

Ultra-sorb® Models LV and LH
Steam Dispersion Panels

**Installation, Operation,
and Maintenance Manual**

DRI-STEEM®
The humidification experts



*For applications using steam from a boiler or from
any DRI-STEEM steam generating humidifier.*

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Unpacking High-efficiency tubes

NOTE: If you have an Ultra-sorb without High-efficiency dispersion tubes (non-insulated tubes), please skip to the next page.

Unpacking

- Remove the dispersion assembly from the shipping container; be careful not to bump or scrape the PVDF insulating material on the dispersion tubes.
- Some dispersion panels are shipped unassembled by customer request or by shipping necessity. Do not lay High-efficiency tubes across or under anything that could compress or damage the insulating material. Compressed insulating material has a reduced R-value.
- Avoid bumping or snagging the PVDF insulating material. Although PVDF is robust, rough handling can cause tears, which could negatively impact performance.
- Before start-up, remove the clear poly film by tearing it along the perforation. **Do not use a knife or sharp object to remove the poly film.**

CAUTION!

The High-efficiency tubes are sleeved in clear poly film for protection during processing, shipping, and installation.

To prevent dirty insulating material, leave the clear poly film on until installation is complete.

Equally important, remove and discard the clear poly film before start-up by tearing it along the perforations.



Figure 3-1:
Ultra-sorb with the High-efficiency Tube option



High-efficiency Tube option

Ultra-sorb dispersion assemblies with the High-efficiency Tube option are designed to produce significantly less dispersion-generated condensate and airstream heat gain, which reduces wasted energy by up to 85%. These improvements are accomplished by reducing the thermal conductivity of the tubes with 1/8" of polyvinylidene fluoride (PVDF) insulating material on the outside of the tubes. These assemblies require careful unpacking, installation, and handling. If your dispersion assembly has the High-efficiency Tube option, be sure to read this section carefully.

Field assembly of Model LH

**Table 4-1:
Ultra-sorb Model LH components**

Description	Qty.
Supply header assembly with shouldered slip couplings	1
Condensate header assembly	1
Mounting flange	2
Dispersion tubes with slip couplings	varies
¼ - 20 x ¾" bolt	8
¼ - 20 nut	8
¼ lock washer	8

