

DRISTEEM[®]
The humidification experts



New!

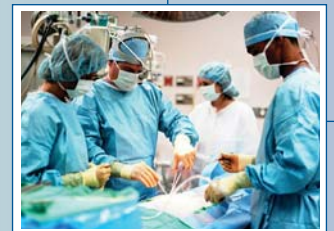
Vapor-logic[®] 4 controller with:

- Web-enabled access
- Interoperability via Modbus[®] or optional BACnet[®] or LonTalk[®]

Plus:

Ultra-sorb[®] Model XV dispersion option

STS[®]
Steam-to-Steam
Humidification System
PRODUCT CATALOG



Chemical-free humidification steam

STS provides the highest indoor air quality available with boiler steam as an energy source.



Humidify using an economical energy source

The STS steam-to-steam humidifier creates chemical-free humidification steam using boiler steam as its energy source. It accomplishes this by circulating pressurized boiler steam through its heat exchanger to vaporize clean fill water into humidification steam. It's a closed-loop system, so no boiler steam or chemicals enter the humidified space; they return to the boiler.

No direct injection of boiler chemicals

Another way to use boiler steam for humidification is to disperse it directly into the air. However, humidifier owners are learning that chemically treated, boiler-generated steam is unsuitable for direct injection humidification for the following reasons:

Boiler water is usually treated with anticorrosion chemicals that can contaminate spaces humidified by direct steam injection.

Airborne boiler chemicals have been found to irritate eyes and skin, and to aggravate respiratory disorders. In addition, they accelerate the aging of certain materials like paper and wood, an issue especially relevant to museum owners.

To ensure chemical-free humidification while taking advantage of economical on-site boiler steam, consider using an STS humidifier.

Interoperability, Web-enabled access with Vapor-logic4 control

STS humidifiers are now fully interoperable via Modbus® or optional BACnet® or LonTalk®. The Vapor-logic4 Web interface provides the capability to set up, view, and adjust humidifier functions via Ethernet, either directly or remotely through a network. See Page 4 for more information.

No dispersion-generated condensate with Ultra-sorb Model XV

DRI-STEEM's Ultra-sorb Model XV steam dispersion panel is now an STS option, delivering chemical-free humidification steam with no condensate loss. That's because Ultra-sorb Model XV circulates pressurized boiler steam through a heat exchanger in its supply header. This heat exchanger instantly flashes dispersion-generated condensate back into humidification steam and returns pressurized condensate to the boiler without additional pumps, valves, or controls.



STS features and benefits

Reliable

- Consistent control to $\pm 3\%$ RH; control to $\pm 1\%$ RH with available options for specific applications; consult DRI-STEEM for recommendations
- Electronically monitored water level ensures continuous, safe operation
- Closed-loop system results in less wear on the boiler — no need to chemically treat make-up water for humidification

Efficient

- Utilizes energy from existing plant steam
- Most energy-efficient means of producing chemical-free steam with pressurized steam as the energy source

Flexible

- Easy retrofit for steam injection humidifiers
- Broad capacity range from 10 to 1600 lbs/hr (4.5 to 726 kg/h), link up to 16 units for capacity up to 25,600 lbs/hr (11,612 kg/h)
- Supports all fill water types: tap, softened, deionized, and reverse osmosis; easy field conversion if water type changes
- Suitable for all dispersion options
- Robust outdoor enclosure or weather cover options available for outdoor operation in any climate

Easy to maintain

- Cleanout plate and removable cover provide access to heat exchanger and tank without removing steam dispersion piping
- User-adjustable water skimmer eliminates floating minerals, while automatic drain and flush removes precipitated minerals; softened fill water significantly reduces maintenance requirements
- Heat exchanger sheds mineral buildup automatically
- End-of-season autodrain



Ultra-sorb Model XV disperses STS-generated humidification steam with no condensate loss. See Page 26.

Ultra-sorb Model XV dispersion option

All STS models can be used with the Ultra-sorb Model XV steam dispersion panel:

- Zero water waste from condensate loss
- High-efficiency tubes and insulated header provide up to 85% reduction in wasted energy
- Steam capacity up to 450 lbs/hr (204 kg/h) per dispersion panel when used with STS

Vapor-logic4 controller

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.

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

Real-time clock allows time-stamped alarm and message tracking, and accurate drain and flush scheduling.

Auxiliary temperature sensor/transmitter allows air temperature monitoring, such as in a duct, and enables temperature compensation to prevent window condensation.

Programmable outputs allow remote signaling and device activation.

Multiple-humidifier control allows staged control of up to 16 humidifiers with one controller.

Controller data, such as RH, air temperature, water use, energy use, alarms, and messages, can be downloaded to a PC for viewing and analysis. RH, alarms, and service messages can also be displayed via the keypad or Web interface.

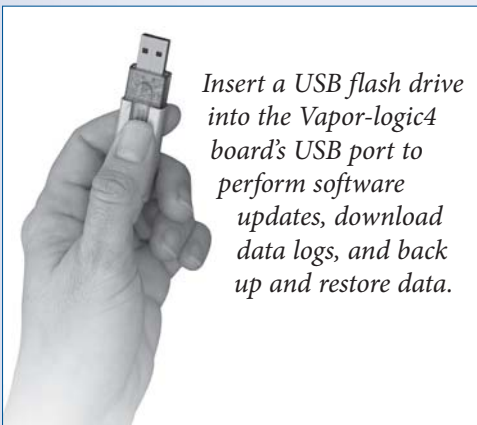
Enhanced diagnostics include:

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

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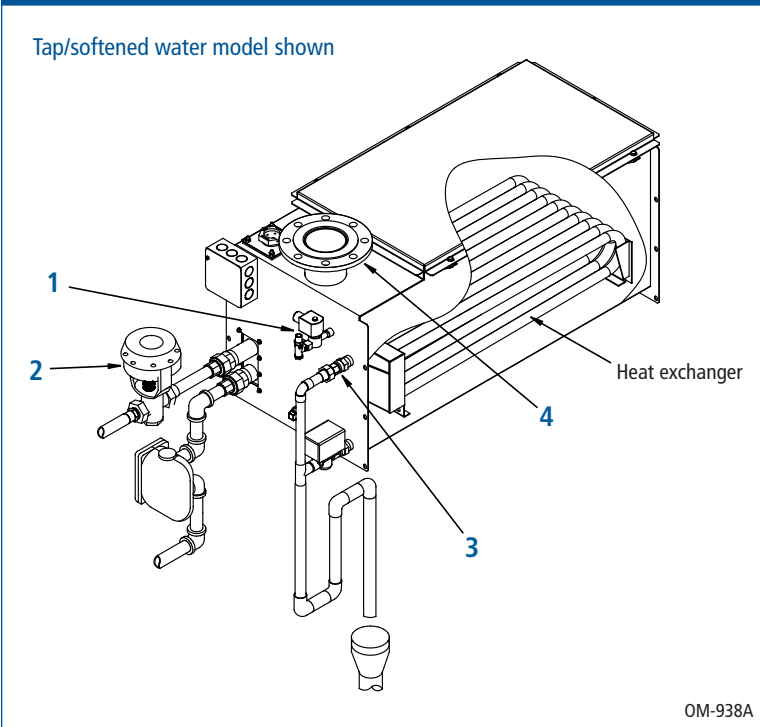
Use the Vapor-logic4 keypad or the standard Web interface, shown here, to control your STS humidification system.



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

STS principle of operation

Figure 5-1:
STS principle of operation



1. When the system is first activated, the fill valve opens, and the evaporating chamber fills with water to the operating level.
2. On a call for humidity, boiler steam passes through the valve to the heat exchanger, causing water in the evaporating chamber to boil. The fill valve opens and closes as needed to maintain the operating water level.
3. During refill in tap/softened water systems, a portion of the surface water is skimmed off, carrying away precipitated minerals.
Humidifiers with the DI/RO water option (using deionized water or water that has been treated using reverse osmosis) do not require skimming.
4. Steam created in the evaporating chamber flows through steam hose, tubing, or piping to the dispersion assembly, where it is discharged into the airstream.

STS components

Figure 6-2:
Vapor-logic4 keypad/display



Figure 6-3
Removable cover

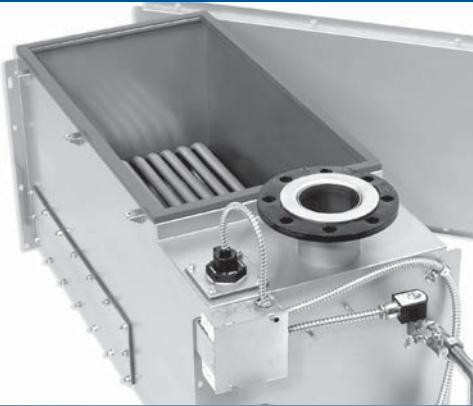
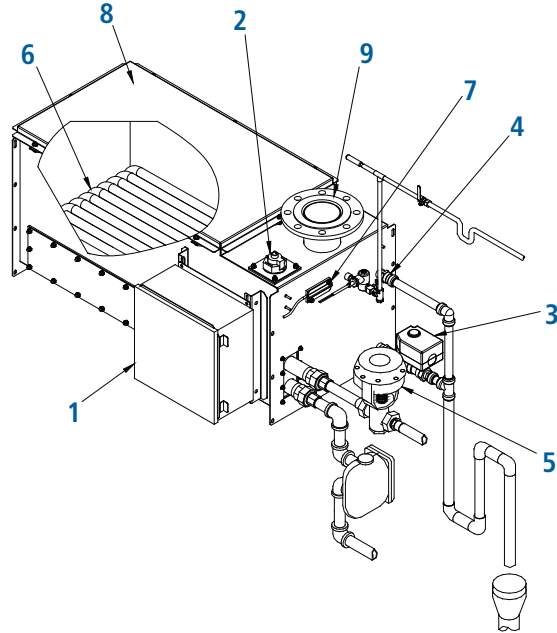


Figure 6-4:
Cleanout plate



Figure 6-1:
STS components

Tap/softened water model shown



1. Vapor-logic4 controller

The Vapor-logic4 controller (in mounted control cabinet option shown above) controls all humidifier functions and can connect to a building automation system via Modbus or optional BACnet or LonTalk. See Page 4 for more information.

2. Water level control

Tap/softened water systems control water levels electronically using a three-rod probe (Figure 7-1).

Systems with the DI/RO water option control water levels using a float valve (Figure 7-2) and low-water cutoff switch.

3. Drain

Tap/softened water humidifiers are programmed to automatically drain if there is no call for humidity after a user-defined time period (72-hour default).

Humidifiers with the DI/RO water option have a manual drain unless ordered with an electric drain to enable automated end of season draining.

STS components

4. Water skimmer/overflow port

In tap/softened water systems, the water skimmer reduces surface minerals in the evaporating chamber. Skimming occurs each time the humidifier fills. The skim time duration is user-adjustable.

In systems with the DI/RO water option, skimming is not required; the skimmer port functions as an overflow port.

5. Steam valve

Upon a call for humidity, the steam valve allows boiler steam to enter the heat exchanger.

6. Heat exchanger

The heat exchanger transfers energy from boiler steam to the clean fill water in the evaporating chamber, generating chemical-free humidification steam. The STS is available with either copper or stainless steel heat exchangers.

7. Temperature sensor

Mounted on the evaporating chamber, this sensor enables:

- Freeze protection
- Preheating, allowing rapid response to a call for humidity
- Over-temperature protection

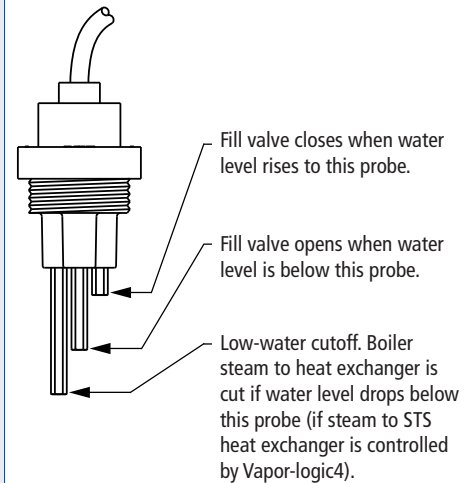
8. Service access

The cover allows periodic inspection and servicing of the evaporating chamber without removing steam hose, tubing, or piping (Figure 6-3). The cleanout plate allows side access to the heat exchanger and tank floor (Figure 6-4).

