressure air flow proving switch to prevent humidifier operation on loss of air flow.
3. Manufacturer shall supply a duct mounted high limit humidistat to prevent condensation in the duct.

III. EXECUTION

A. General

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