Please read instructions while assembling

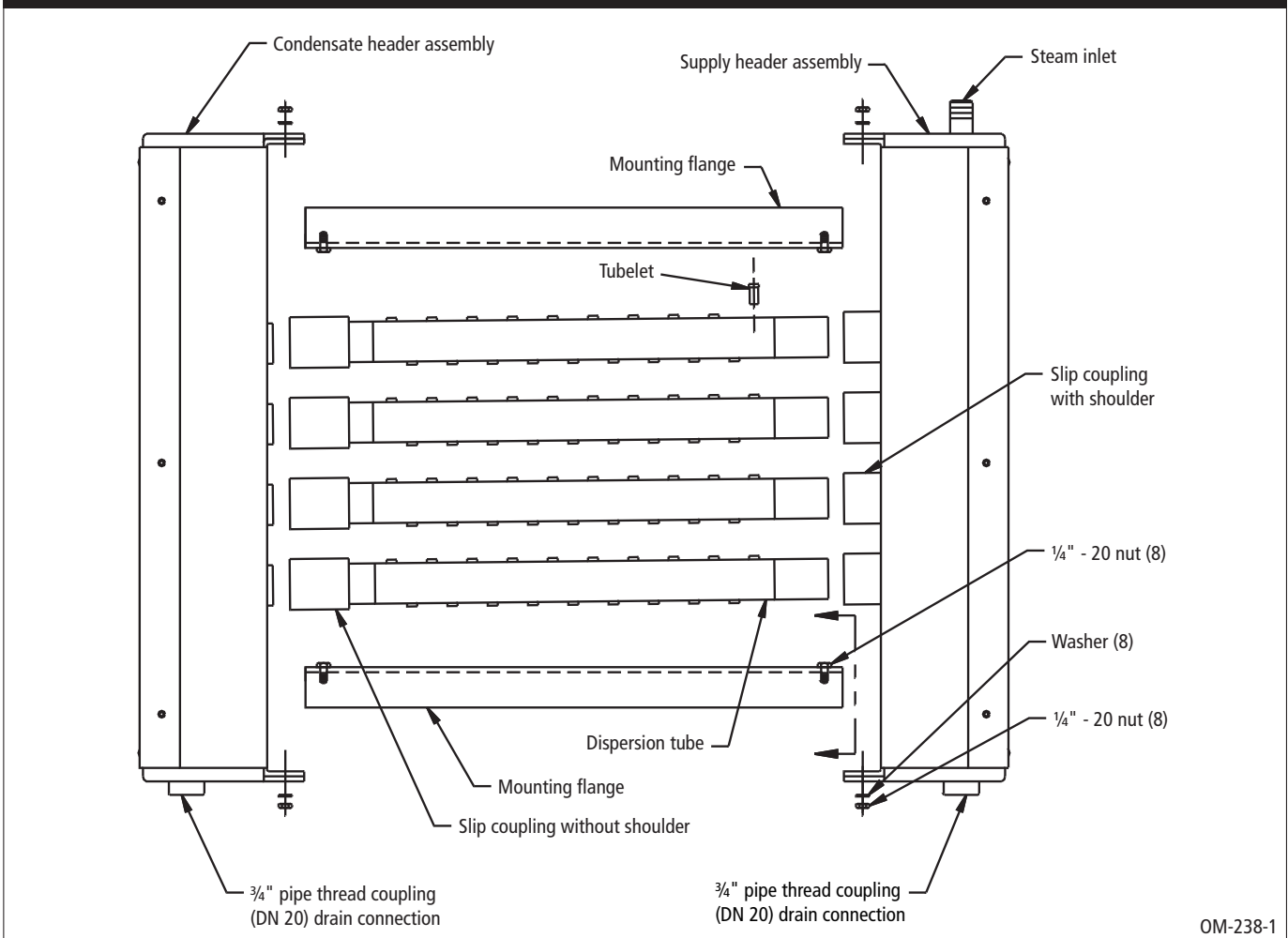
STEP 1 - Unpack

Unpack the Ultra-sorb components and verify that you have all items on the packing list.

Note that both the supply header assembly and the condensate header assembly have a ¾" half coupling drain connection on one end. This will be the lower end of the installed dispersion assembly. The supply header assembly has a steam inlet (nipple or tubing) on the end opposite the drain connection.

Arrange the components on a large, flat working surface, positioning them as indicated in Figure 4-1 (condensate header to the left, supply header to the right).

**Figure 4-1:
Ultra-sorb Model LH**



OM-238-1

Field assembly of Model LH

STEP 2 - Bolt the mounting flanges to the supply header assembly

Refer to Figure 5-1 and 5-2.

Attach the two mounting flanges to the supply header assembly as indicated using 1/4" - 20 bolts with the nuts finger tight.

STEP 3 - Insert the dispersion tubes

Refer to Figure 5-3. Insert the plain ends (no slip couplings) of the dispersion tubes into the slip couplings already mounted on the supply header assembly. The slip couplings are factory lubricated; if well aligned during insertion, no further lubrication should be needed. Push and twist the tube in until it bottoms out on the internal shoulder of the slip coupling (see Figure 5-4).

CAUTION! Use care to avoid cutting the internal O-rings of the slip couplings.