9. Steam outlet

Steam generated in the humidifier rises through the steam outlet and travels to the dispersion assembly through steam hose, tubing, or piping.

Figure 7-1:
Water level control for tap/softened water humidifier

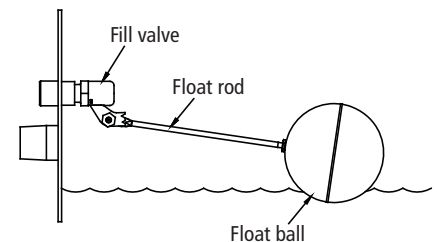


Humidifiers using tap or softened water control water levels electronically using a three-rod probe. The controller responds with the above actions when the water level reaches each rod.

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VLC-OM-030

Figure 7-2:
Water level control for DI/RO-water option humidifier



Humidifiers using DI/RO water control water levels using a float valve. An optional low-water cutoff switch is available as a remote water indicator.

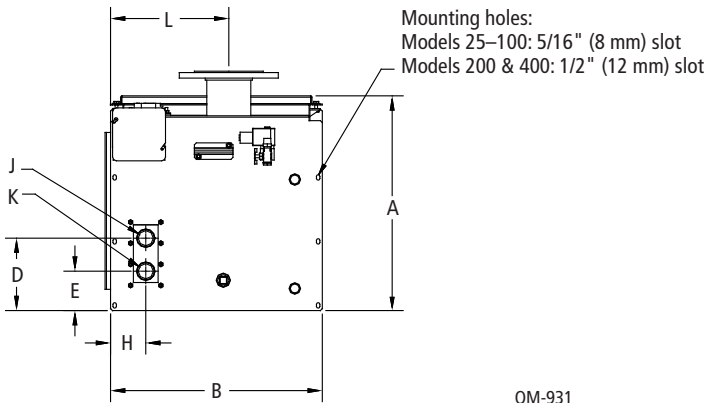
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STS dimensions

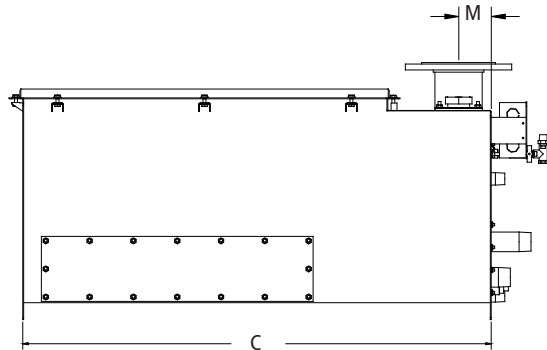
Figure 8-1:
Dimensions, STS models 25, 50, 100, 200, and 400 (with copper or stainless steel heat exchangers)

Front view



OM-931

Side view



OM-932

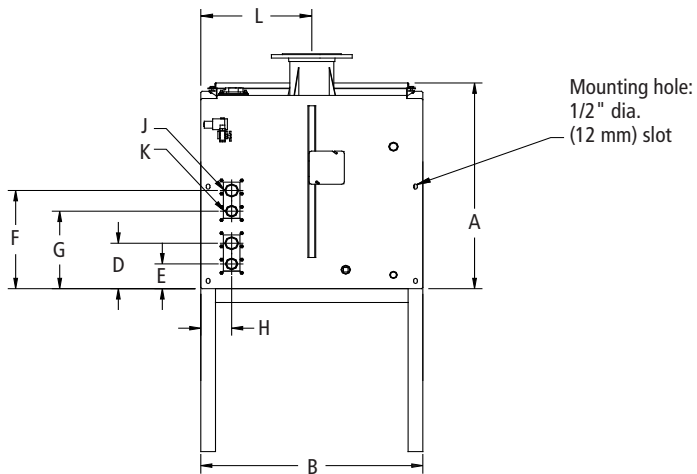
Notes:

- Tap/softened water model shown
- See dimensions in Tables 9-1 and 9-2

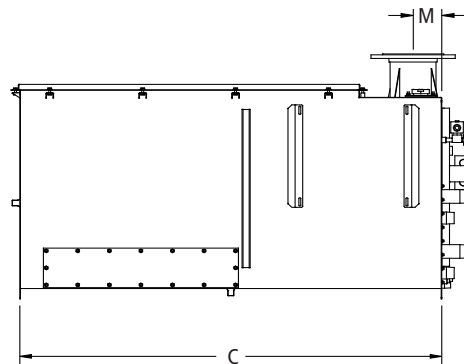
mc_010511_1012-tap

Figure 8-2:
Dimensions, STS model 800 (with copper or stainless steel heat exchangers)

Front view



Side view



OM-936

Notes:

- Tap/softened water model shown
- See dimensions in Tables 9-1 and 9-2

mc_010511_1013-tap

STS dimensions

**Table 9-1:
Dimensions, STS with copper heat exchangers**

	Description See drawings in Figures 8-1 and 8-2	STS model*									
		25C		50C		100C		400C		800C	
		inches	mm	inches	mm	inches	mm	inches	mm	inches	mm
A	Height**	19.50	495	19.50	495	19.50	495	19.50	495	29.75	756
B	Width	14.75	375	14.75	375	19.25	489	30.25	768	30.25	768
C	Length	23.65	600	39.65	1007	39.65	1007	55.15	1401	55.15	1401
D	Bottom to supply inlet of first heat exchanger	6.63	168	6.63	168	6.63	168	6.63	168	6.63	168
E	Bottom to return outlet of first heat exchanger	3.63	92	3.63	92	3.63	92	3.63	92	3.63	92
F	Bottom to supply inlet of second heat exchanger	—	—	—	—	—	—	—	—	14.28	363
G	Bottom to return outlet of second heat exchanger	—	—	—	—	—	—	—	—	11.24	285
H	Side to heat exchanger	3.25	83	3.25	83	3.25	83	3.25	83	3.25	83
J	Pressurized steam supply inlet	3/4" pipe thread	DN20	1 1/4" pipe thread	DN32	1 1/4" pipe thread	DN32	1 1/2" pipe thread	DN40	1 1/2" pipe thread	DN40
K	Pressurized steam return outlet	3/4" pipe thread	DN20	3/4" pipe thread	DN20	1 1/4" pipe thread	DN32	1 1/4" pipe thread	DN32	1 1/4" pipe thread	DN32
L	Side to steam outlet	6.25	159	8.63	219	9.63	245	13.00	330	13.00	330
M	Front to steam outlet	2.50	64	2.25	57	2.75	70	3.75	95	3.75	95

* C, S, and SNC in model numbers are explained in "Heat exchangers and water types" on Page 10.

**Add 23.5" (597 mm) to overall height when STS is mounted on four support legs. Add 22.5" (572 mm) to overall height when STS is mounted on two H-legs.

mc_010511_1010

**Table 9-2:
Dimensions, STS with stainless steel heat exchangers**

	Description See drawings in Figures 8-1 and 8-2	STS model*											
		25S		50S		100S		200S		400SNC		800SNC	
		inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm
A	Height**	19.50	495	19.50	495	19.50	495	19.50	495	19.50	495	29.75	756
B	Width	14.75	375	14.75	375	19.25	489	30.25	768	30.25	768	30.25	768
C	Length	23.65	600	39.65	1007	39.65	1007	55.15	1401	55.15	1401	55.15	1401
D	Bottom to supply inlet of first heat exchanger	6.85	174	6.85	174	6.85	174	6.85	174	6.85	174	6.85	174
E	Bottom to return outlet of first heat exchanger	3.35	85	3.35	85	3.35	85	3.35	85	3.35	85	3.35	85
F	Bottom to supply inlet of second heat exchanger	—	—	—	—	—	—	—	—	—	—	14.5	368
G	Bottom to return outlet of second heat exchanger	—	—	—	—	—	—	—	—	—	—	11.0	279
H	Side to heat exchanger	3.25	83	3.25	83	3.25	83	3.25	83	3.25	83	3.25	83
J	Pressurized steam supply inlet	3/4" pipe thread	DN20	1" pipe thread	DN25	1" pipe thread	DN25	1 1/2" pipe thread	DN40	1 1/2" pipe thread	DN40	1 1/2" pipe thread	DN40
K	Pressurized steam return outlet	3/4" pipe thread	DN20	3/4" pipe thread	DN20	3/4" pipe thread	DN20	3/4" pipe thread	DN20	3/4" pipe thread	DN20	3/4" pipe thread	DN20
L	Side to steam outlet	6.25	159	8.63	219	9.63	245	13.00	330	13.00	330	13.00	330
M	Front to steam outlet	2.50	64	2.25	57	2.75	70	3.75	95	3.75	95	3.75	95

* C, S, and SNC in model numbers are explained in "Heat exchangers and water types" on Page 10.

**Add 23.5" (597 mm) to overall height when STS is mounted on four support legs. Add 22.5" (572 mm) to overall height when STS is mounted on two H-legs.

mc_010511_1011

STS capacities and weights

**Table 10-1:
Output capacities for STS models with copper heat exchangers**

STS model	Steam pressure*							
	5 psi	34 kPa	10 psi	69 kPa	13 psi	90 kPa	15 psi	103 kPa
	lbs/hr	kg/h	lbs/hr	kg/h	lbs/hr	kg/h	lbs/hr	kg/h
25C	20	9	70	32	100	45	120	54
50C	50	23	150	68	200	91	240	109
100C	100	45	300	136	400	181	480	218
400C	300	136	580	263	720	327	790	358
800C	650	295	1275	578	1500	680	1600	726

* Steam pressure at connection to STS steam valve (valve provided by DRI-STEEM)

mc_010411_1645

**Table 10-2:
Output capacities for STS models with stainless steel heat exchangers**

STS model	Steam pressure*							
	5 psi	34 kPa	10 psi	69 kPa	13 psi	90 kPa	15 psi	103 kPa
	lbs/hr	kg/h	lbs/hr	kg/h	lbs/hr	kg/h	lbs/hr	kg/h
25S	10	5	25	11	30	14	35	16
50S	30	14	55	25	75	34	80	36
100S	60	27	110	50	140	64	150	68
200S	150	68	290	132	360	163	390	177
400SNC	170	77	392	178	552	250	637	289
800SNC	212	96	825	374	1095	497	1223	555

* Steam pressure at connection to STS steam valve (valve provided by DRI-STEEM)

mc_010411_1646

Heat exchangers and water types

For use with tap/softened or DI/RO water:

- STS models ending in **C** (copper heat exchangers with a nickel coating)
- STS models ending in **S** (stainless steel heat exchangers with a Teflon coating)

For use with DI/RO water option only:

- STS models ending in **SNC** (stainless steel heat exchangers with no coating)

**Table 10-3:
STS weights**

STS model	Shipping weight		Operating weight*	
	lbs	kg	lbs	kg
25	95	43	175	79
50	125	57	336	152
100	139	63	350	159
200	245	111	850	386
400	320	145	950	431
800	410	186	1450	658

* Operating weight does not include weight of interconnecting piping provided by installer.

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STS mounting and clearances

Figure 11-1:
Support legs, STS models 25, 50, and 100 only

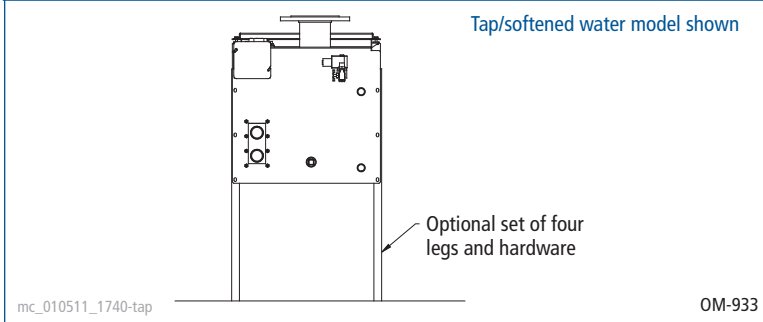


Figure 11-2:
Wall brackets, STS models 25, 50, and 100 only

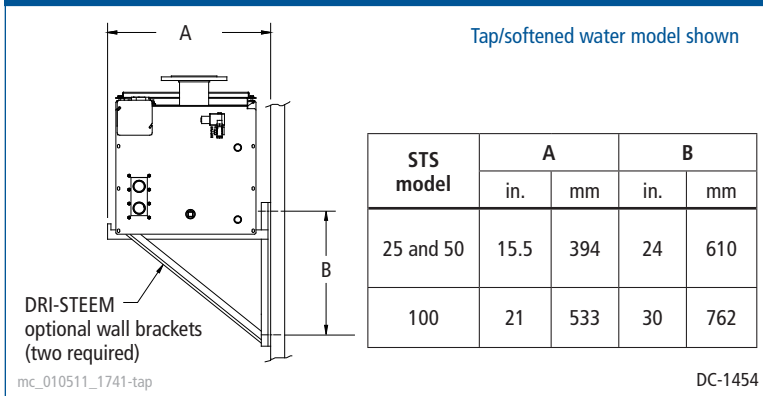


Figure 11-3:
Recommended clearances

* Minimum access clearance of 18" (457 mm) recommended for periodic removal of top cover for access to tank.

