DRISTEEM®
The humidification experts

XT

Electrode Steam
Humidification System

PRODUCT CATALOG

- *Affordable*
- *Easy to maintain*
- *Vapor-logic® 4 controller*

Cost-effective steam humidification

The XT humidifier is easy to maintain. Just replace the affordable plastic cylinder. Cylinder replacement frequency varies with humidifier usage and water hardness.

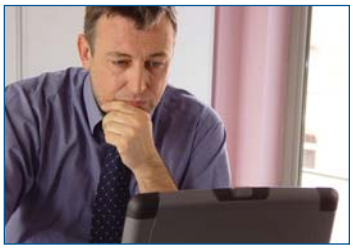
DRI-STEEM XT electrode steam humidifiers provide reliable humidification for a wide range of buildings, including office buildings and health care, government, and educational facilities. Low up-front cost and minimal maintenance make XT one of the most affordable humidification systems to purchase and install.

Quick and easy maintenance

Just replace the affordable plastic cylinder when prompted.

Comprehensive control with Vapor-logic4

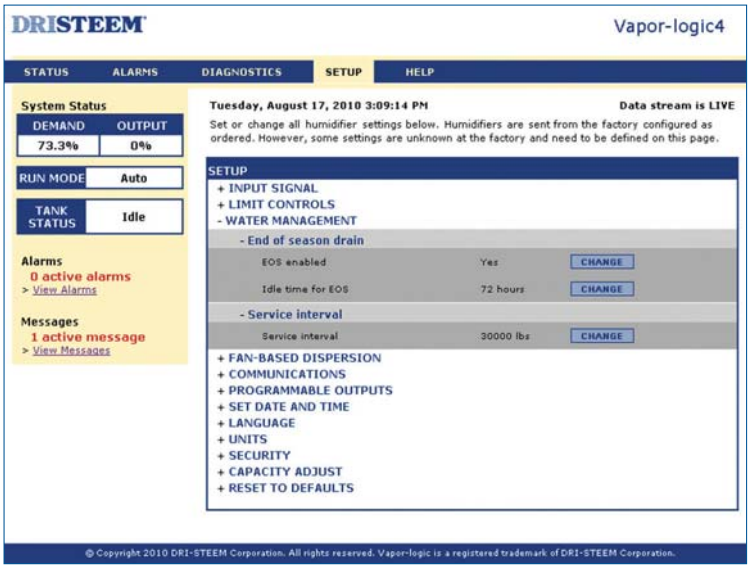
XT humidifiers with Vapor-logic4 set new standards for control in electrode steam humidification:



Interoperability allows communication with building automation systems via Modbus or with optional BACnet or LonTalk protocols.

Proprietary algorithm auto tunes drain and fill events to keep electrical current within demand parameters for optimized humidifier performance.

Web-enabled control allows you to set up, view, and adjust humidifier functions via Ethernet, either directly or remotely through a network.



XT humidifier features and benefits

Proven performance with Vapor-logic®4

- Algorithm auto tunes drain and fill events to optimize humidifier performance based on water conditions and steam production
- Quickly responds to changing humidification demands
- Capable of controlling RH within 3% of set point in standard modulating mode using a modulating demand input signal from a humidistat or an RH input signal from a transmitter
- Capable of controlling RH within 5% of set point in on-off mode

Application flexibility

- Capacity range from 5 to 200 lbs/hr (2 to 90 kg/h). See Table 5-1.
- Stage up to four humidifiers together for maximum system capacity of 800 lbs/hr (360 kg/h).
- Uses hard or softened water. See "Application considerations" on Page 30.
- Aesthetically pleasing cabinet for finished-space applications.
- Compact in size; fits easily into small spaces.
- Disperses steam through ductwork via dispersion devices or directly into a space with a steam blower.

Minimal maintenance

No cleaning required. Simply replace the plastic cylinder when prompted. Replacement frequency varies with humidifier usage and water type.

Integral water tempering

If doing maintenance and the unit is hot, water is automatically tempered to send cooled water to the drain.

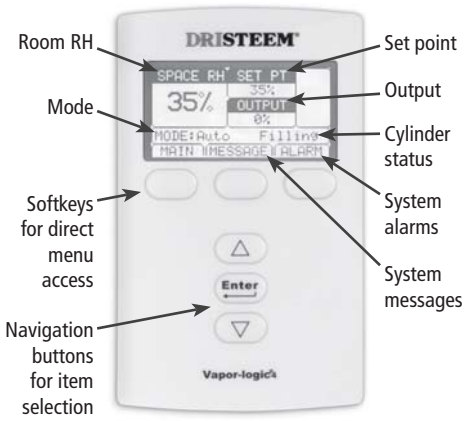
Prevents microbial growth

Cylinder automatically drains after a specified time with no call for humidity. Time is user adjustable; default is 72 hours.

DRI-STEEM XT electrode steam humidifiers are ideal for finished-space and limited-space applications. Electrical connections are easily accessible, and plumbing connections are included for fast, hassle-free installation.

Vapor-logic4 controller

Keypad/display



Insert a USB flash drive into the Vapor-logic4 board's USB port to perform firmware updates, or to back up and restore data.

Accurate, responsive control

The Vapor-logic4 controller provides accurate, responsive RH control. PID control tunes the system for maximum performance.

Modbus, BACnet, or LonTalk allow interoperability with multiple building automation systems. Modbus is standard, and BACnet or LonTalk are available options.

Web interface provides the capability to set up, view, and adjust humidifier functions via Ethernet, either directly or remotely through a network.

Cycle counter triggers a message when it's time to replace the contactor.

USB port allows easy firmware updates, and data backup and restore capability.

Real-time clock allows time-stamped alarm and message tracking.

Algorithm monitors water conductivity and auto tunes drain and fill events to optimize humidifier performance.

Programmable outputs allow remote signaling and device activation.

Controller data, such as RH, water use, energy use, alarms, and messages, can be downloaded to a PC for viewing and analysis. RH, alarms, and messages can also be viewed on the keypad/display and Web interface.

Enhanced diagnostics include:

- **Test outputs** function using keypad/display or Web interface to verify component operation
- **Test humidifier** function using simulated demand to validate performance

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XT humidifier specifications, capacities, and weights

Table 5-1:
XT humidifier specifications

XT model	kW	Max. steam capacity		Current draw (amps)												Shipping weight		Max. operating weight	
				Single-phase							Three-phase								
		lbs/hr	kg/h	120V	208V	230V	240V	277V	480V	600V	208V	240V	400V	480V	600V	lbs	kg	lbs	kg
5	1.7	5	2.3	14.2	8.2	7.4	7.1	—	—	—	—	—	—	—	—	47.2	21.4	46.3	21.0
10	3.4	10	4.5	—	16.3	14.8	14.2	12.3	7.1	5.7	9.4	8.2	4.9	4.1	3.3	47.2	21.4	46.3	21.0
20	6.7	20	9.1	—	32.2	29.1	27.9	24.2	14.0	11.2	18.6	16.1	9.7	8.1	6.4	48.1	21.8	54.0	24.5
30	10.1	30	13.6	—	—	—	—	—	—	—	28.0	24.3	14.6	12.1	9.7	62.2	28.2	87.5	39.7
50	16.8	50	22.7	—	—	—	—	—	—	—	46.6	40.4	24.2	20.2	16.2	62.2	28.2	87.5	39.7
75	25.1	75	34.0	—	—	—	—	—	—	—	—	—	36.2	30.2	24.2	75.2	34.1	124.3	56.4
100	33.5	100	45.4	—	—	—	—	—	—	—	—	—	48.4	40.3	32.2	75.2	34.1	124.3	56.4
150	50.3	150	68.1	—	—	—	—	—	—	—	—	—	72.6	60.5	48.4	129.2	58.6	242.9	110.2
200	67.0	200	90.8	—	—	—	—	—	—	—	—	—	96.7	80.6	64.5	129.2	58.6	242.9	110.2

Note: For circuit protection requirements, see the fusing and line currents table in the "Overview" section of the *XT Electrode Steam Humidifier Installation, Operation, and Maintenance Manual* (available at www.dristeem.com).

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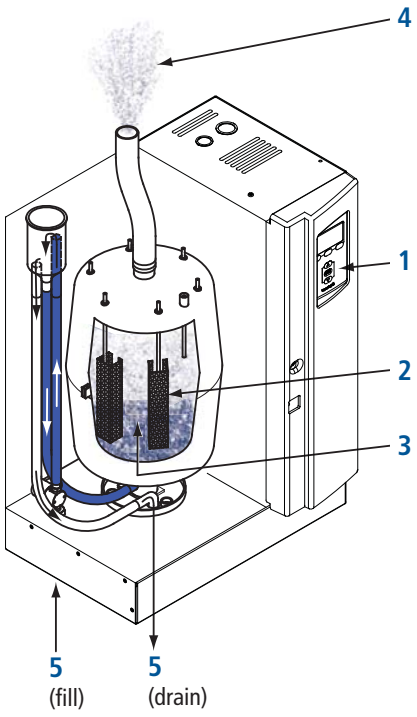
XT humidifier principle of operation

Humidifier performance is optimized based on water conditions and steam production. An algorithm in the on-board controller monitors water conductivity and auto tunes drain and fill frequency and duration to keep electrical current within demand parameters.

Figure 6-1:
XT humidifier principle of operation



1. Controller receives a call for humidity

When the RH level in the humidified space drops below set point, the humidifier controller receives a call for humidity and calculates a corresponding electrical current. The controller closes the contactor, which energizes the electrodes. If there is not enough water in the steam cylinder, the fill valve opens and water enters the steam cylinder.

2. Energized electrodes boil water into steam

When the water level in the steam cylinder rises to touch the electrodes, electrical current flows through the water between the electrodes. Electrical resistance in the water causes the water to heat up and boil into steam. The steam flows through the steam outlet and through steam hose, tubing, or piping to the steam blower or dispersion assembly, where it is discharged into the airstream.

3. Electrical current increases to meet demand

As the amount of water covering the electrodes increases, current flow increases. The fill valve remains open until the amperage increases to 10 percent above the current corresponding to the demand signal. Then the fill valve closes, and the water boils into steam.

4. Water continues to boil into steam

As the water boils into steam, the amount of water covering the electrodes decreases, and current flow decreases. When current flow decreases to 10 percent below the current corresponding to the demand signal, the fill valve opens to increase the water level in the steam cylinder, which increases current flow and steam production.

5. Controller initiates drain/fill events to flush conductive ions

As steam production continues, the concentration of conductive ions in the water increases, eventually leading to increased electrical current through the water. An algorithm monitors water conductivity and auto tunes drain and fill events to keep electrical current within demand parameters. This optimizes humidifier performance based on water conditions and steam production.

The humidifier has integral drain water tempering. Drain water is automatically cooled before entering the drain.

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Figure 7-1:
XT humidifier components