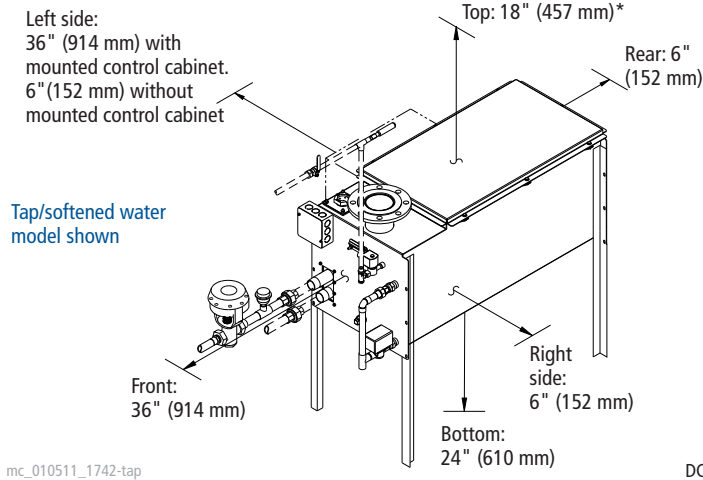


Table 11-1:
STS mounting options

Mounting method	STS model	
	25, 50, 100	200, 400, 800
Trapeze hanger	standard	—
H-legs	—	standard
Support legs	optional	—
Wall brackets	optional	—

Figure 11-4:
H-legs, STS models 200, 400, and 800 only

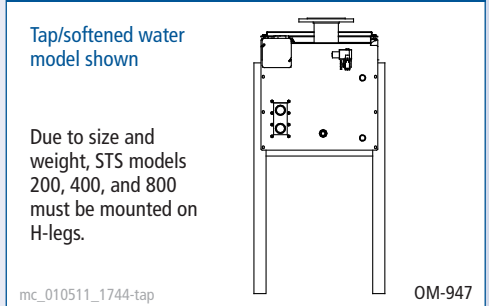
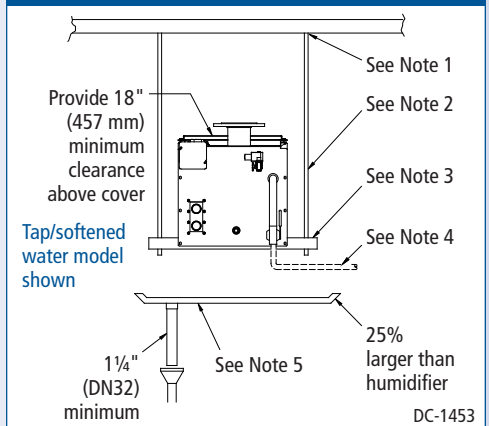


Figure 11-5:
Trapeze hanger, STS models 25, 50, and 100 only

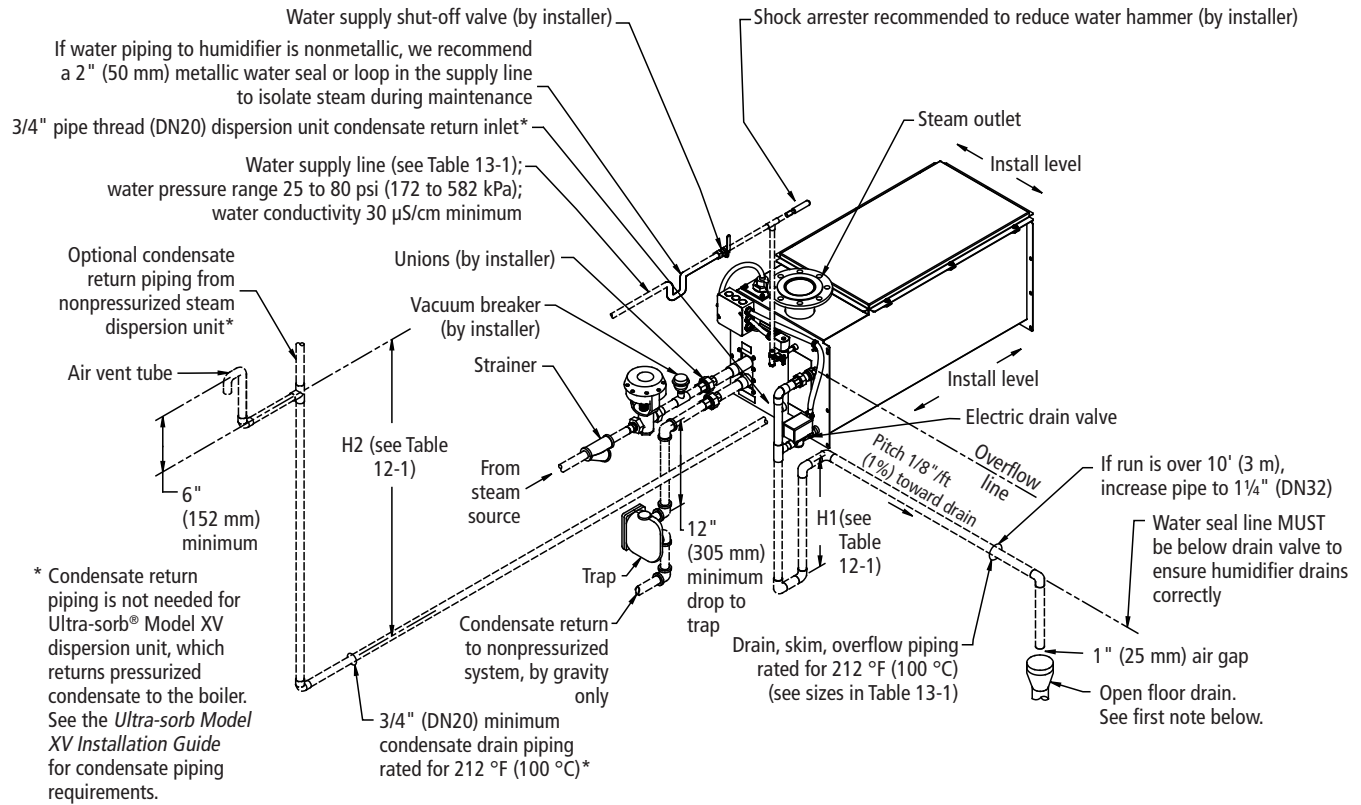


Notes:

1. Secure rods to overhead construction.
2. 3/8" (M10) threaded rod of length required.
3. Angle or channel sized to properly support humidifier.
4. Humidifier drain to appropriate building waste. Do not drain humidifier directly into drip pan. Install water seal as shown on Pages 12 through 15.
5. Drip pan (by installer) recommended in overhead installations to prevent possible water damage to equipment below.

STS piping: Tap/softened water, one heat exchanger

Figure 12-1:
Field piping overview for tap/softened water STS models 25, 50, 100, 200, and 400



Notes:

- Offset humidifier from floor drain to prevent flash steam from rising into the humidifier.
- Locate air gap only in spaces with adequate temperature and air movement to absorb flash steam; otherwise, condensation may form on nearby surfaces. Refer to governing codes for drain pipe size and maximum discharge water temperature.
- Water supply inlet is more than 1" (25 mm) above skim/overflow port, eliminating the possibility of backflow or siphoning from tank. No additional backflow prevention is required; however, governing codes prevail.
- Damage caused by chloride corrosion is not covered by your DRI-STEEM warranty.
- Dashed lines indicate provided by installer.

DC-1451

mc_010411_1556-tap

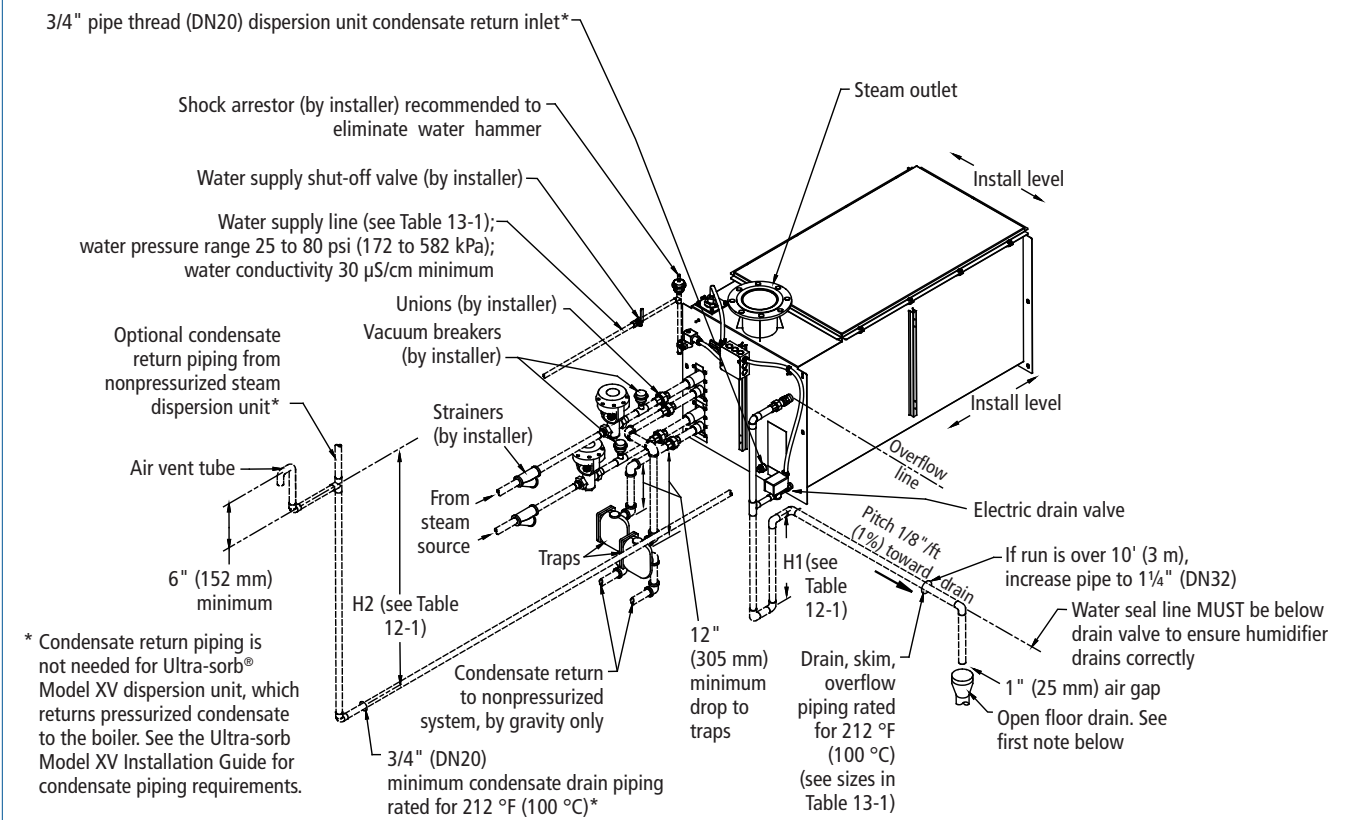
Table 12-1:
Heights required to overcome humidifier internal pressure (H1, H2)

Unit output		Water seal height (H1)		Air vent height (H2)			
		All STS models		STS models			
				25, 50, 100, 200, 400		800	
lbs/hr	kg/h	inches	mm	inches	mm	inches	mm
≤ 138	≤ 62	12	305	27	686	—	—
139-183	63-83	15	381	30	762	—	—
> 183	> 83	18	457	33	838	42.25	1073

mc_010611_0730

STS piping: Tap/softened water, two heat exchangers

Figure 13-1:
Field piping overview for tap/softened water STS model 800



Notes:

- Offset humidifier from floor drain to prevent flash steam from rising into the humidifier.
- Locate air gap only in spaces with adequate temperature and air movement to absorb flash steam; otherwise, condensation may form on nearby surfaces. Refer to governing codes for drain pipe size and maximum discharge water temperature.
- Water supply inlet is more than 1" (25 mm) above skim/overflow port, eliminating the possibility of backflow or siphoning from tank. No additional backflow prevention is required; however, governing codes prevail.
- Damage caused by chloride corrosion is not covered by your DRI-STEEM warranty.
- Dashed lines indicate provided by installer.