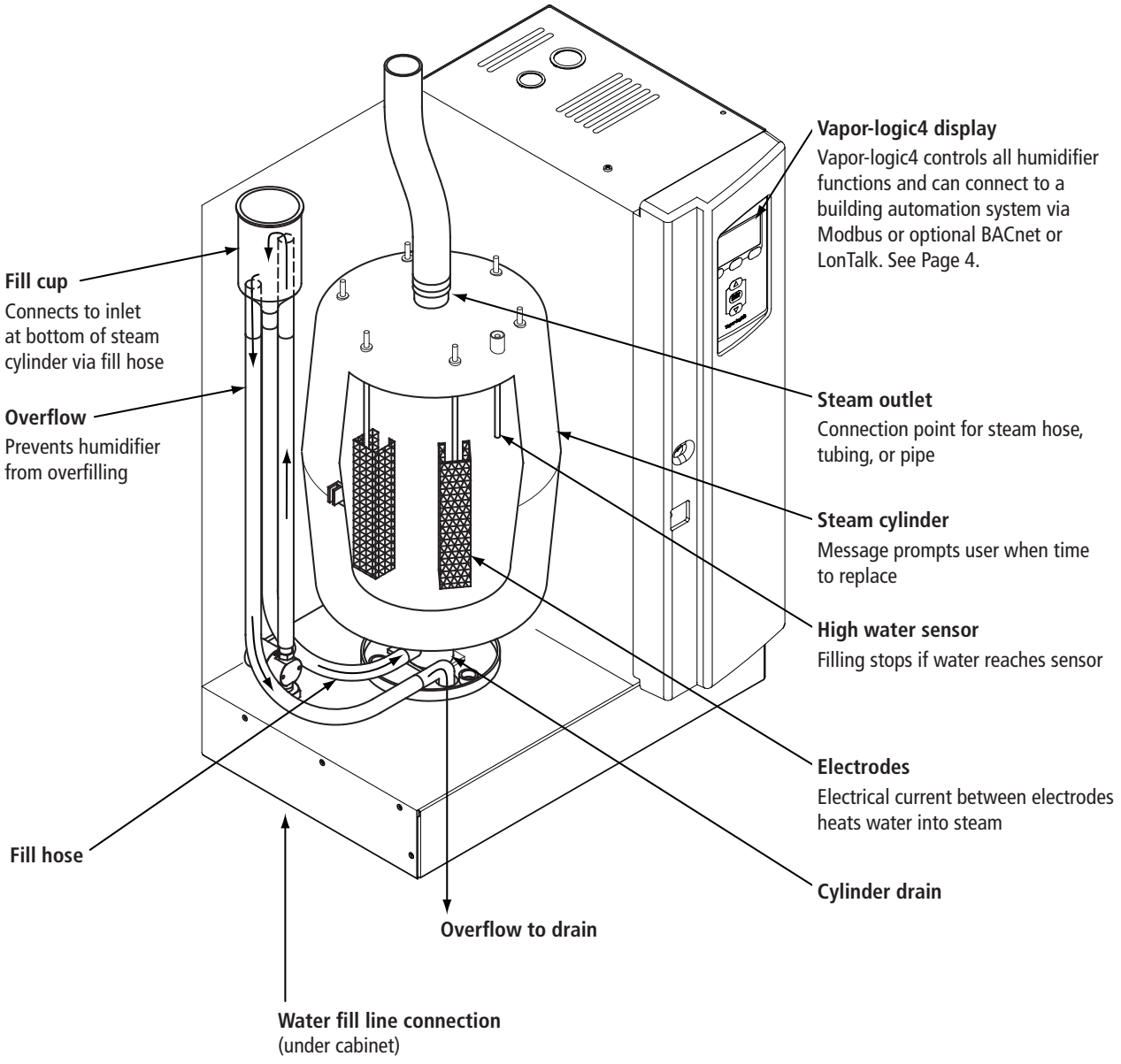

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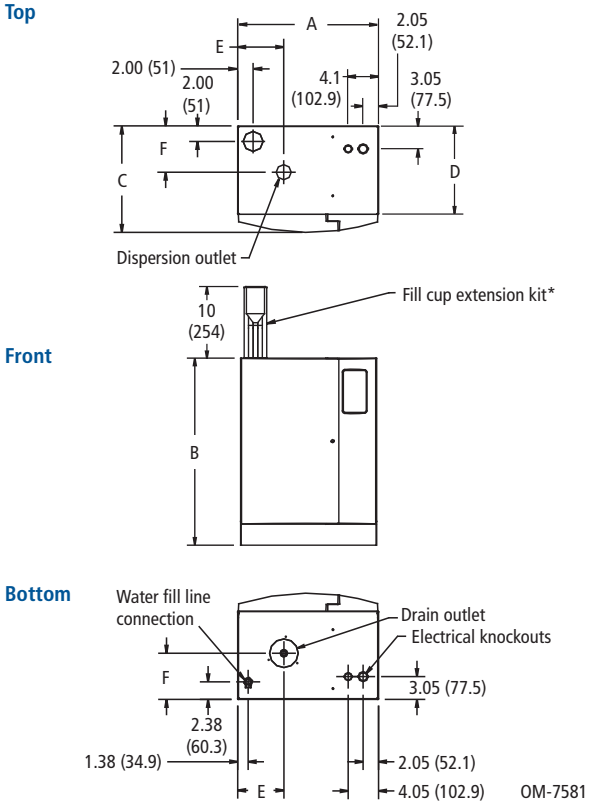
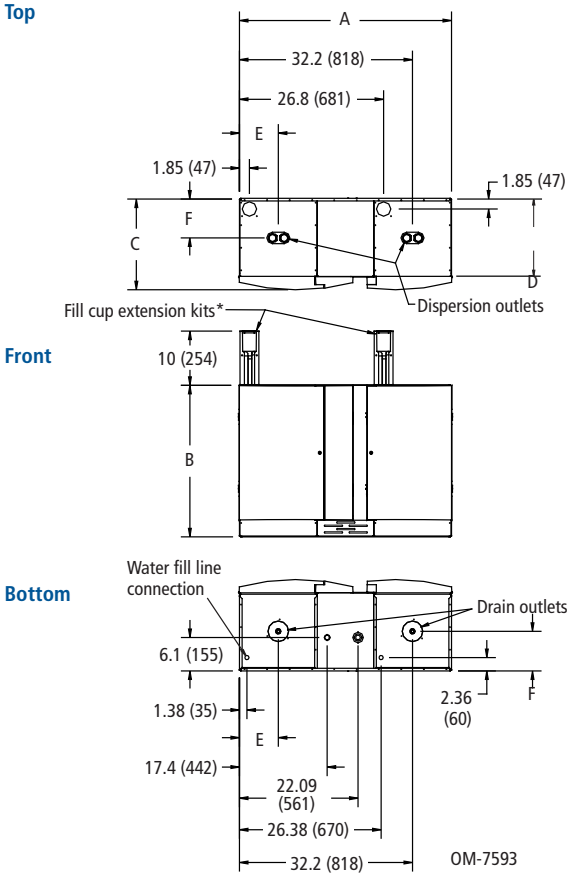
Figure 8-1: XT humidifier dimensional drawings

XT models 5 through 100



XT models 150 and 200



Notes:

* Fill cup extension kit is required and ships with XT models 75 through 200 (ships loose). It is also required for XT models 30 and 50 for the conditions described in Table 16-1, and all XT humidifiers using Rapid-sorb or Ultra-sorb dispersion.

- Labeled dimensions: inches (millimeters).
- See mounting dimensions and electrical knockouts in Figure 9-1.

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Table 8-1: Dimensions by model number

Dimension	Description	XT models							
		5, 10, and 20		30 and 50		75 and 100		150 and 200	
		inches	mm	inches	mm	inches	mm	inches	mm
A	Cabinet width	16.1	409	19.2	488	21.5	546	39.8	1011
B	Cabinet height	23.9	607	25.8	655	28.0	711	28.0	711
C	Cabinet depth including doors	12.1	307	14.1	358	16.9	429	17.0	432
D	Cabinet depth not including doors	10	254	11.8	300	14.4	366	14.4	366
E	Cabinet left edge to steam/drain outlet centers	4.6	117	6.2	157	7.2	183	7.2	183
F	Cabinet back edge to steam/drain outlet centers	6.1	155	6.2	157	7.2	183	7.2	183

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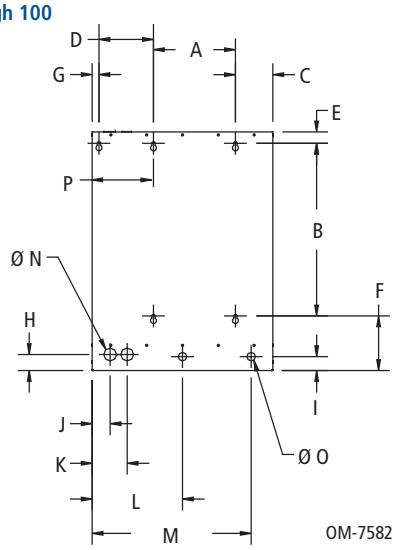
XT humidifier mounting and clearances

Figure 9-1:
XT humidifier mounting keyhole locations

XT models 5 through 100



XT models 150 and 200

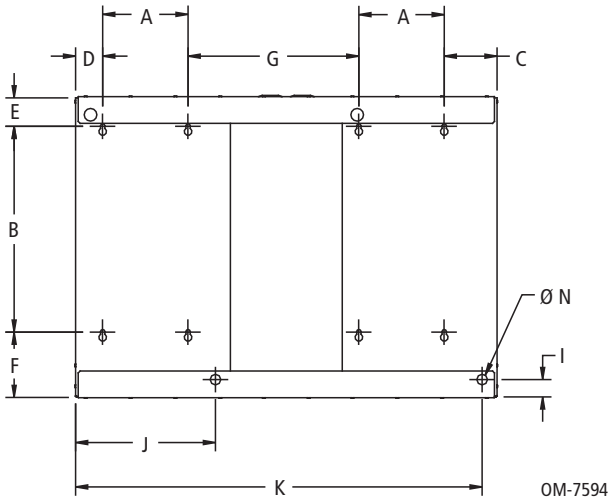


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Table 9-1:
XT humidifier mounting keyhole dimensions

Dimension	XT models							
	5, 10, and 20		30 and 50		75 and 100		150 and 200	
	inches	mm	inches	mm	inches	mm	inches	mm
A	5.0	127	8.2	208	9.6	244	8.0	203
B	16.5	419	18.1	460	20.2	513	19.3	490
C	3.6	91	3.6	91	4.4	112	5.0	127
D	—	—	—	—	6.4	163	2.5	64
E	1.0	25	1.3	33	1.3	33	2.7	69
F	6.4	163	6.4	163	6.4	163	6.2	157
G	—	—	—	—	0.8	20	16.0	406
H	1.9	48	1.9	48	1.9	48	—	—
I	1.6	41	1.6	41	1.6	41	1.7	43
J	2.1	53	2.1	53	2.1	53	13.1	333
K	4.1	104	4.1	104	4.1	104	38.1	968
L	7.9	201	9.5	241	10.6	269	—	—
M	14.4	366	17.4	442	18.7	475	—	—
N	1.5	38	1.5	38	1.5	38	1.0	25
O	1.0	25	1.0	25	1.0	25	—	—
P	7.1	180	7.1	180	7.2	183	—	—

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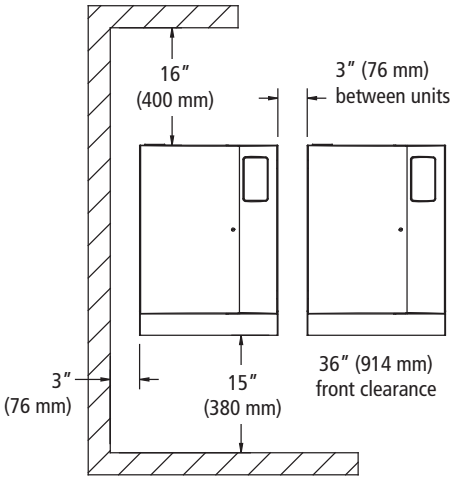
Mount the XT humidifier to wall studs using the lag bolts provided and the mounting keyholes on the back of the cabinet.

Maintain clearances as shown in Figure 9-2.

Figure 9-2:
XT humidifier recommended minimum clearances



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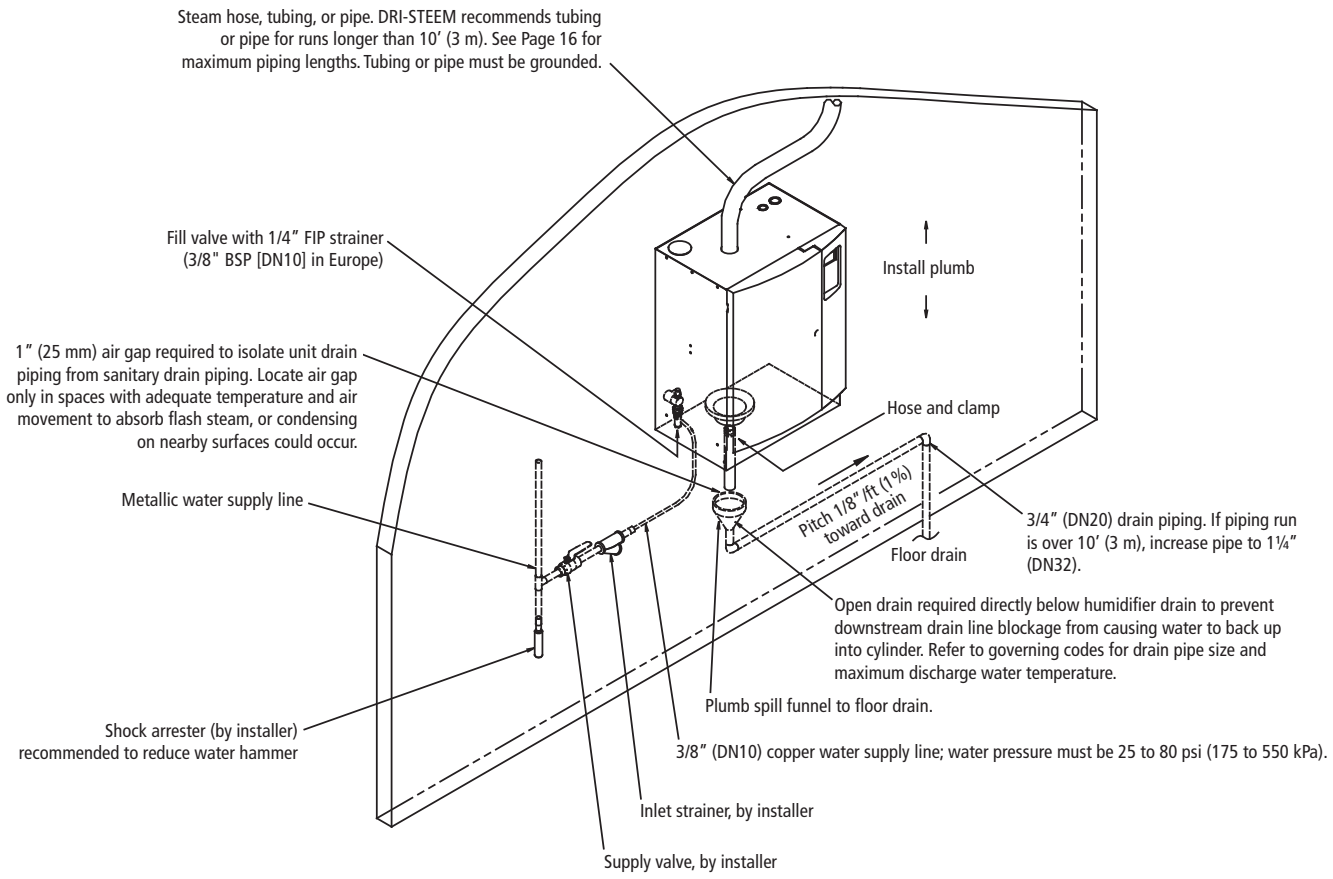
XT humidifier piping: Models XT-5 through XT-100

Figure 10-1:
XT humidifier field piping overview, models 5 through 100



Notes:
- XT models 75 and 100 are shipped with a fill cup extension.
- Dashed lines indicate provided by installer.

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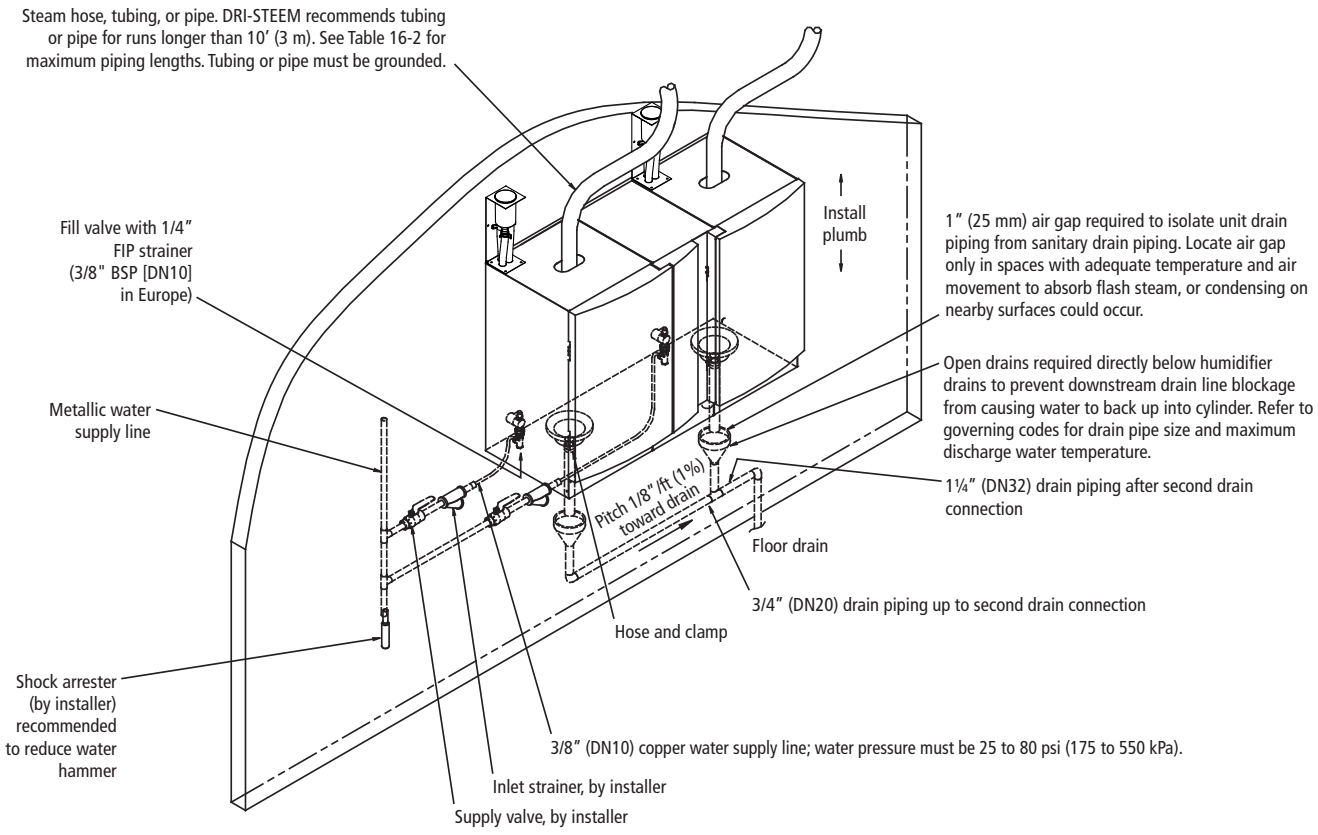
XT humidifier piping: Models XT-150 and XT-200

Figure 11-1:
XT humidifier field piping overview, models 150 and 200



Note: Dashed lines indicate provided by installer.

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XT humidifier duct dispersion options

Figure 12-1:
Ultra-sorb Models LV

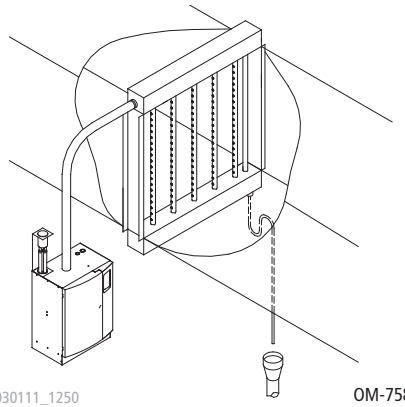

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Figure 12-2:
Rapid-sorb

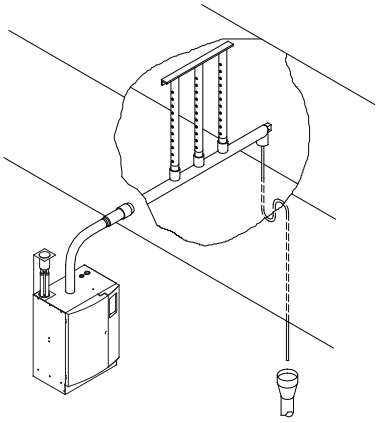

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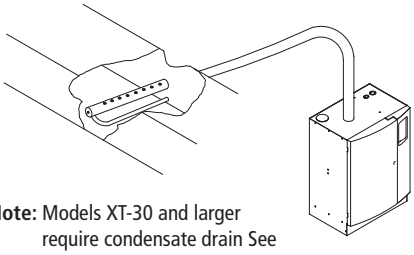
Figure 12-3:
Single dispersion tube



Note: Models XT-30 and larger require condensate drain See Figure 27-2.

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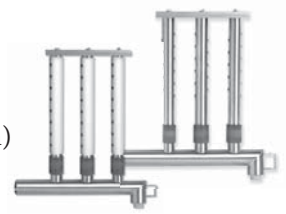
Ultra-sorb® Model LV

- Double-header design
- Shortest non-wetting distance; install within inches of upstream dampers, coils, or elbows without dripping
- Steam capacity up to 1,850 lbs/hr (839 kg/h)
- Factory assembled for easy installation
- High-efficiency tube option

Rapid-sorb®



- Single-header design
- Short non-wetting distance
- Steam capacity up to 800 lbs/hr (363 kg/h)
- Assembled on-site
- High-efficiency tube option

Single or multiple tubes

- Horizontal or vertical airflow
- Available with or without condensate drain
- Steam capacity up to 85 lbs/hr (39 kg/h)

High-efficiency Tube option

- Up to 85% reduction in wasted energy, airstream heat gain, and condensate production
- PVDF insulation is plenum-approved for in-duct installation
- Will not absorb water or support microbial growth; has a closed-cell structure
- Available on Ultra-sorb and Rapid-sorb

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Ultra-sorb Model LV with high-efficiency tubes

XT humidifier open space dispersion options

XT steam blowers

XT steam blowers (XTSB), designed to disperse steam directly into large open spaces, are particularly useful in finished spaces and rooms where there are no air-handling ducts.

There are two XTSB models:

XTSB-20, for capacities up to 20 lbs/hr (9.1 kg/h), can be directly mounted on XT humidifier models 5, 10, and 20.

XTSB-50, for capacities up to 50 lbs/hr (22.7 kg/h), can be directly mounted on XT humidifier models 30 and 50.

XT humidifiers can be configured to operate with one or more XTSB. Multiple XTSB-50 are used remotely with XT-75 and larger humidifiers. See Table 13-1.

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For more information on XTSB, see Pages 28 and 29.

Table 13-1:
Single or multiple XTSB for XT humidifier models*

XT model	XTSB-20 units per kit	XTSB-50 units per kit
5	1	—
10	1	—
20	1	—
30	—	1
50	—	1
75	—	2
100	—	2
150	—	4
200	—	4

* XTSBs are sold as kits to match the associated XT humidifier. The number of XTSB units per kit are shown in this table.

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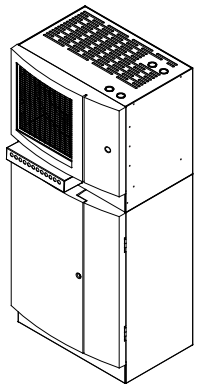
Figure 13-1:
Top- and remote-mounted XTSB

Mounted on top of humidifier



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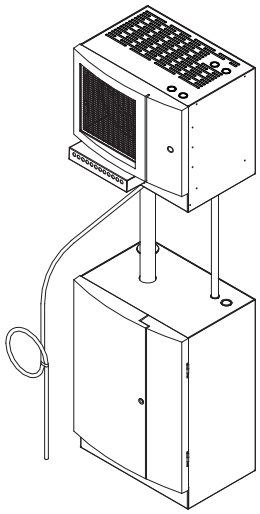
Condensate returned to steam cylinder fill hose.

Mounted remotely from humidifier



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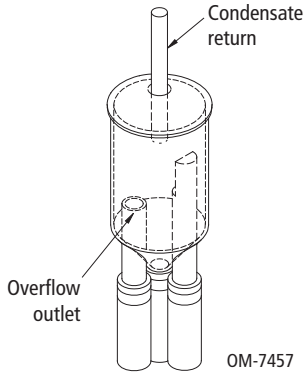
Condensate returned to open drain. Condensate can also be returned to humidifier fill cup.

Condensate from remote XTSB returned to humidifier fill cup



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Use DRI-STEEM condensate hose or copper tubing. To avoid foaming, thoroughly flush copper tubing to remove residue before routing to fill cup.

Offset condensate return hose so it is not above overflow outlet.

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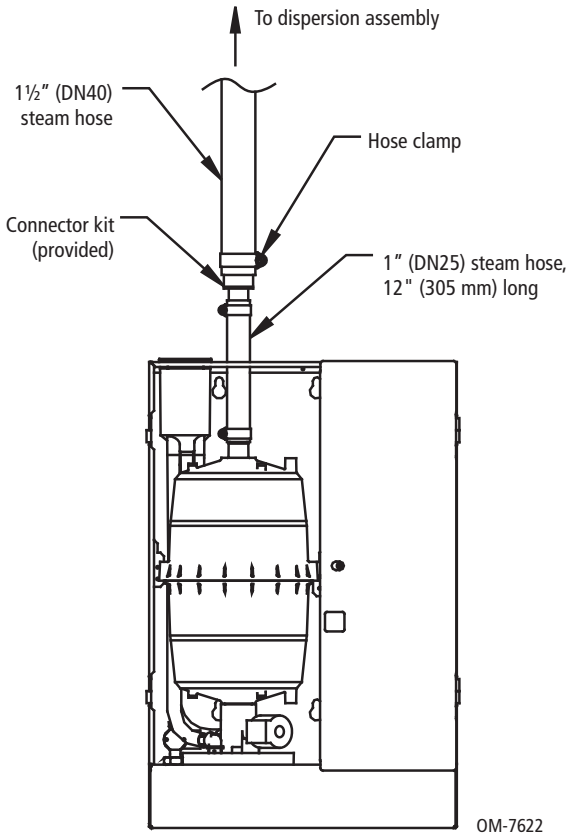
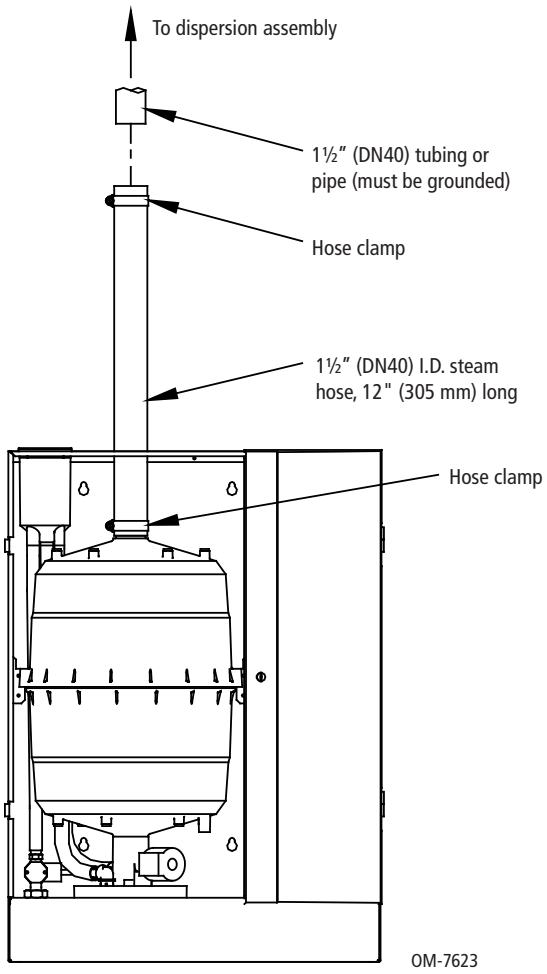
Figure 14-1:
Steam outlet connections, XT models 5 through 75

Steam outlet connections to steam hose (XT models 5, 10, 20 shown)



Steam outlet connections to tubing or pipe (XT models 30, 50, 75 shown)



Notes:
- Steam hose and clamps are provided with these humidifiers.
- XT-75 is shipped with a fill cup extension.