DC-1467

mc_010411_1550-tap

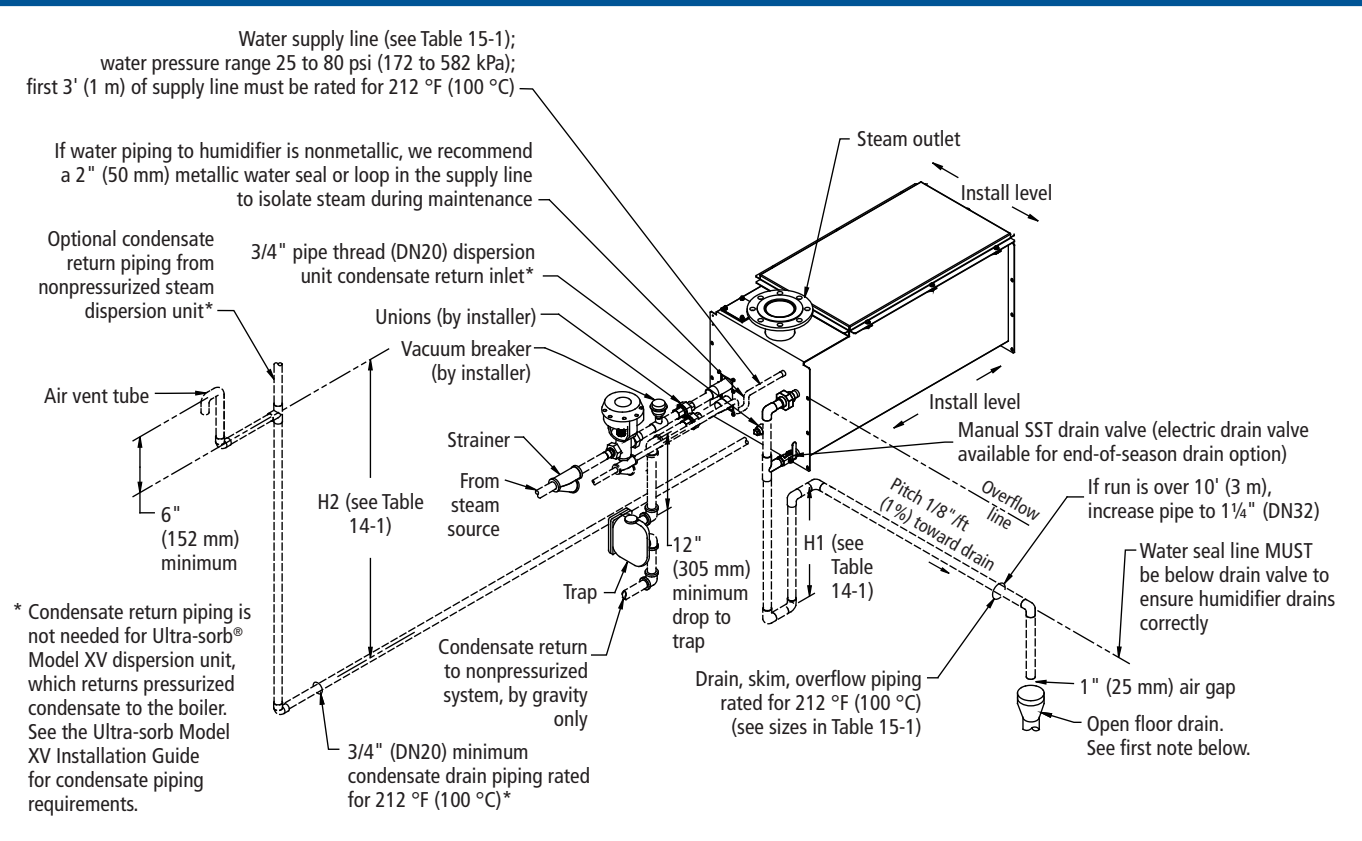
Table 13-1:
STS connection sizes

Description	Connection size
Water makeup (fill)	1/4" pipe thread (DN8), all STS models
Drain	3/4" (DN20) for STS models 25 through 100 1" (DN25) for STS models 200 through 800
Steam outlet	Varies with capacity and dispersion type; see Table 16-1
Condensate return	3/4" pipe thread (DN20)
Pressurized steam supply inlet and return outlet	See sizes in Tables 9-1 and 9-2

mc_010411_1555

STS piping: DI/RO water option, one heat exchanger

Figure 14-1:
Field piping overview for STS models 25, 50, 100, 200, and 400 with DI/RO water option



Notes:

- Offset humidifier from floor drain to prevent flash steam from rising into the humidifier.
- Locate air gap only in spaces with adequate temperature and air movement to absorb flash steam; otherwise, condensation may form on nearby surfaces. Refer to governing codes for drain pipe size and maximum discharge water temperature.
- Water supply inlet is more than 1" (25 mm) above skim/overflow port, eliminating the possibility of backflow or siphoning from tank. No additional backflow prevention is required; however, governing codes prevail.
- Damage caused by chloride corrosion is not covered by your DRI-STEEM warranty.
- Dashed lines indicate provided by installer.

DC-1459

mc_010411_1556-di

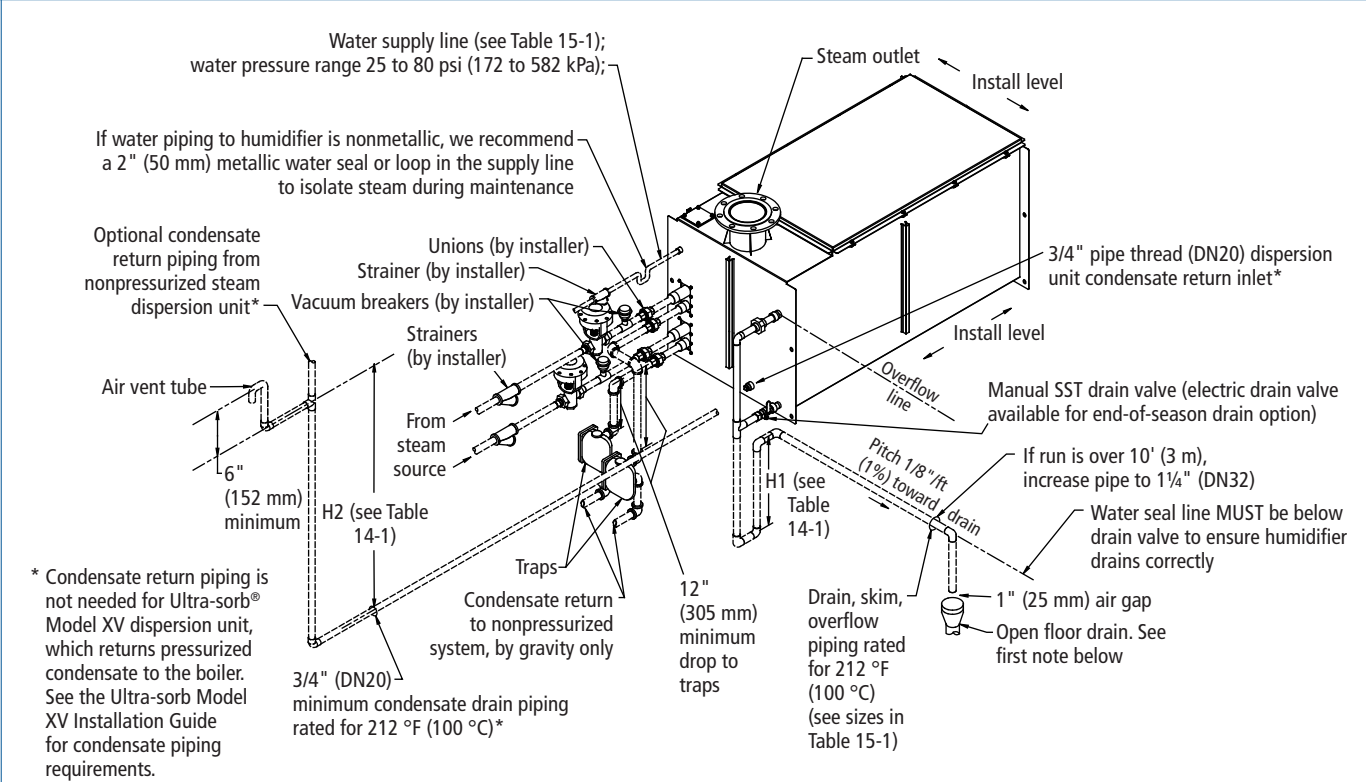
Table 14-1:
Heights required to overcome humidifier internal pressure (H1, H2)

Unit output		Water seal height (H1)		Air vent height (H2)			
		All STS models		STS models			
				25, 50, 100, 200, 400		800	
lbs/hr	kg/h	inches	mm	inches	mm	inches	mm
≤ 138	≤ 62	12	305	27	686	—	—
139-183	63-83	15	381	30	762	—	—
> 183	> 83	18	457	33	838	42.25	1073

mc_010611_0730

STS piping: DI/RO water option, two heat exchangers

Figure 15-1:
Field piping overview for STS model 800 with DI/RO water option



* Condensate return piping is not needed for Ultra-sorb® Model XV dispersion unit, which returns pressurized condensate to the boiler. See the Ultra-sorb Model XV Installation Guide for condensate piping requirements.

Notes:

- Offset humidifier from floor drain to prevent flash steam from rising into the humidifier.
- Locate air gap only in spaces with adequate temperature and air movement to absorb flash steam; otherwise, condensation may form on nearby surfaces. Refer to governing codes for drain pipe size and maximum discharge water temperature.
- Water supply inlet is more than 1" (25 mm) above skim/overflow port, eliminating the possibility of backflow or siphoning from tank. No additional backflow prevention is required; however, governing codes prevail.
- Damage caused by chloride corrosion is not covered by your DRI-STEEM warranty.
- Dashed lines indicate provided by installer.

DC-1468

mc_010411_1550-di

Table 15-1: STS connection sizes	
Description	Connection size
Water makeup (fill)	1/4" pipe thread (DN8), all STS models
Drain	3/4" (DN20) for STS models 25 through 100 1" (DN25) for STS models 200 through 800
Steam outlet	Varies with capacity and dispersion type; see Table 16-1
Condensate return	3/4" pipe thread (DN20)
Pressurized steam supply inlet and return outlet	See sizes in Tables 9-1 and 9-2

mc_010411_1555

Interconnecting steam hose, tubing, and pipe

**Table 16-1:
Maximum steam carrying capacity and length of interconnecting steam hose, tubing, and pipe***

DRI-STEEM steam hose ^{†††}						Copper or stainless steel tubing and Schedule 40 steel pipe					
Hose I.D.		Maximum capacity		Maximum length ^{**}		Tube or pipe size ^{***}		Maximum capacity		Maximum developed length [†]	
inches	DN	lbs/hr	kg/h	ft	m	inches	DN	lbs/hr	kg/h	ft	m
2	50	250	113	10	3	2	50	220	100	30	9
						3 ^{††}	80 ^{††}	450	204	80	24
						4 ^{††}	100 ^{††}	750	340	100	30
						5 ^{††}	125 ^{††}	1400	635	100	30
						6 ^{††}	150 ^{††}	2300	1043	100	30

* Based on total maximum pressure drop in hose, tubing, or pipe of 5" wc (1244 Pa)

** Maximum recommended length for steam hose is 10' (3 m). Longer distances can cause kinking or low spots.

*** To minimize loss of capacity and efficiency, insulate tubing and pipe.

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

†† Requires flange connection.

††† 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 evaporating chamber resulting in condensate discharge at the dispersion assembly. Do not use steam hose for outdoor applications.