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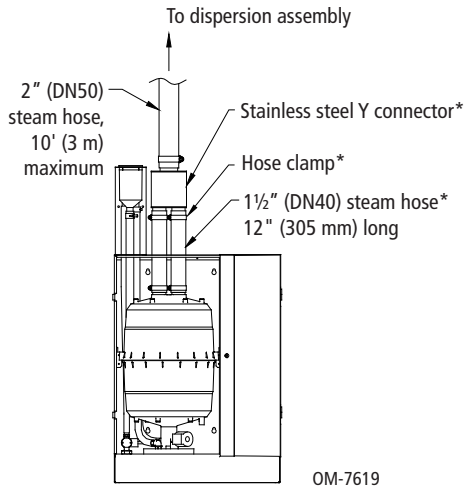
Piping: Steam outlet connections with hose, XT models 100 through 200

Figure 15-1:
Steam outlet connections for XT models 100 through 200 within 10' (3 m) of dispersion assembly

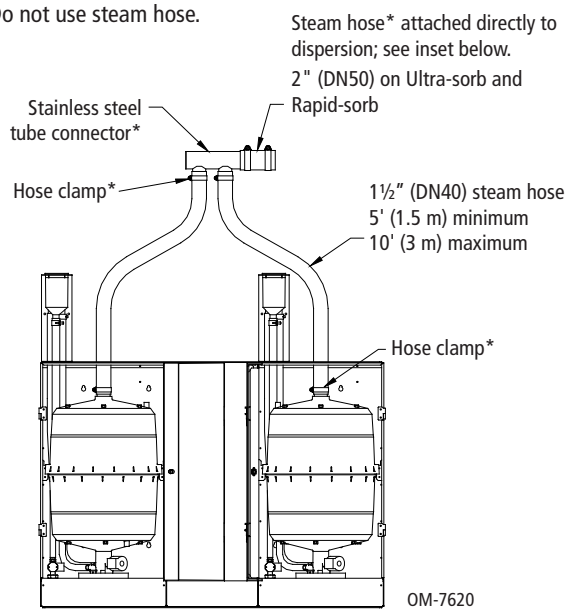
Note: For horizontal runs longer than 5' (1.5 m), hard pipe or tubing is required. Do not use steam hose.

XT-100



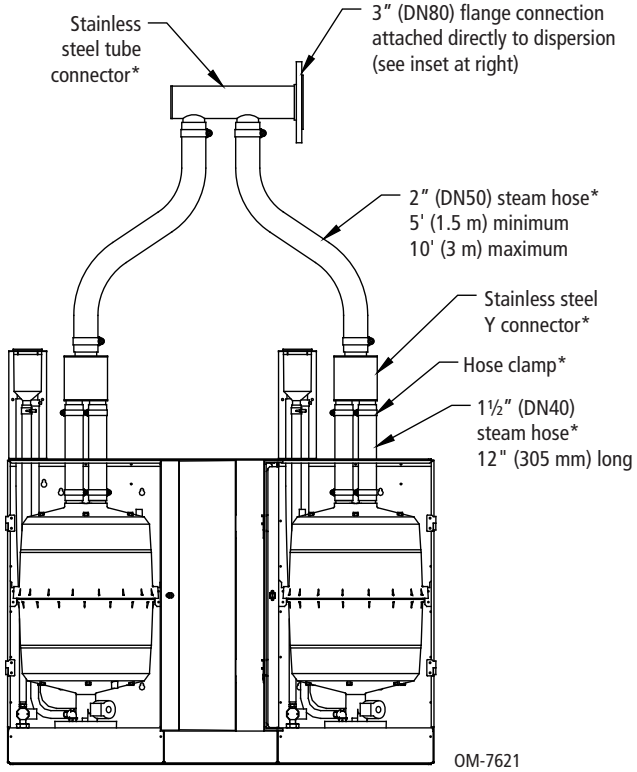
* Stainless steel Y connector, two 1½" (DN40) hoses, and four hose clamps ship with each XT-100 humidifier.

XT-150



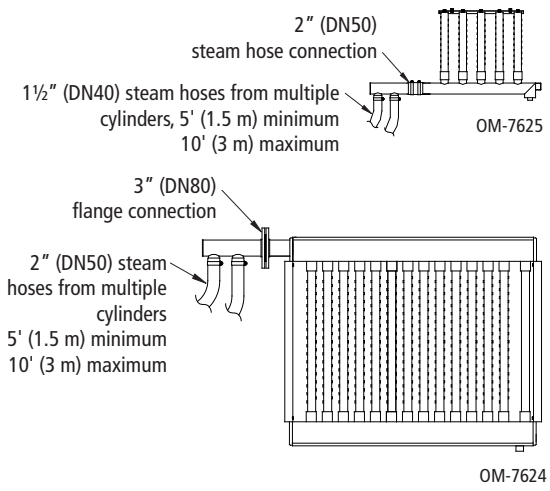
* Stainless steel tube connector, one 2" (DN50) hose, and two hose clamps ship with each XT-150 humidifier.

XT-200



* Stainless steel tube connector, two stainless steel Y-connectors, four 1½" (DN40) hoses, and eight hose clamps ship with each XT-200 humidifier.

Connecting multiple cylinders to a dispersion assembly



For multiple cylinders, connect the stainless steel tube connector (provided with XT models 150 and 200; available for staged XT humidifiers) directly to the dispersion inlet. The diameter and pitch of the tube connector must match the inlet diameter and pitch of the dispersion unit. Connect a maximum of two cylinders to the tube connector with steam hose, tubing, or pipe.

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Piping: Interconnecting piping from humidifier to dispersion assembly

To maximize humidifier performance, see Tables 16-1 and 16-2, and follow all installation recommendations in the *XT Installation, Operation, and Maintenance Manual* (available at www.dristeem.com).

Table 16-1:
Insulated 1½" (DN40) steam tubing maximum lengths for XT models 5 through 50

XT model	Maximum developed length*	
	ft	m
5	13	4.0
10	25	7.6
20	50	15.2
30**	50	15.2
50**	50	15.2

Notes:

- For larger XT models, see Table 16-2.

* Maximum developed lengths are based on 5% steam loss in piping. Developed length equals measured length plus 50% of measured length to account for pipe fittings.

** Values in this table are based on duct static pressure of 2" wc (498 Pa). For XT models 30 and 50, if maximum developed length is more than 20' (6 m), and duct static pressure exceeds 2" wc (498 Pa), a fill cup extension kit is required.

mc_021511_1715

Table 16-2:
Maximum steam carrying capacity and length of interconnecting steam hose, tubing, and pipe for XT humidifiers

XT model	DRI-STEEM steam hose*						Copper or stainless steel tubing and Schedule 40 steel pipe (Insulate tubing or piping to minimize loss of capacity and efficiency.)					
	Hose I.D.		Maximum capacity per cylinder†		Maximum length††		Tube or pipe size		Maximum capacity per cylinder†		Maximum developed length†††	
	inches	DN	lbs/hr	kg/h	ft	m	inches	DN	lbs/hr	kg/h	ft	m
75 and 150	1½	40	75	34.0	10	3	1½	40	75	34.0	100	30
100 and 200	2	50	100	45.4	10	3	2	50	100	45.4	100	30

Notes:

- See Table 16-1 for XT humidifiers with lower capacities using 1½" steam tubing.
- Values in this table are based on condensate flowing with steam (steam hose, tubing, or pipe pitched toward dispersion device).

* When using steam hose, use DRI-STEEM steam hose for best results. Field-supplied hose may have shorter life and may cause foaming in the cylinder resulting in condensate discharge at the dispersion assembly. Do not use steam hose for outdoor applications.

† For XT-150 and XT-200, capacities listed are the maximum steam carrying capacity per tube or pipe attached to each cylinder, with separate steam piping from each cylinder to the connection on the dispersion device. See Figure 18-1.

†† DRI-STEEM typically recommends 10' (3 m) maximum steam hose length pitched at 2"/ft (15%). Steam hose has a tendency to sag if it is not supported for its full length. Sagging leads to collecting condensate and system pressure issues. Hard pipe or tubing is less prone to sagging and can allow for 1/8"/ft (1%) pitch minimum with longer runs.

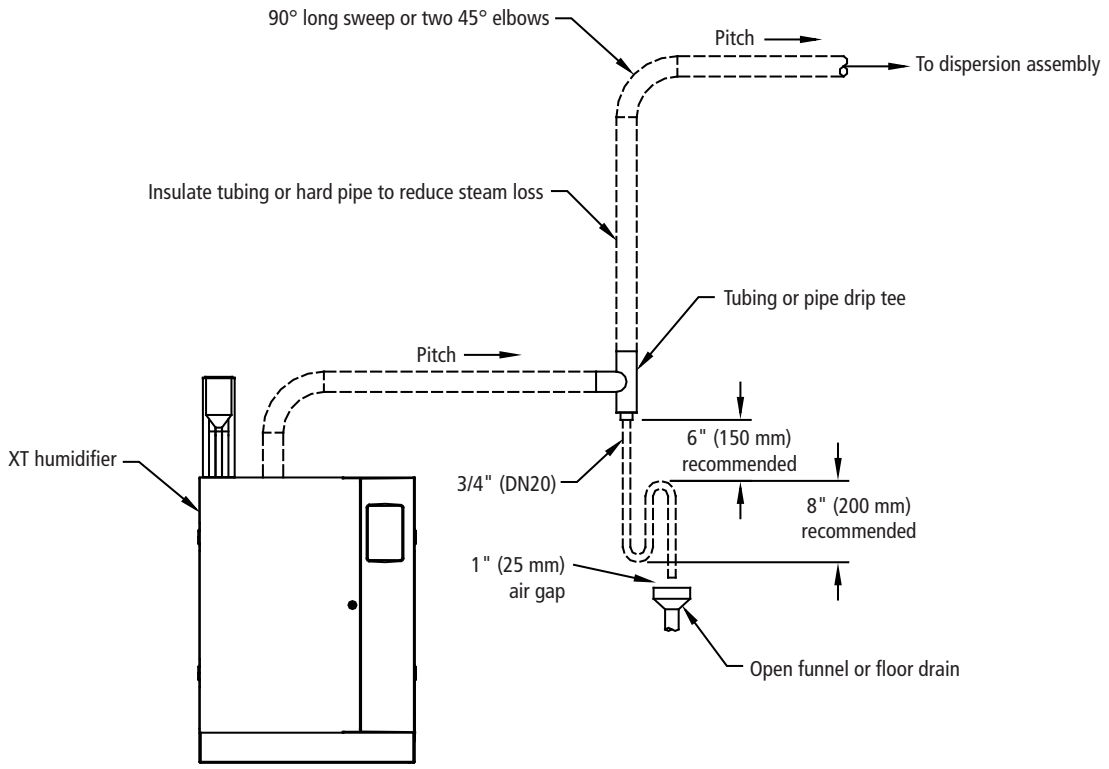
††† Developed length equals measured length plus 50% of measured length to account for pipe fittings.

mc_091410_1050-XT

Piping: Interconnecting piping from humidifier to dispersion assembly

When a vertical riser is required in the steam piping (shown below), a drip tee is required in order to eliminate a condensate collection point that will restrict steam flow.

Figure 17-1:
Detail of vertical riser drips



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OM-7648

Piping: Connecting to dual-cylinder humidifiers with tubing or pipe

XT models 150 and 200 have capacities requiring dispersion devices with condensate drains. For these models, DRI-STEEM recommends

- running separate steam piping from each cylinder to the connection on the dispersion device, and
- pitching steam piping toward the dispersion device.

The installer should not attempt to drain condensate back to the cylinder.

Figure 18-1:
Dual-cylinder XT humidifier connected to Rapid-sorb or Ultra-sorb with riser drips in steam supply lines

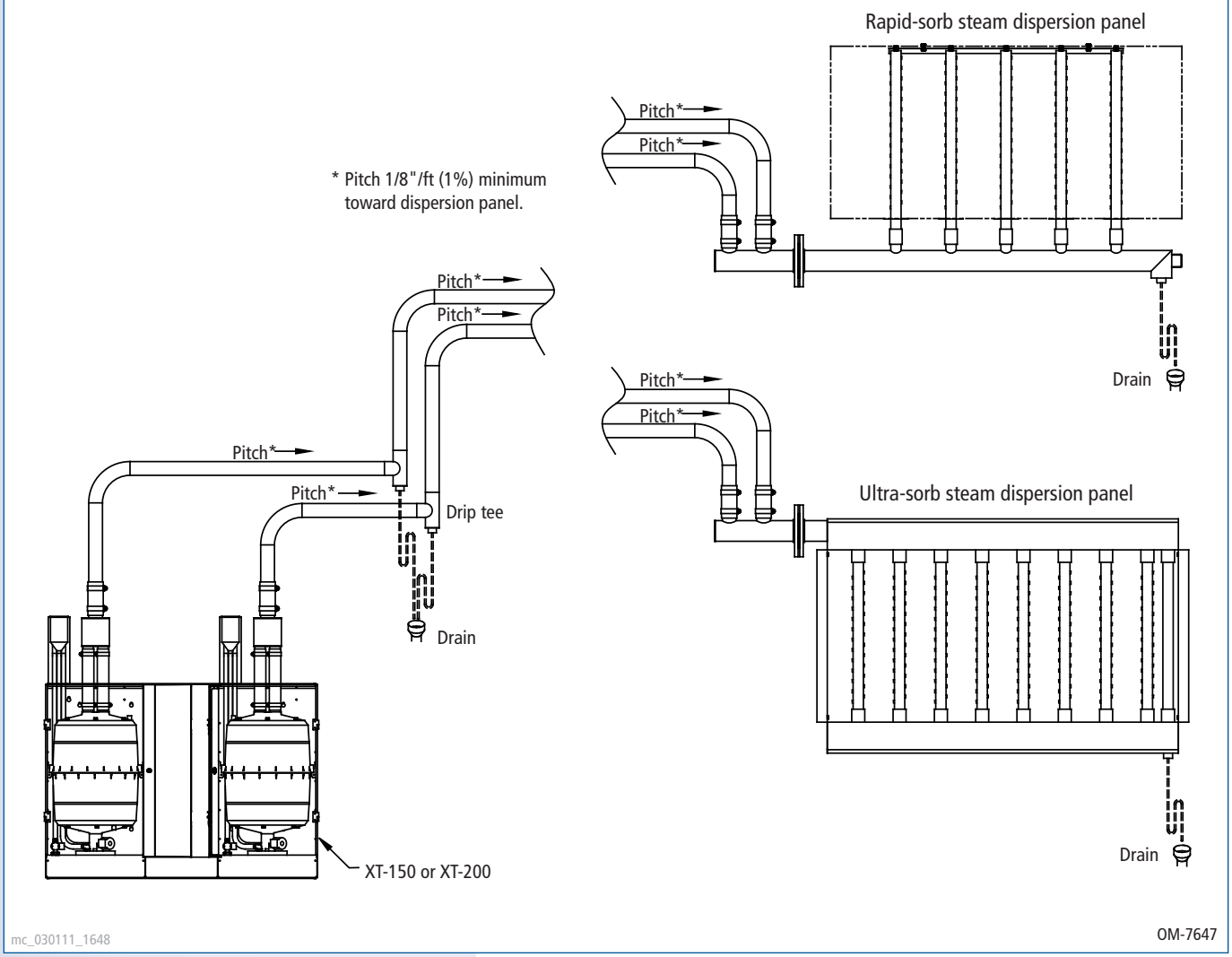
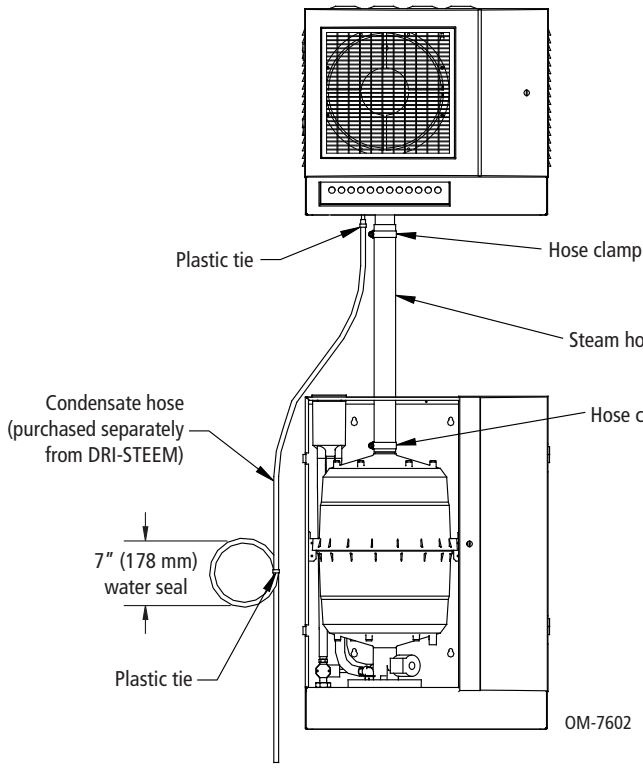


Figure 19-1:
Piping from XT humidifier steam cylinders to XT steam blowers (XTSB)

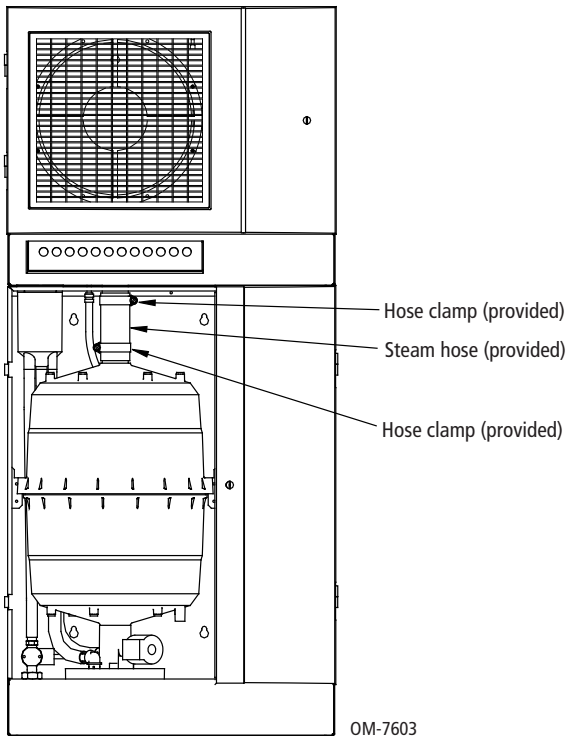
XTSB mounted remotely



Maximum recommended distance between humidifier and XTSB is 10' (3 m).

To open drain or humidifier fill cup
Water seal is required, whether condensate is piped to open drain or returned to humidifier fill cup.

XTSB mounted directly on top of XT humidifier



See Pages 28 and 29 for more information about XTSBs.

mc_091010_0939

Figure 20-1:
Piping from XT humidifier steam cylinders to XTSBs with Y connectors

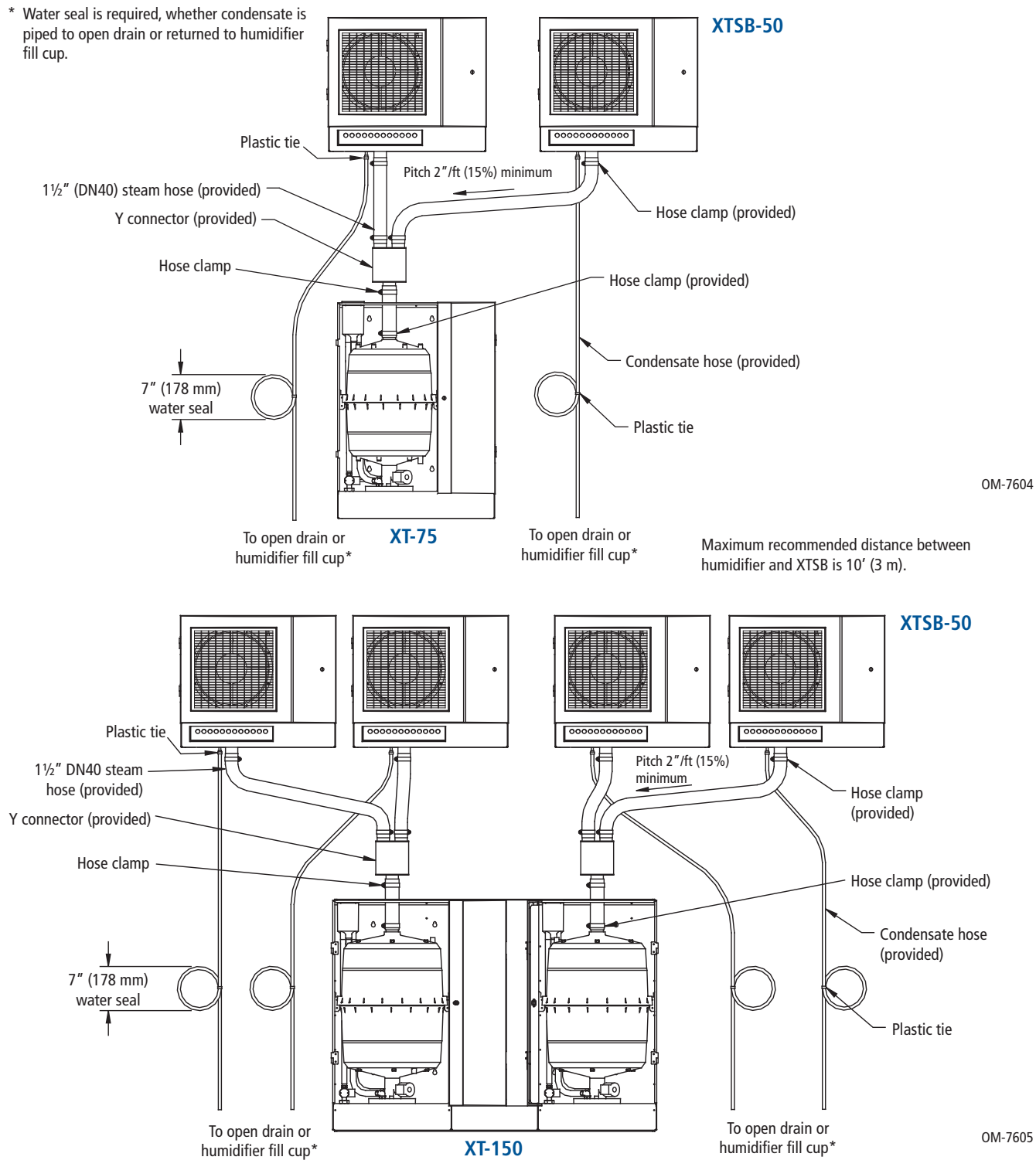
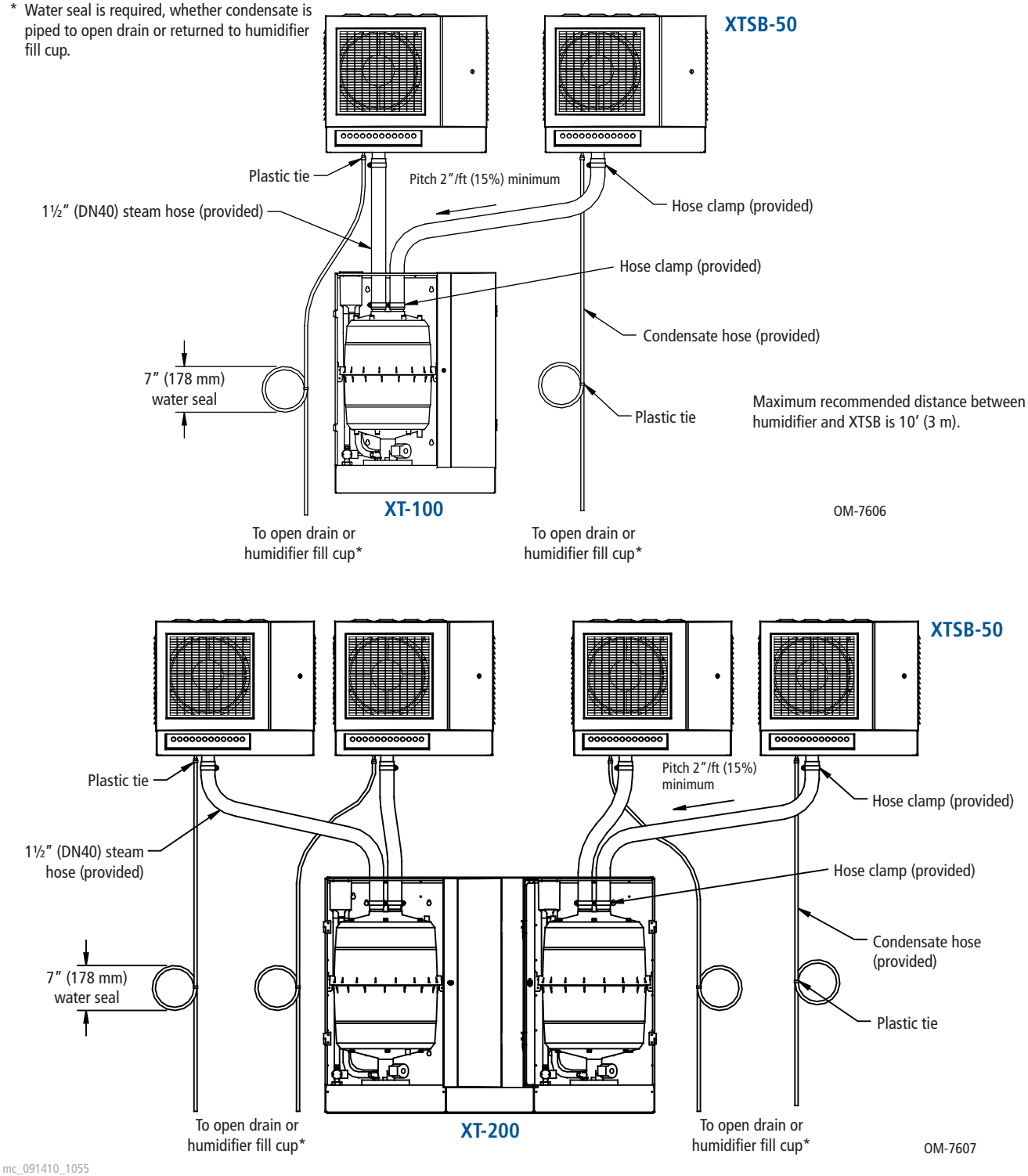