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STS steam outlet connections

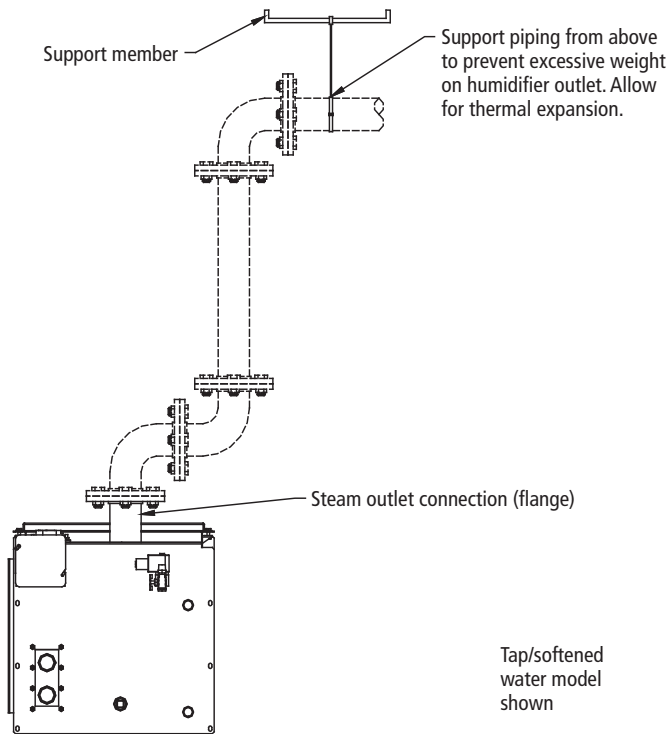
**Table 17-1:
STS steam outlet sizes and types**

STS model	Pipe thread size	Hose size	Flange size			
	2" (DN50)	2" (DN50)	3" (DN80)	4" (DN100)	5" (DN125)	6" (DN150)
25	X	X				
50	X	X	X			
100	X	X	X	X		
200			X	X	X	X
400			X	X	X	X
800				X	X	X

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**Figure 17-1:
Flange connection**

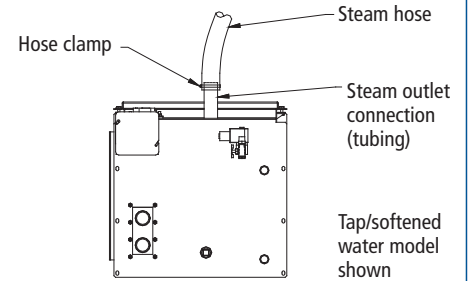
Dashed lines indicate provided by installer



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DC-1458

**Figure 17-2:
2-inch hose connection**



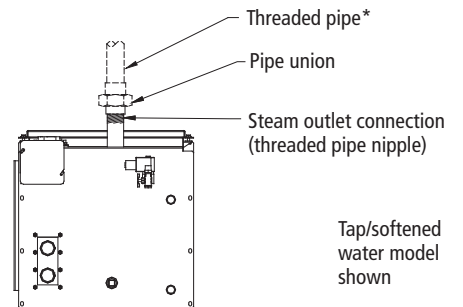
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DC-1455

**Figure 17-3:
2-inch threaded pipe connection**

Dashed lines indicate provided by installer

* Support pipe from above to prevent excessive weight on humidifier outlet. Allow for thermal expansion.

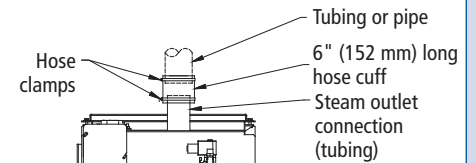


mc_010511_1747-tap

DC-1456

**Figure 17-4:
2-inch tubing or hard pipe connection
using hose cuff with clamps**

Dashed lines indicate provided by installer



mc_010511_1746-tap

DC-1456

STS weather cover

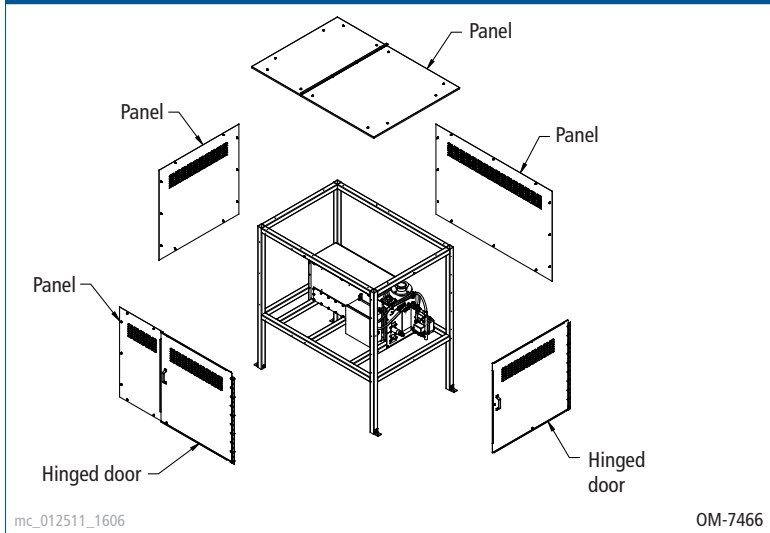
**Table 18-1:
Weather cover weights**

Weather cover size	lbs	kg
STS 25 to 100	425	193
STS 200 to 800	550	250

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The optional STS weather cover is water-resistant and designed to protect an STS humidifier from rain and sun. The STS weather cover option comes with the control cabinet mounted on the humidifier. This weather cover has been tested and approved by ETL Testing Laboratories, Inc., and is listed to UL Standard 1995 and certified to CAN/CSA Standard C22.2 No. 236.

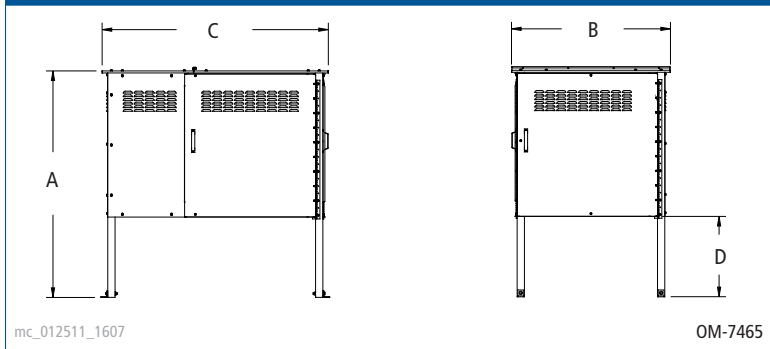
**Figure 18-1:
Weather cover exploded view**



mc_012511_1606

OM-7466

**Figure 18-2:
Weather cover dimensions**



mc_012511_1607

OM-7465

**Table 18-2:
Weather cover dimensions**

Letter	Description	STS 25 to 100		STS 200 to 800	
		inches	mm	inches	mm
A	Height	62	1575	66	1676
B	Length	43.5	1105	53	1346
C	Width	62	1575	78.25	1988
D	Distance from bottom	22	559	22	559

mc_012511_1605

STS outdoor enclosure

Outdoor humidifier operation in any climate is possible with the DRI-STEEM outdoor enclosure. The prepiped, factory-assembled unit ships complete to the job site. Installation is a snap with curb or flush mounting options.

Factory constructed and assembled. The outdoor enclosure is shipped complete with the humidifier preinstalled and tested. The humidifier is prepiped within the enclosure with an integral water seal, ready for quick connection to water, steam and electricity.

Install on the ground or on the roof. Outdoor enclosures are ideal for facilities that have limited interior space.

Certified, tested and proven. In-house testing and numerous successful installations have proven that the outdoor enclosure provides reliable operation under extreme conditions.

Easy access for service. Steel enclosure doors provide full access to internal components. The doors feature stainless steel hinges, and the latches operate from outside and inside of the unit.

Protects in cold and hot climates. To ensure complete safety and operation in all climates, the outdoor enclosure has supplemental heating and ventilating systems that automatically maintain required operation conditions. DRI-STEEM humidifiers housed in outdoor enclosures operate properly when outdoor temperatures range from -40°F to 122°F (-40°C to 50°C).

Robust design. The outdoor enclosure is ruggedly built to completely protect internal components. The enclosure is constructed of heavy-duty galvanized steel and is fully insulated. Gaskets on doors ensure a tight seal.

Figure 19-1:
Typical rooftop installation overview

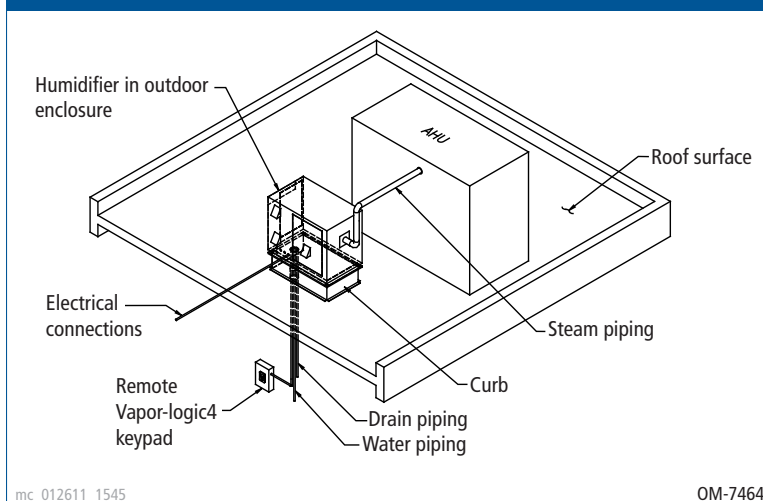
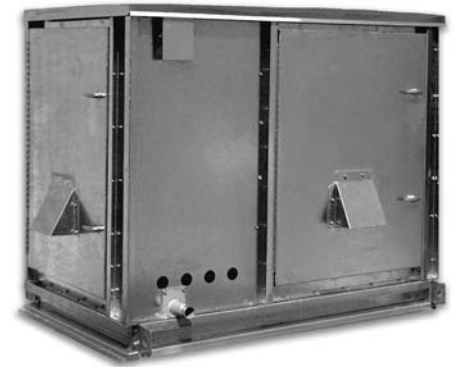
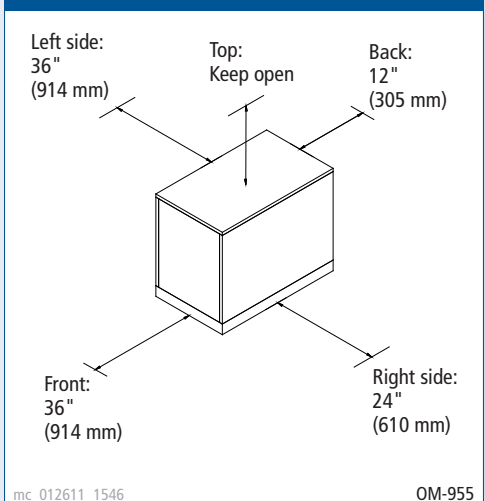