Figure 21-1:
Piping from XT humidifier steam cylinders with multiple outlets to XTSBs



Calculating non-wetting distances

Guaranteed absorption

- Cataloged and guaranteed steam absorption distances
- Unique tubelets in dispersion tubes eliminate condensate drips
- Published absorption tables for sizing and selecting the correct dispersion option
- Dri-calc® software available for system selection and absorption distance calculations

Notes:

- Final equipment selection should account for condensate loss. See the *DRI-STEEM Design Guide* for steam loss tables.
- Dispersion assembly should accommodate maximum output capacity of humidifier.

Sample exercise

Read through this exercise to learn more about specifying a dispersion unit based on non-wetting distance. Assume you have chosen to use Ultra-sorb units because you want pre-assembled panels.

Assume the entering air is 20% RH, and the leaving air needs to be 70% RH. Design for a non-wetting distance of 24" (610 mm) maximum.

Solution

Refer to Figure 23-1. Find 20% entering RH. Proceed vertically until you intersect the 70% leaving RH line. Draw a line horizontally from that point to the right to see that for 24" (610 mm) of non-wetting distance, 6" (150 mm) tube spacing would be the closest match.

Verify capacity

From Table 22-1, note that for 6" (150 mm) spacing, maximum capacity is 18 lbs/hr/ft^2 (88 kg/h/m^2). Multiply this value by the active face area of the Ultra-sorb to determine if the unit will produce adequate output capacity. If the capacity is inadequate, go to the next smaller tube spacing.

Steam absorption considerations

1. Non-wetting distance is the dimension downstream from the leaving side of the steam dispersion assembly to the point where wetting will not occur, although wisps of steam may be present. Solid objects at duct air temperature, such as coils, dampers, fans, etc., downstream of this dimension will remain dry.
2. **CAUTION!** Non-wetting distances described in this catalog do not apply when installing a steam dispersion assembly upstream of filter media. If you need to install a steam dispersion assembly upstream of filter media, consult your representative or DRI-STEEM directly for special recommendations.
3. Note that the rise (Δ) in RH (the difference between entering and leaving RH) has a direct bearing on the non-wetting distance. As the rise increases, more vapor needs to be dispersed into the air, and thus the non-wetting distance increases.
4. Uneven airflow over the cross-section of a dispersion assembly can result in nonuniform mixing of steam with air which, in turn, will adversely affect the non-wetting distance.

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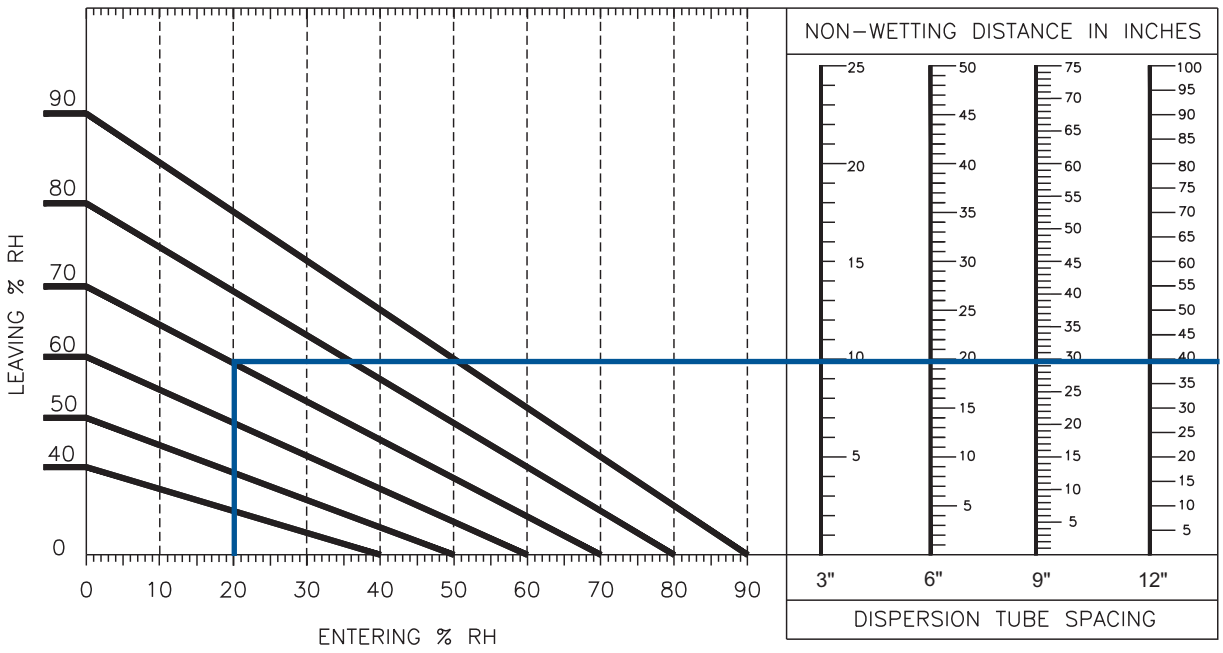
Figure 23-1:
Ultra-sorb non-wetting distances



Note:
The above data apply to all air velocities up to 1,500 fpm (7.6 m/s), and are based on air leaving the zone of humidification at conditions of 55 °F (13 °C) and the stated % RH. The blue lines in the graph refer to the sample exercise described on Page 22.

mc_042710_0900

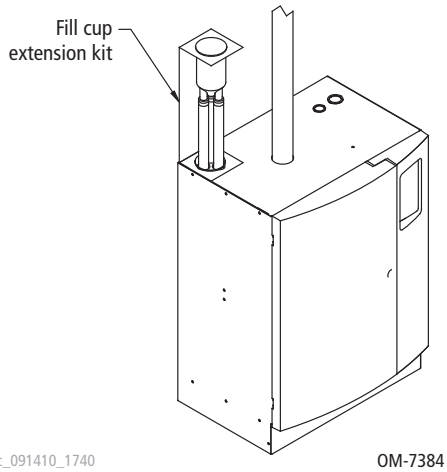
Table 23-1:
Ultra-sorb tube spacing and capacity

Tube spacing		Maximum capacity	
inches	mm	lbs/hr/ft²	kg/h/m²
3	75	36	175
6	150	18	88
9	225	12	59
12	300	9	44

Note:
The above steam flow capacity data are based on pounds (kg) of steam per hour per square foot (meter) of face area, exclusive of headers, at various tube spacings.

mc_042710_0905

Figure 23-2:
Fill cup extension kit



mc_091410_1740 OM-7384

Fill cup extension kit is required when XT humidifier is connected to Ultra-sorb Model LV.

Ultra-sorb LV

- Vertical dispersion tubes
- Suitable for AHUs or ductwork
- Use when duct height is greater than duct width
- May use with pressurized or nonpressurized steam (horizontal airflow only)

Table 24-1:
Nonpressurized steam header capacities

Header capacity		Header diameter	
lbs/hr	kg/h	inches	DN
300	135	3	80
600	270	4	100
1100	500	5	125
1850	820	6	150

Figure 24-1:
Ultra-sorb LV dimensions

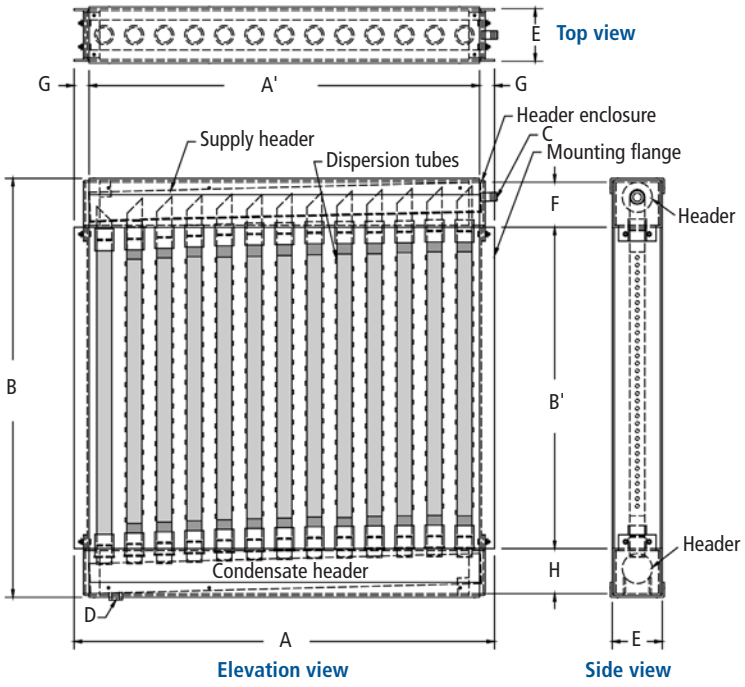
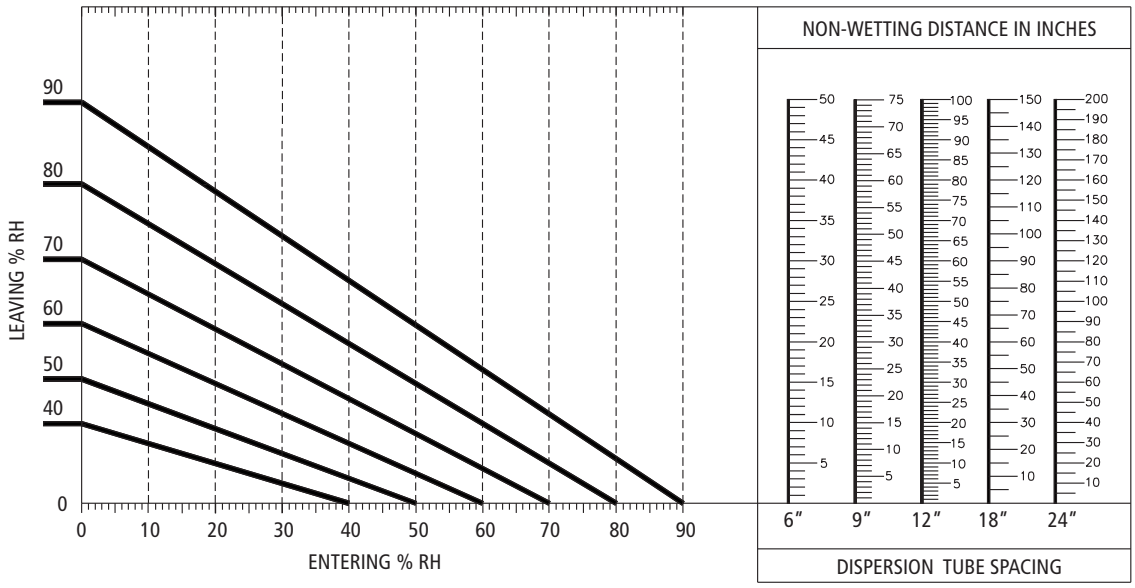