Figure 19-2:
Outdoor enclosure



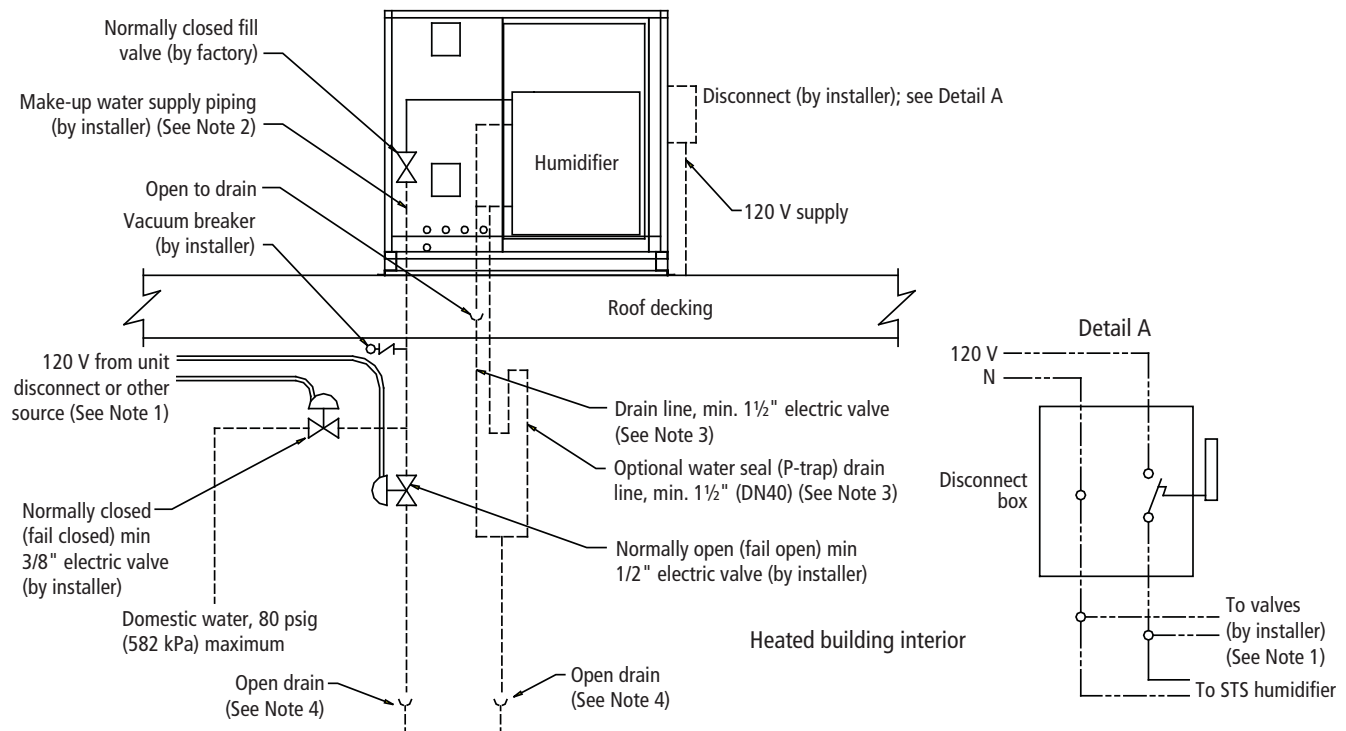
Install an STS humidifier virtually anywhere. This prepackaged, factory-installed unit ships complete to the job site, ready for easy-to-connect water and electrical connections. The STS outdoor enclosure option comes with the control cabinet mounted on the humidifier.

Figure 19-3:
Outdoor enclosure clearances



STS outdoor enclosure

Figure 20-1:
Outdoor enclosure installation detail



OM-7558

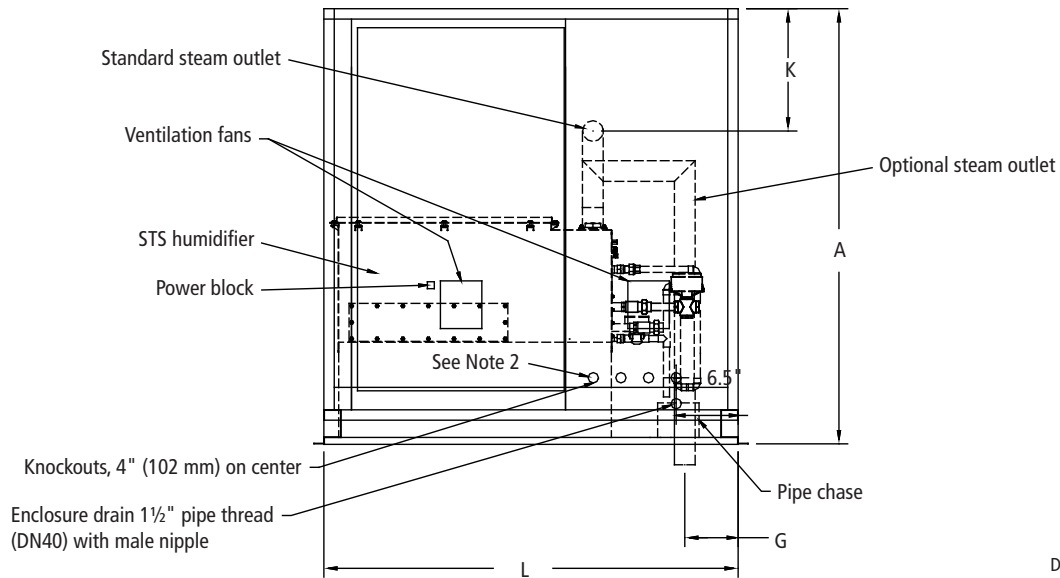
Notes:

1. Insulate supply water piping to avoid dripping from condensation. To ensure that water does not remain in the fill line and freeze if there is a loss of power, DRI-STEEM recommends field installing additional valves upstream of the fill valve in a conditioned space. Power these valves on the same circuit that supplies the STS (as shown above); if the power goes off, water drains out of the fill line to prevent freezing.
2. Ensure that water lines are protected from freezing conditions.
 - Install heat tracing and insulation on fill piping inside the outdoor enclosure.
 - In extreme or critical applications in which the unlikely event of a water leak could cause severe damage, DRI-STEEM recommends a thermostat with a remote sensor on the fill line to cut power to the STS **and** safety valves to stop fill water to the STS and drain the fill piping when the temperature is below freezing.
3. DRI-STEEM recommends copper or iron drain piping for outdoor enclosures. On a loss of power the tank water will drain, but not be cooled by the Drane-kooler because of the field supplied safety shut-off valves. If it is critical to keep the Drane-kooler functional in the case of a power loss, disconnect the Drane-kooler and relocate it down inside the conditioned space of the building. Pipe the supply water for the Drane-kooler before the safety shut-off valves.
4. If copper or iron piping is used for both the fill and drain piping, these drains may be tied together. Locate 1" air gap only in spaces with adequate temperature and air movement to absorb flash steam; otherwise, condensation may form on nearby surfaces. Refer to governing codes for drain pipe size and maximum discharge water temperature.

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STS outdoor enclosure

Figure 21-1:
Outdoor enclosure with standard or optional steam outlet, elevation view



DC-1476

Notes:

1. The outdoor enclosure has two available steam distribution configurations. The standard configuration has a steam outlet on the right side of the outdoor enclosure for connecting to steam dispersion unit piping. The optional internal steam distribution configuration routes steam within the outdoor enclosure and down through the enclosure pipe chase into a building.
2. There are four knockouts located on the right and left side of the enclosure. Knockout sizes are 1½" (hole dia. 50 mm) for STS models 25-100, and 2" (hole dia. 63.5 mm) for STS models 200-800. Run the electrical power into the enclosure at these knockouts.
3. All piping from the STS unit to the steam outlet is stainless steel pipe. Depending on the application, interconnecting piping from the steam outlet to the dispersion assembly can be steam hose, tubing, or piping.
4. Install a riser trap in the branch line leading to the humidifier.
5. The preferred location for the STS steam control valve is inside the outdoor enclosure. If one of these valves must be located inside the building, it must be located within 6' (1.8 m) of the humidifier to reduce pressure drop.
6. See the dimensions in Table 22-1.

mc_012511_1635

Table 21-1:
Outdoor enclosure weights

STS model	Shipping weight*		Operating weight*	
	lbs	kg	lbs	kg
25	600	272	680	308
50	625	284	840	381
100	640	290	860	390
200	1050	476	1650	748
400	1125	510	1750	794
800	1225	556	2250	1021

* Includes humidifier

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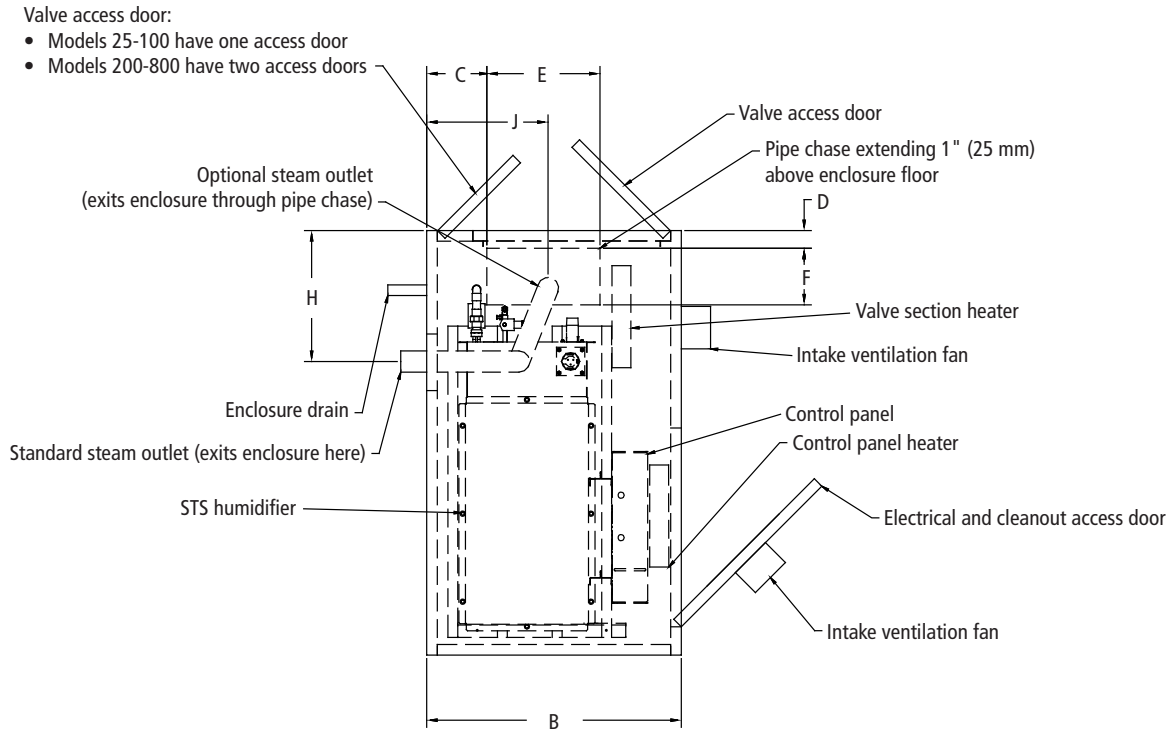
Table 21-2:
Outdoor enclosure connection sizes

Description	STS model	
	25 – 100	200 – 800
Water makeup (fill)	1/4" pipe thread (DN8)	1/4" pipe thread (DN8)
Drain	3/4" (DN20)	1" (DN25)
Condensate return	3/4" pipe thread (DN20)	3/4" pipe thread (DN20)
Steam outlet	See Table 17-1.	

mc_012611_1017

STS outdoor enclosure

Figure 22-1:
Outdoor enclosure, top view



mc_012611_0837

DC-1478

Table 22-1:
Outdoor enclosure dimensions*

Item	Description	STS model			
		25-100		200-800	
		inches	mm	inches	mm
A	Enclosure height	56.00	1422	66.00	1676
B	Enclosure width	36.00	914	46.00	1168
C	Pipe chase position	4.50	114	4.50	114
D		2.00	57	3.50	89
E	Pipe chase size	20.00	508	32.00	312
F		8.00	203	10.00	254
G	Steam pipe position	6.00	152	8.50	216
H		18.63	473	22.00	559
J		14.50	368	20.50	521
K		12.25	311	11.00	279
L	Enclosure length	60.00	1524	78.00	1981

* See drawings in Figures 21-1 and 22-1.

mc_012611_1015

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 nonpressurized steam 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.

Managing and controlling condensate

Some condensation is inevitable in steam dispersion, but through careful design, condensate can be managed and controlled:

Ultra-sorb Model XV dispersion panels have a single supply header with an integral heat exchanger circulating boiler steam. Heat from the boiler steam vaporizes all dispersion-generated condensate and returns pressurized condensate to the boiler. STS with Ultra-sorb Model XV (standard with high-efficiency tubes and insulated header) is the most efficient steam humidification system available, and the only chemical-free boiler steam humidification system that totally manages condensate.

Ultra-sorb Models LV and LH steam 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.

Rapid-sorb dispersion units have steam entering one end of a single bottom header with velocities carefully managed so that condensate is not pushed out into the air along with the steam; it drains out at the opposite end of the header.

Reduce condensate, wasted energy with high-efficiency tubes

See “High-efficiency Tube option” on Page 24.