Table 24-2:
Ultra-sorb LV dimensions

Dimension	Inches (mm)
A Overall width	15" (380) min, 147" (3735) max, in 1" (25) increments
A' Face width	12" (305) min, 144" (3660) max, in 1" (25) increments
B Overall height	21" (530) min, 156" (3960) max, in 1" (25) increments Panels with overall height more than 98" (2490 mm) are shipped unassembled.
B' Face height	12" (305) min, 144" (3660) max, in 1" (25) increments
C Steam inlet diameter	Determined by maximum steam capacity
D Condensate drain	¾" pipe thread (DN20)
E Header enclosure (front to back)	For 3" (DN80) and 4" (DN100) headers, E = 5" (127); for 5" (DN125) header, E = 6" (152); for 6" (DN150) header, E = 7" (178)
F Header enclosure (top to bottom)	For 3" (DN80) header F = 4.5" (114); for 4" (DN100) header, F = 5.5" (140); for 5" (DN125) header, F = 6.5" (165); for 6" (DN150) header F = 7.5" (191)
G Flange	1.5" (38)
H Condensate header enclosure	4.5" (114)
Note: Header dimensions are determined by capacity. See Table 24-1.	

mc_050808_1215

Figure 25-1:
Rapid-sorb non-wetting distances



Note:
The above data apply to all air velocities up to 1,500 fpm (7.6 m/s) and are based on air leaving the zone of humidification at 55 °F (13 °C) and the stated % RH.

Table 25-1:
Rapid-sorb dispersion tube capacities*

Tube capacity		Tube diameter	
lbs/hr	kg/h	inches	DN
≤35	≤16	1½	40
36-70	17-32	2	50

* If duct height is <15" (381 mm), tube quantities may need to increase to compensate for reduced capacity of short tubes. Consult DRI-STEEM or see Dri-calc for the correct calculation.

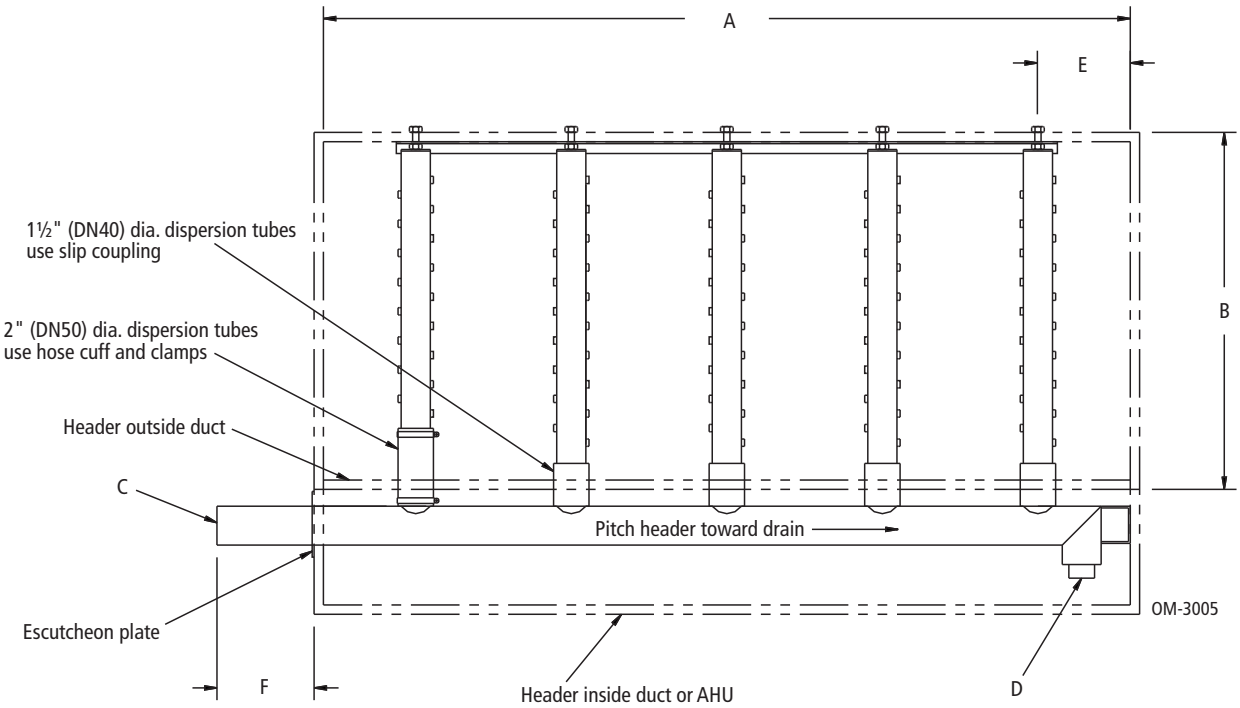
mc_042710_1410

Table 25-2:
Rapid-sorb header capacities

Header capacity		Header diameter	
lbs/hr	kg/h	inches	DN
≤250	≤113	2	50
251-500	114-227	3	80
501-800	228-363	4	100

Fill cup extension kit is required when XT humidifier is connected to Rapid-sorb. See Figure 23-2.

Figure 26-1:
Rapid-sorb dimensions



Note:
Add water seal to condensate drain as shown in the Dri-calc Installation Guides or the humidifier's Installation, Operation and Maintenance manual.

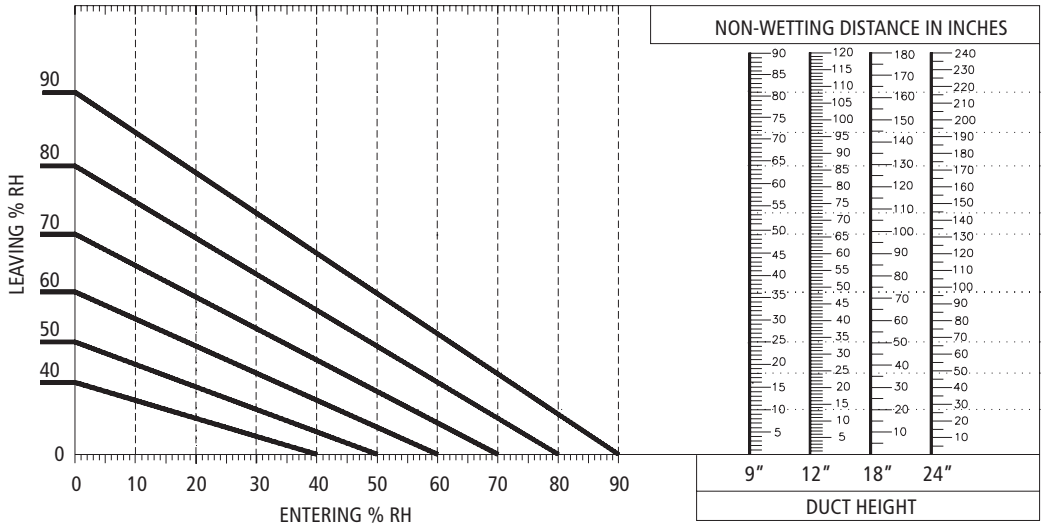
Table 26-1:
Rapid-sorb dimensions

Dimension	Description	Inches (mm)
A	Face width	12" (305) minimum to 120" (3048) maximum in 1" (25) increments
B	Face height	12" (305) minimum to 120" (3048) maximum in 1" (25) increments
C	Steam inlet	Determined by supply steam pressure
D	Condensate drain	¾" pipe thread (DN20)
E	Distance from tube center to inside of duct or AHU wall	4.5" (114) minimum
F	Distance from outside of duct or AHU wall to end of Rapid-sorb leader	4.5" (114) minimum

Note:
All Rapid-sorb units are custom-sized and field-assembled to fit the duct or air handler. Consult DRI-STEEM for sizes larger or smaller than those listed above.

mc_042710_1415

Figure 27-1: Single dispersion tube non-wetting distances

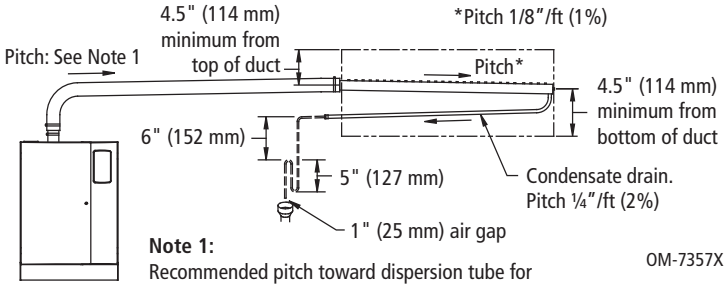


Note: The above data apply to all air velocities up to 1,500 fpm (7.6 m/s), and are based on air leaving the zone of humidification at conditions of 55 °F (13 °C) and the stated % RH.

mc_042710_1417

Figure 27-2: Single dispersion tube with and without condensate drain

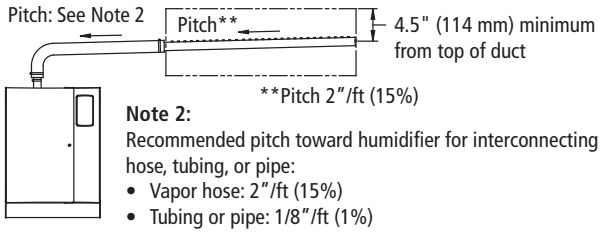
With drain



OM-7357X

Note 1:
Recommended pitch toward dispersion tube for interconnecting hose, tubing, or pipe:
- Vapor hose: 2″/ft (15%)
- 1½" tubing or pipe: ½″/ft (5%)

Without drain



Note 2:
Recommended pitch toward humidifier for interconnecting hose, tubing, or pipe:
- Vapor hose: 2″/ft (15%)
- Tubing or pipe: 1/8″/ft (1%)

1½" Single dispersion tube without condensate drain is not available for Models XT-30 and larger.

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OM-7356X

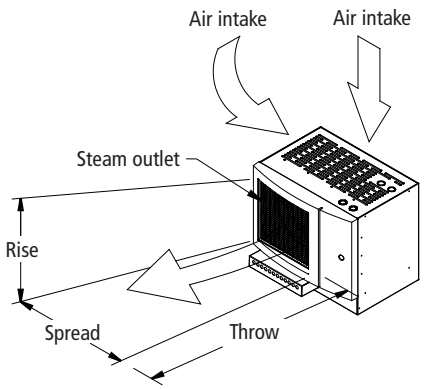
Table 27-1: Single dispersion tube capacities

Tube size		Maximum capacity of dispersion tube			
		Without drain		With drain	
inches	DN	lbs/hr	kg/h	lbs/hr	kg/h
1½	40	28.4	13	56.8	25.8
2	50	56.8	25.8	85.2	38.6

mc_042710_1416

Fill cup extension kit is required when maximum developed length of tubing/pipe from XT humidifier to dispersion tube is more than 20′ (6 m). See Figure 23-2.

Figure 28-1:
XTSB rise, spread, throw



mc_110110_1530 OM-7598

On a call for humidity, the controller closes the contactors to energize the humidifier electrodes and the fan relay to energize the XT steam blowers (XTSB). When the call for humidity is satisfied, the controller opens the humidifier contactor but keeps the XTSB running for a preset amount of time, which is adjustable via the Vapor-logic4 Setup menu.

As steam is discharged from the XTSB, it quickly cools and turns to a visible fog that is lighter than air. As this fog is carried away from the XTSB by the airstream, it tends to rise toward the ceiling. If the fog contacts solid surfaces (columns, beams, ceiling, pipes, etc.) before it disappears, it can condense and drip. The greater the space relative humidity, the further the fog will rise, spread, and throw.

Table 28-1 lists the maximum rise, spread, and throw non-wetting distances for XT humidifiers with XTSBs. Surfaces cooler than ambient temperature, or objects located within this minimum dimension, can cause condensation and dripping. To avoid steam impingement on surrounding areas, observe the minimum non-wetting distances in the table.