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

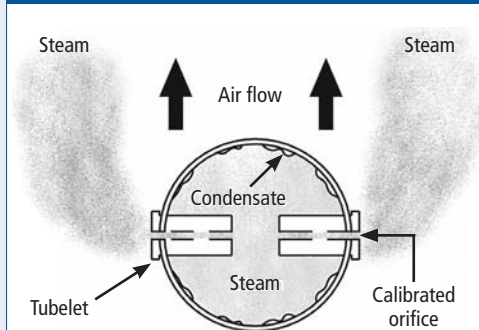
Figure 23-1:
DRI-STEEM dispersion tubes



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.

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Figure 23-2:
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.

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OM-150a

STS steam dispersion options

Figure 24-1:
Ultra-sorb Model LV dispersion

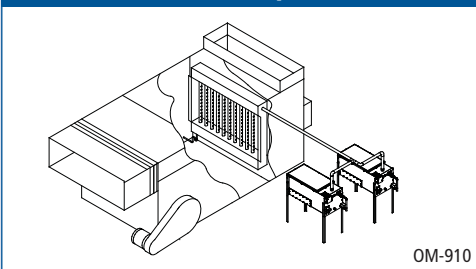


Figure 24-2:
Rapid-sorb dispersion

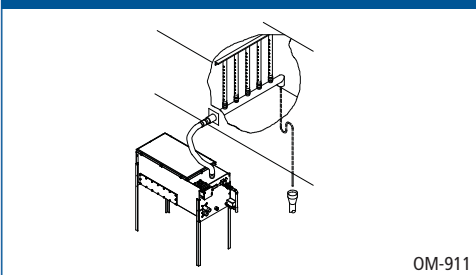
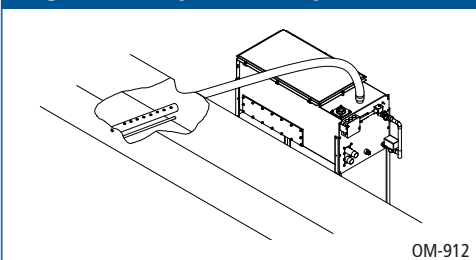


Figure 24-3:
Single or multiple tube dispersion



Ultra-sorb® Model XV

- Shortest absorption
- Standard with high-efficiency tubes and insulated header
- Closed-loop system returns chemicals and steam to boiler
- No condensate loss or water waste
- Available with steam capacity up to 450 lbs/hr (204 kg/h) per dispersion panel



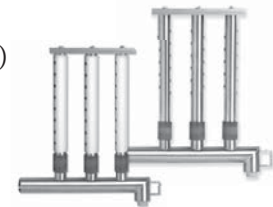
Ultra-sorb® Model LV

- Shortest absorption
- Factory assembled for easy installation
- High-efficiency tube option
- Steam capacity up to 1,850 lbs/hr (839 kg/h)



Rapid-sorb®

- Single-header design
- Short absorption
- 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 option for Ultra-sorb Models LV and LH, Rapid-sorb, and single or multiple tubes



Ultra-sorb Model LV with high-efficiency tubes

Calculating non-wetting distances

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 26-1. 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 26-1, note that for 6" (150 mm) spacing, maximum capacity is 18 lbs/hr/ft² (88 kg/h/m²). 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

- 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.
- **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.
- 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.
- 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.

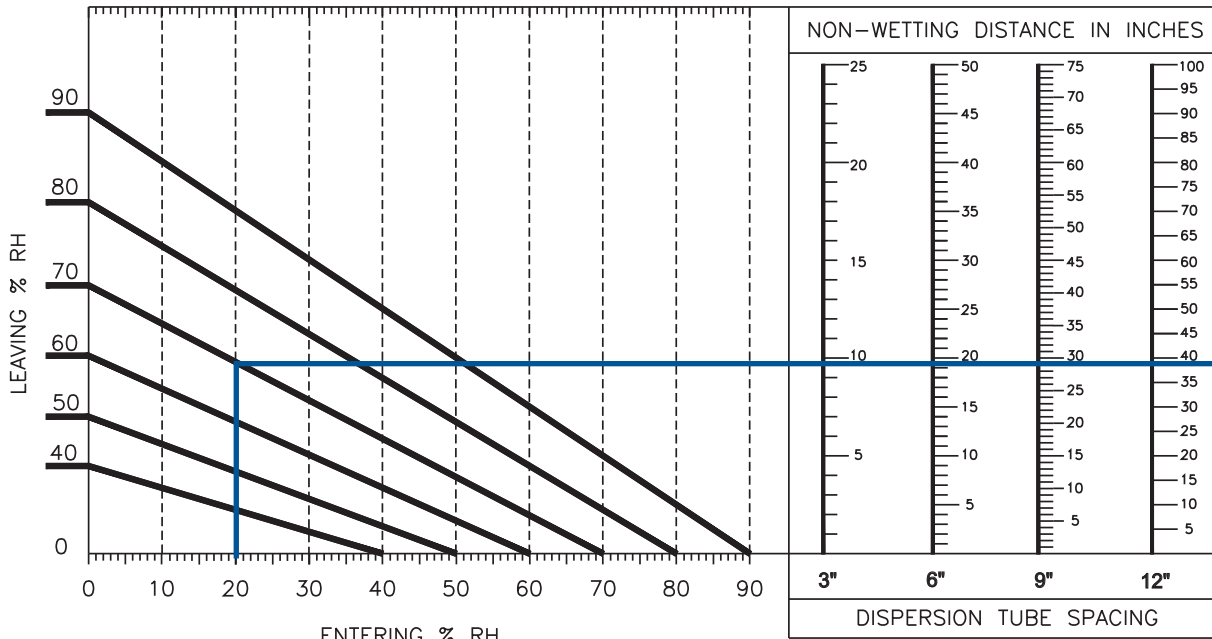
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Notes:

- 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.

Ultra-sorb dispersion

**Figure 26-1:
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 25.

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**Table 26-1:
Ultra-sorb tube spacing and capacity**

Tube spacing		Maximum capacity	
inches	mm	lbs/hr/ft ²	kg/h/m ²
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.

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Ultra-sorb Model XV dispersion

Figure 27-1:
Ultra-sorb Model XV dimensions

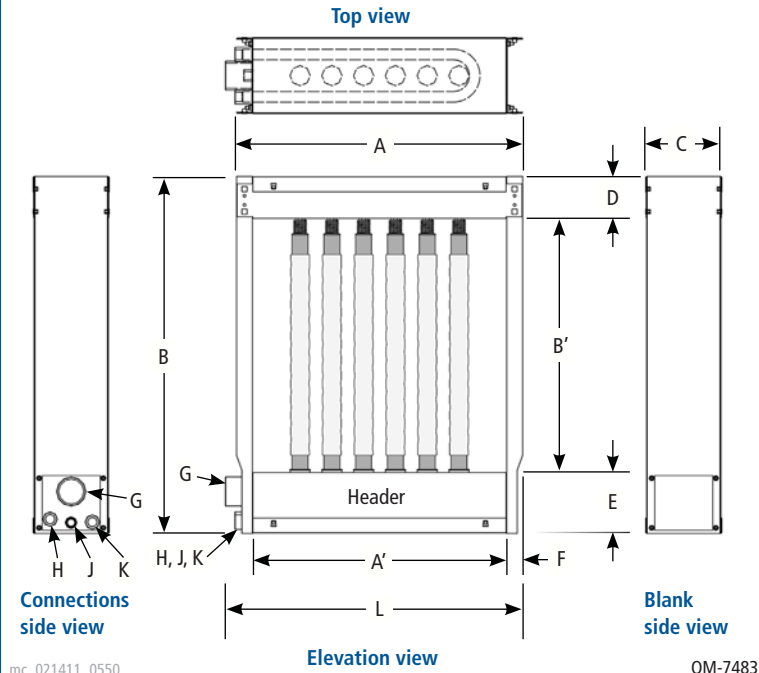


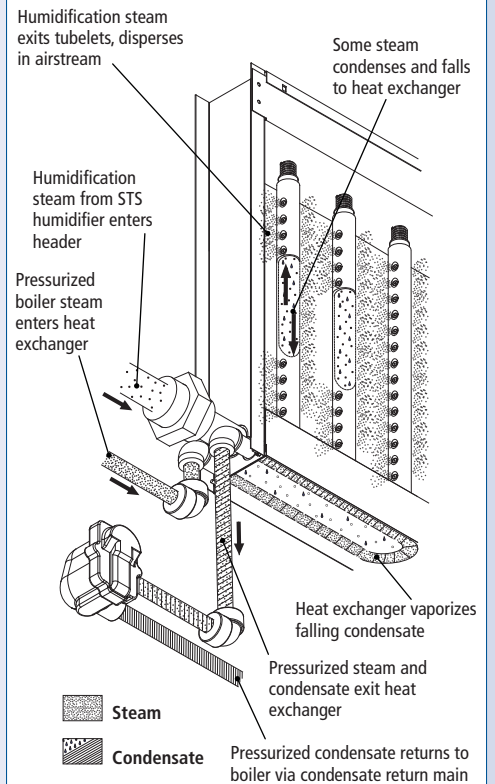
Table 27-1:
Ultra-sorb Model XV dimensions

A Panel width	15" (380 mm) min, 147" (3735 mm) max, in 1" (25 mm) increments
A' Face width	12" (305 mm) min, 144" (3660 mm) max, in 1" (25 mm) increments
B Overall height*	21.75" (550 mm) min, 153.75" (3905 mm) max, in 1" (25 mm) increments
B' Face height	12" (305 mm) min, 144" (3660 mm) max, in 1" (25 mm) increments
C Frame depth	7.2" (183 mm)
D Frame enclosure	3.9" (99 mm)
E Header enclosure	5.85" (149 mm)
F Mounting flange	1.5" (38 mm)
G Humidification steam inlet (internal thread)	1" or 2" NPT, determined by maximum steam capacity
H Pressurized steam inlet (internal thread)	3/4" NPT
J Access port and optional overflow (internal thread)	1/2" NPT
K Pressurized condensate outlet (internal thread)	3/4" NPT
L Overall width	1" connection, same as dimension A; 2" connection, dimension A + 1"

* Panels with overall height more than 120" (3048 mm) have two-piece side flanges and are shipped with brackets and panel fasteners for easy field assembly. Panels with overall height more than 98" (2490 mm) are shipped unassembled.

Figure 27-2:
STS humidifier with Ultra-sorb Model XV dispersion option

Ultra-sorb Model XV disperses STS-generated humidification steam with no condensate loss.



Ultra-sorb Model LV dispersion

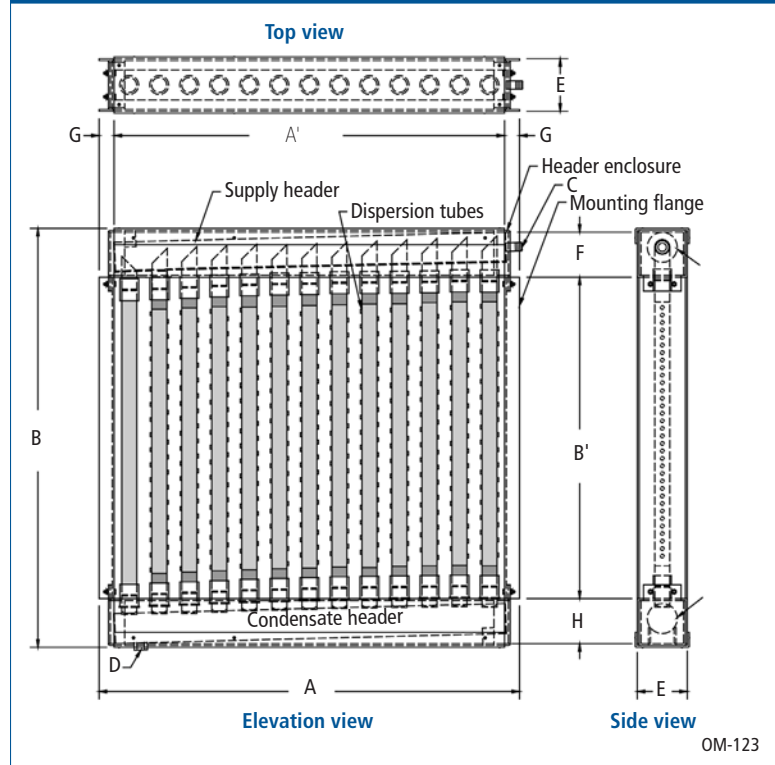
Ultra-sorb LV

- 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 28-1:
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 28-1:
Ultra-sorb LV dimensions**