XTSBs are field wired to the XT humidifier blower terminals. A wiring diagram is included with the XTSB.

mc_091310_1741

Table 28-1:
XTSB minimum non-wetting distances

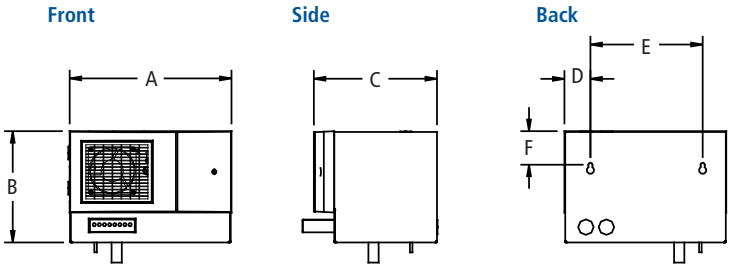
XT model	Maximum steam capacity		30% RH @ 70 °F (21 °C)						40% RH @ 70 °F (21 °C)						50% RH @ 70 °F (21 °C)						60% RH @ 70 °F (21 °C)					
			Rise		Spread		Throw		Rise		Spread		Throw		Rise		Spread		Throw		Rise		Spread		Throw	
	lbs/hr	kg/h	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m	ft	m
5	5	2.3	0.7	0.2	0.9	0.3	1.9	0.6	0.8	0.2	1.2	0.4	2.1	0.6	1.1	0.3	1.5	0.5	2.5	0.8	1.5	0.5	1.5	0.5	3.2	1.0
10	10	4.5	1.4	0.4	1.9	0.6	3.8	1.2	1.7	0.5	2.4	0.7	4.3	1.3	2.3	0.7	3.0	0.9	5.0	1.5	3.0	0.9	3.0	0.9	6.5	2.0
20	20	9.1	2.5	0.8	2.8	0.9	6.5	2.0	3.0	0.9	3.3	1.0	7.4	2.3	3.8	1.2	4.0	1.2	8.5	2.6	4.0	1.2	4.0	1.2	10.0	3.0
30	30	13.6	3.1	0.9	3.0	0.9	7.5	2.3	3.6	1.1	3.4	1.0	8.7	2.7	4.3	1.3	4.0	1.2	9.5	2.9	4.2	1.3	3.5	1.1	11.0	3.4
50	50	22.7	3.3	1.0	3.1	0.9	9.6	2.9	3.8	1.2	3.5	1.1	10.7	3.3	4.4	1.3	4.0	1.2	12.0	3.7	4.8	1.5	4.7	1.4	14.0	4.3
75	75	34.0	3.3	1.0	3.1	0.9	9.6	2.9	3.8	1.2	3.5	1.1	10.7	3.3	4.4	1.3	4.0	1.2	12.0	3.7	4.8	1.5	4.7	1.4	14.0	4.3
100	100	45.4	3.3	1.0	3.1	0.9	9.6	2.9	3.8	1.2	3.5	1.1	10.7	3.3	4.4	1.3	4.0	1.2	12.0	3.7	4.8	1.5	4.7	1.4	14.0	4.3
150	150	68.0	3.3	1.0	3.1	0.9	9.6	2.9	3.8	1.2	3.5	1.1	10.7	3.3	4.4	1.3	4.0	1.2	12.0	3.7	4.8	1.5	4.7	1.4	14.0	4.3
200	200	90.7	3.3	1.0	3.1	0.9	9.6	2.9	3.8	1.2	3.5	1.1	10.7	3.3	4.4	1.3	4.0	1.2	12.0	3.7	4.8	1.5	4.7	1.4	14.0	4.3

Rise: Minimum non-wetting height above the steam outlet of the XTSB
Spread: Minimum non-wetting width from the steam outlet of the XTSB
Throw: Minimum non-wetting horizontal distance from the steam outlet of the XTSB

mc_091310_1740

Figure 29-1: XTSB dimensions

XTSB-20 shown



mc_091410_1106 OM-7601

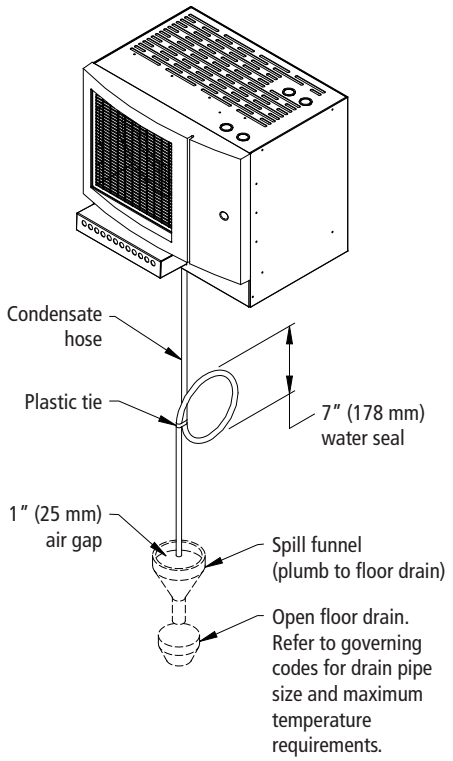
Table 29-1: XTSB dimensions

Dimension	XTSB-20		XTSB-50	
	inches	mm	inches	mm
A	15.8	401	19.1	485
B	10.9	277	16.1	409
C	12.0	305	14.1	358
D	2.6	66	1.0	25
E	11.0	279	11.8	300
F	3.3	84	2.7	69

mc_091310_1742

Figure 29-2: XTSB drain line piping

XTSB-50 shown



Note:
Shown with condensate to open drain. Condensate can also be returned to cup through field-installed hole in fill cup cap. See Figure 13-1.

mc_091410_1105 OM-7600

Table 29-2: XTSB specifications

XTSB model	Maximum capacity		Shipping weight *		Operating weight		Volume airflow		Current draw at 115V (50/60 Hz)	Input power	Noise **
	lbs/hr	kg/h	lbs	kg	lbs	kg	cfm	m^3/min			
20	20	9.1	24.0	10.9	20.9	9.5	106	3.0	0.2 A	18 W	49 dBA
50	50	22.7	41.0	18.6	38.1	17.3	665	18.8	0.23 A	23 W	53 dBA

* XTSBs ship separately from XT humidifiers.
** Noise measurements taken 6.5' (2 m) in front of XTSB cabinet.

mc_091310_1743

Application considerations

Recommended supply water conductivity for DRI-STEEM electrode humidifiers is 125 to 1250 µS/cm.

Electrode humidifiers function very differently from other humidifier technologies. Some of the factors to consider are steam output consistency, efficiency, cylinder life, and start-up time. Understanding these factors and the variables that impact them will result in proper application of this technology.

Output consistency and efficiency

DRI-STEEM's controller algorithm optimizes steam output consistency, water efficiency, and energy efficiency by managing the frequency and duration of drain and fill events for the supply water being used. The frequency and duration of drain and fill events is proportional to the conductivity of the supply water. Less conductive supply water requires less frequent drain and fill events, resulting in more consistent steam output and more efficient use of energy and water.

Cylinder life

Hard water scale coats the electrodes and eventually requires a cylinder replacement. The harder the water, the more frequent the need for a new cylinder.

Softened water is an option in some facilities. Because softened water ions stay in solution to much higher concentrations than hard water ions, softened water does not coat the electrodes nearly as much as hard water, potentially extending cylinder life.

There are benefits and tradeoffs to consider when the application allows a choice between hard and softened water:

- The benefit of softened water is longer cylinder life (depending on water chemistry), but the trade-off is more frequent drain and fill events.
- The benefit of hard water is less frequent drain and fill events but may result in more frequent cylinder replacement.

Start-up time

Start-up time is how long it takes the humidifier to reach output from a given demand when first installed and after cylinder changes. The more conductive the water, the shorter the start-up time.

Water conductivity and drain and fill events

The paragraphs at left explain why steam output consistency, efficiency, cylinder life, and start-up time are impacted by water conductivity and by drain and fill events.

Water conductivity: In electrode humidifiers, steam output is directly related to the resistance of the water in the steam cylinder and, therefore, the conductivity of the water between the electrodes. Higher water levels cover more electrode surface and result in more steam; lower water levels cover less electrode surface and result in less steam. Since water conductivity and water level both correlate to steam output, DRI-STEEM's algorithm monitors conductivity and manages drain and fill events to optimize humidifier performance and provide proper steam output.

Drain and fill events: As the water in the cylinder boils into steam, the concentration of conductive ions increases until it reaches a threshold that triggers a drain and fill event. This rids the cylinder of highly conductive water and replaces it with less conductive fill water. The more conductive the fill water and the higher the demand, the more quickly the threshold is reached, and the more frequently the cylinder automatically drains and fills to stay within the parameters for proper steam output.

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Drip-free dispersion basics

Guaranteed non-wetting distances

Using data collected in our on-site test lab, we have developed guaranteed steam absorption (non-wetting) distances. Performance charts allow you to confidently choose equipment that will accommodate any application.

Dry steam

Adding humidification to an airstream without creating wetness in the duct system is critical for the maintenance of a healthy environment. Wet areas in ducts are a threat to the health of building occupants since they moisten dust on duct floors, creating ideal breeding grounds for disease-producing microbes. In addition, water accumulating in ducts can drip and cause building damage.

Steam exits drip-free through tubelets

All DRI-STEEM evaporative dispersion tube units discharge steam through thermal-resin tubelets fitted into dispersion tubes. These tubelets extend from the center of the tube, where the steam is driest, through the tube wall, to the duct airstream. In essence, the tubelets provide a temperature-neutral exit tunnel for steam, allowing steam to cross over lower-temperature metal without condensing or dripping. Each tubelet contains a calibrated orifice sized for steam capacity. These tubelets are a DRI-STEEM exclusive, and are essential for drip-free steam dispersion.

Condensate drains away

Some condensation is inevitable in steam dispersion, but through careful design, condensate can be controlled and directed away from where it can cause problems.

For example, Ultra-sorb Model LV and LH dispersion panels have a unique double-header design that uses gravity to remove condensate. Steam enters the supply header and exits through the tubelets, and condensate drains out the return header.

In the Rapid-sorb dispersion unit, steam enters one end of the single bottom header with velocities carefully managed so condensate is not pushed out into the air along with the steam. Condensate drains out at the opposite end of the header.

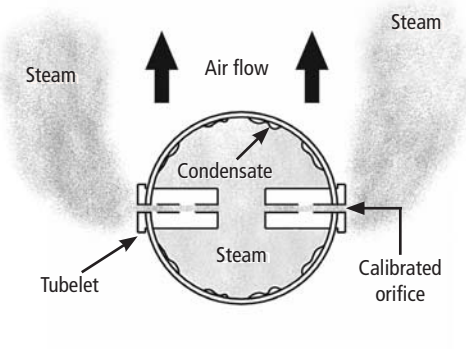
Reduce condensate and wasted energy with high-efficiency tubes

To significantly reduce condensate and wasted energy, use DRI-STEEM's high-efficiency tubes, which reduce dispersion-generated condensate and wasted energy by up to 85%. See "High-efficiency Tube option" on Page 12.

Figure 31-1:
DRI-STEEM dispersion tubes

DRI-STEEM's dispersion tubes are fitted with one or two rows of closely-spaced thermal-resin tubelets to evenly disperse steam across the airstream.

Figure 31-2:
DRI-STEEM tubelets



DRI-STEEM's unique tubelets extend into the center of the tube so only the driest steam is discharged into the air.

OM-150a

Figure 31-3:
High-efficiency tubes

High-efficiency tubes are an available option for Ultra-sorb Models LV and LH and Rapid-sorb steam dispersion panels.

Conserving resources through better performance

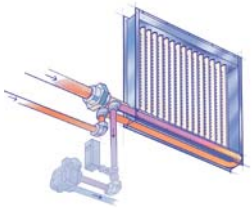
DRI-STEEM conserves resources by designing humidification systems that optimize performance. Systems that perform well save energy and water and, ultimately, cost less to operate and maintain.

Save energy

For applications requiring short absorption, high-efficiency dispersion tubes reduce wasted energy up to 85% by significantly reducing airstream heat gain and condensate production. Available for new and retrofit Ultra-sorb® and Rapid-sorb® steam dispersion panels.

For warm, dry applications, DRI-STEEM's High-Pressure Atomizing System disperses unheated micro-fine water particles into airstreams or open spaces. As atomized water droplets evaporate, air temperature drops, reducing the cooling load. This provides significant energy savings when humidifying and cooling simultaneously.

Save water



Ultra-sorb Model XV eliminates water waste and reduces airstream heat gain, energy costs, and boiler chemical use. Available for STS® steam-to-steam humidifiers and all pressurized steam applications.

Optimize performance

DRI-STEEM's most advanced controller, Vapor-logic®4 continuously monitors space conditions to align humidifier output with demand. The result is accurate, responsive control.

Your DRI-STEEM representative is:

Expect quality from the industry leader

For more than 45 years, DRI-STEEM has been leading the industry with creative and reliable humidification solutions. Our focus on quality is evident in the construction of the XT humidifier. DRI-STEEM leads the industry with a Two-year Limited Warranty and optional extended warranty.

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