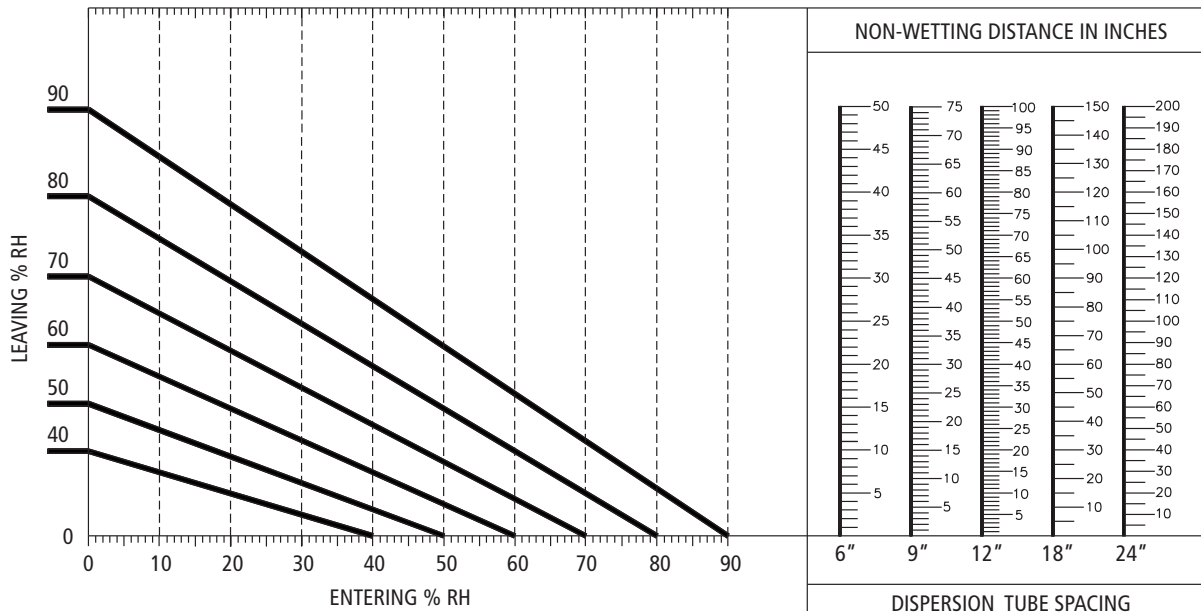
**Table 28-2:
Ultra-sorb LV dimensions**

A Overall width	15" (380 mm) min, 147" (3735 mm) max, in 1" (25 mm) increments
A' Face width	12" (305 mm) min, 144" (3660 mm) max, in 1" (25 mm) increments
B Overall height	21" (530 mm) min, 156" (3960 mm) max, in 1" (25 mm) increments Panels with overall height more than 98" (2490 mm) are shipped unassembled.
B' Face height	12" (305 mm) min, 144" (3660 mm) max, in 1" (25 mm) 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 mm); for 5" (DN125) header, E = 6" (152 mm); for 6" (DN150) header, E = 7" (178 mm)
F Header enclosure (top to bottom)	For 3" (DN80) header F = 4.5" (114 mm); for 4" (DN100) header, F = 5.5" (140 mm); for 5" (DN125) header, F = 6.5" (165 mm); for 6" (DN150) header F = 7.5" (191 mm)
G Flange	1.5" (38 mm)
H Condensate header enclosure	4.5" (114 mm)

Note: Header dimensions are determined by capacity. See Table 28-1.

Rapid-sorb dispersion

Figure 29-1:
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 29-2:
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.

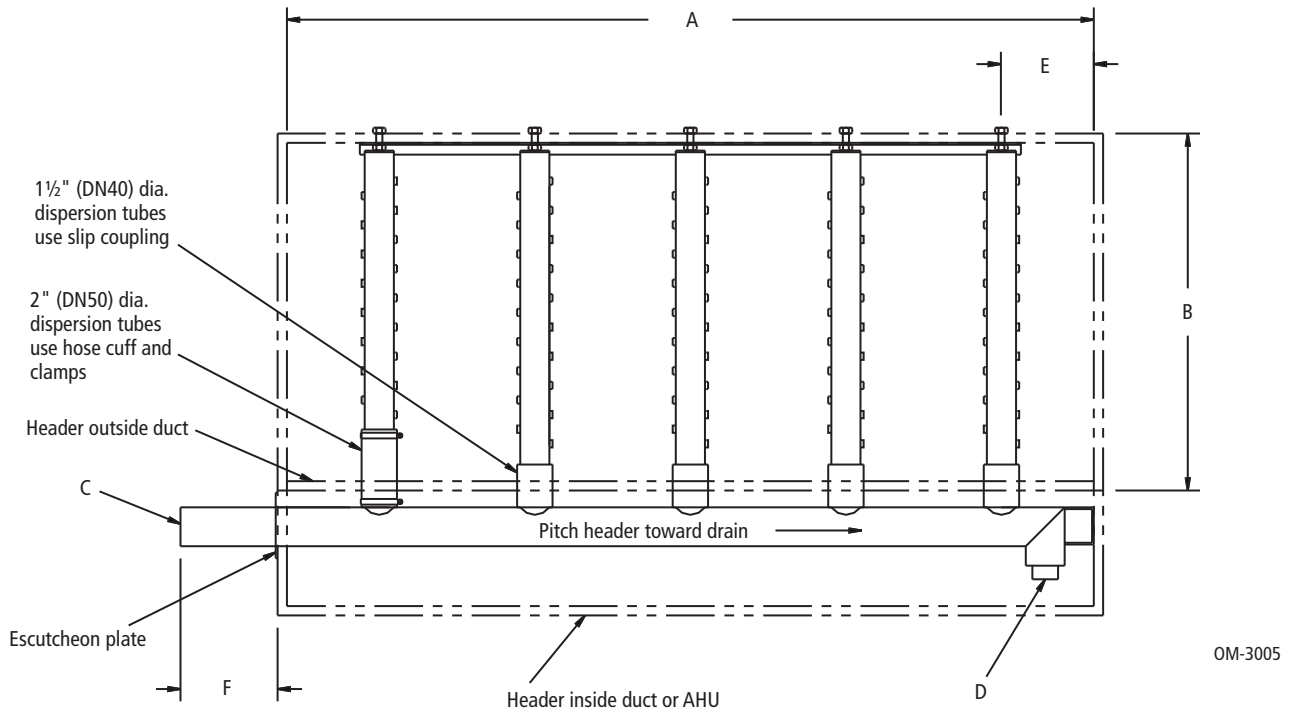
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Table 29-1:
Rapid-sorb header capacities

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

Rapid-sorb dispersion

**Figure 30-1:
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 30-1:
Rapid-sorb dimensions**

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

Single dispersion tube

Figure 31-1:
Single dispersion tube non-wetting distances

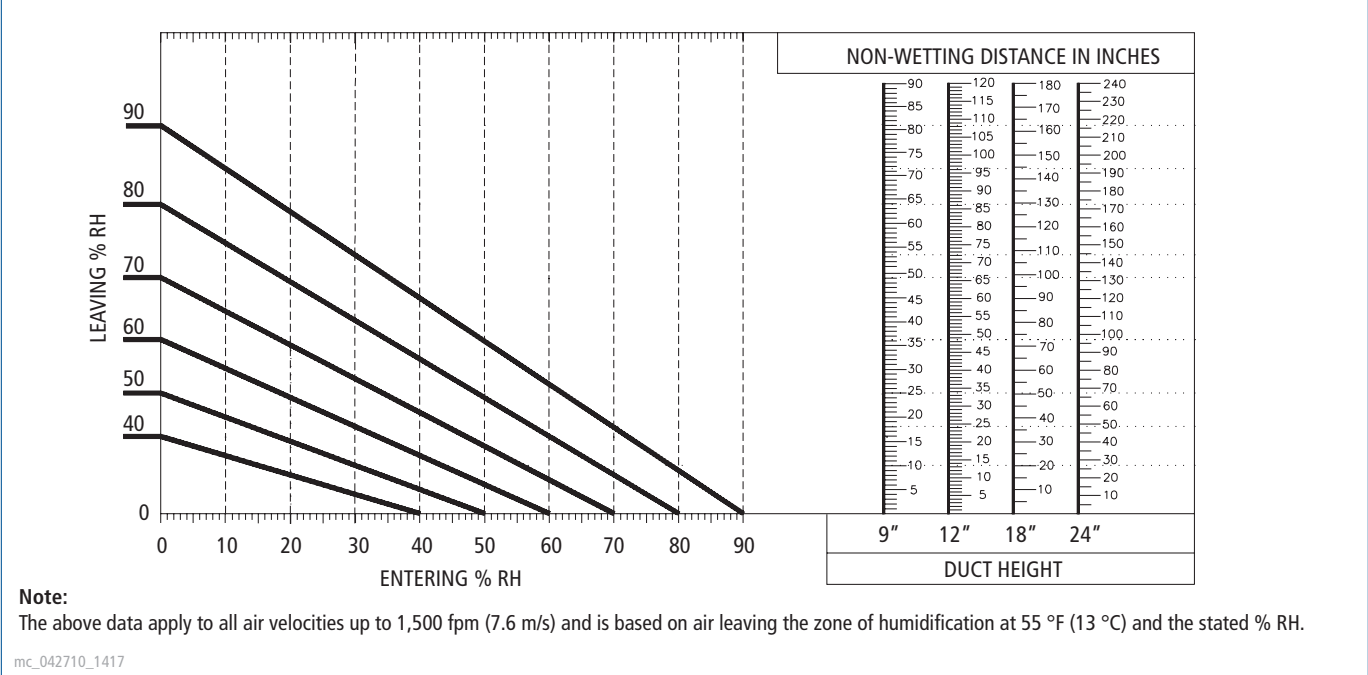


Figure 31-2:
Single tube with condensate drain

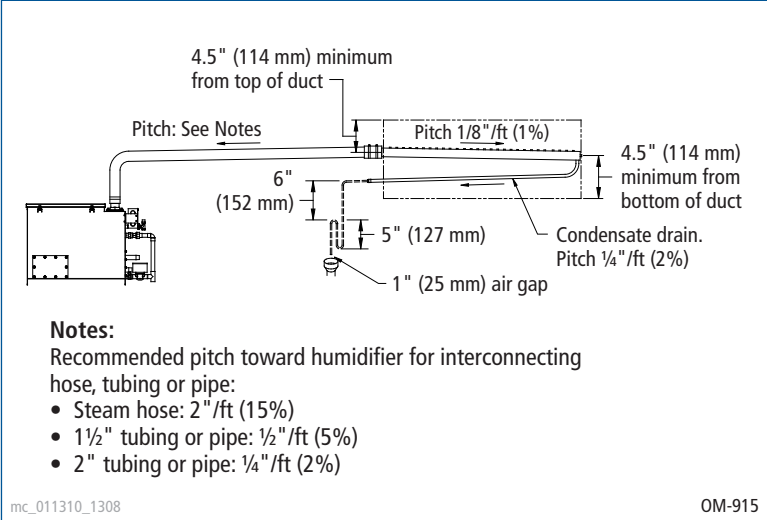


Table 31-1:
Single dispersion tube capacities

Tube size		Capacity			
		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

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Conserving resources through better performance

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 STS humidifier, which features cleanable, stainless steel construction. DRI-STEEM also leads the industry with a Two-year Limited Warranty and optional extended warranty.

For more information

www.dristeem.com
sales@dristeem.com

For the most recent production information visit our website:

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DRI-STEEM Corporation

An ISO 9001:2000 certified company

U.S. Headquarters:
14949 Technology Drive
Eden Prairie, MN 55344
800-328-4447 or 952-949-2415
952-229-3200 (fax)

European office:
Marc Briers
Grote Hellekensstraat 54 b
B-3520 Zonhoven
Belgium
+3211823595 (voice)
+3211817948 (fax)
E-mail: marc.briers@dristeem.com

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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.

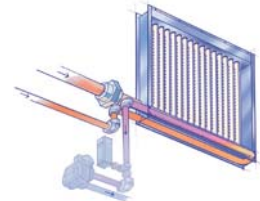


For warm, dry applications, DRI-STEEM's High-Pressure Atomizing System disperses unheated micro-fine water particles into airstreams or open spaces. As atomized water droplets evaporate, air temperature drops, reducing the cooling load. This provides significant energy savings when humidifying and cooling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