Figure 5-3:
Dispersion tubes

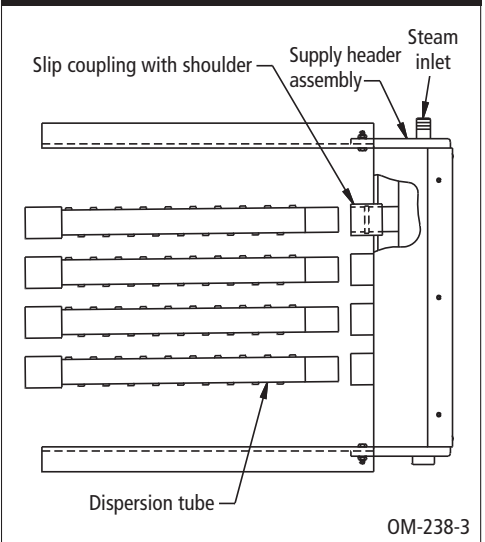


Figure 5-1:
Supply header assembly

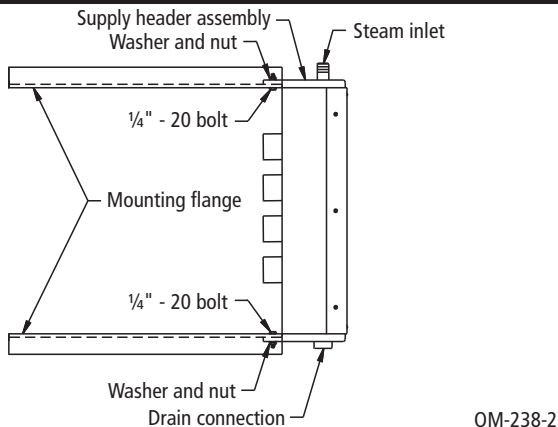


Figure 5-4:
Slip coupling with shoulder

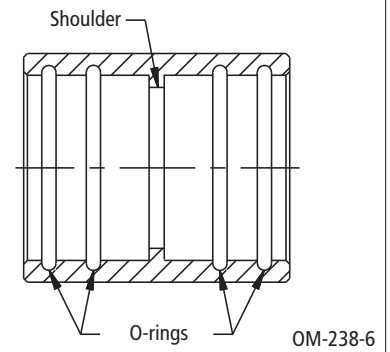


Figure 5-2:
Detail view of mounting flange

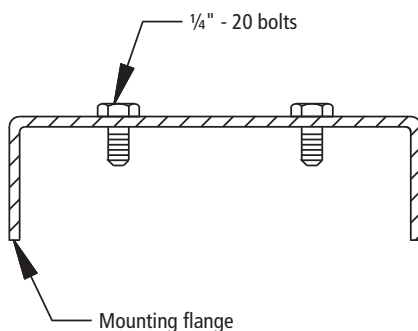
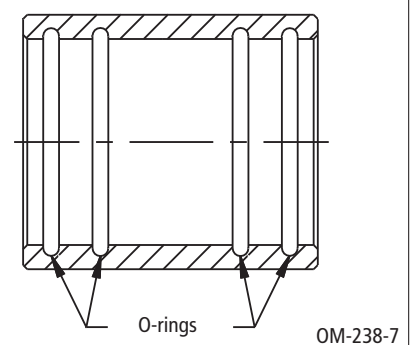
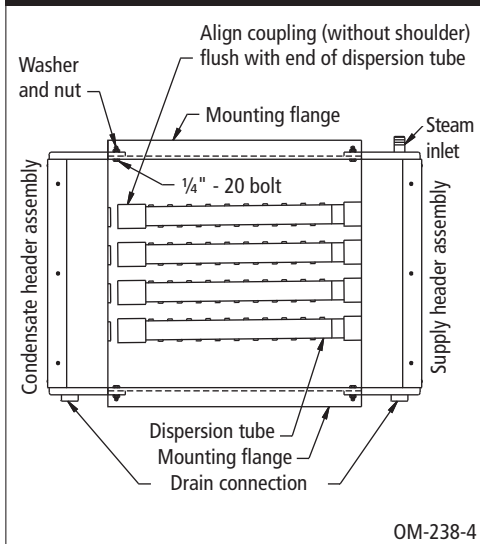


Figure 5-5:
Slip coupling without shoulder



Field assembly of Model LH

**Figure 6-1:
Condensate header assembly**



STEP 4 - Bolt the mounting flanges to the condensate header assembly

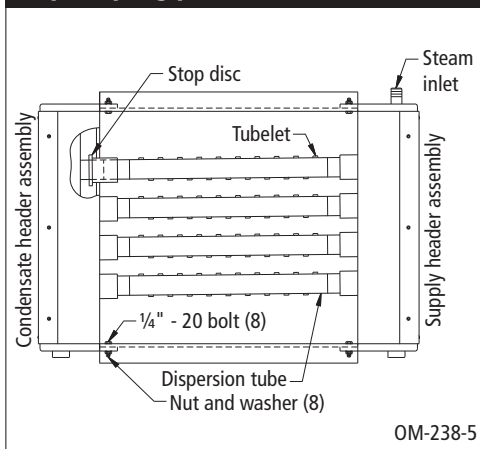
Refer to Figure 6-1. Push the slip couplings onto the dispersion tubes flush with the tube ends. Make sure the drain connection is properly oriented. Attach the mounting flanges using 1/4" - 20 bolts, and leave the nuts finger tight.

STEP 5 - Slide the slip couplings onto the condensate header assembly and orient the tubelets

SUGGESTION: Gripping the drain connection with vise grip pliers and applying a back and forth rolling motion to the header will assist in sliding the slip couplings into place.

Refer to Figure 6-2. It may be necessary to push and twist the slip couplings onto the condensate header. Again care must be taken to avoid cutting the internal O-rings. Slide the slip couplings on until they bottom out against the stop disc on the condensate header. The steam tubelets must be aimed so that they discharge the steam perpendicular to the airstream. Rotate the dispersion tubes as needed.

**Figure 6-2:
Slip coupling placement**



After tightening the 1/4" - 20 bolts at all 4 corners, the Ultra-sorb panel is ready for installation. See page 10.

Field assembly of Model LV

Please read instructions while assembling

STEP 1 - Unpack

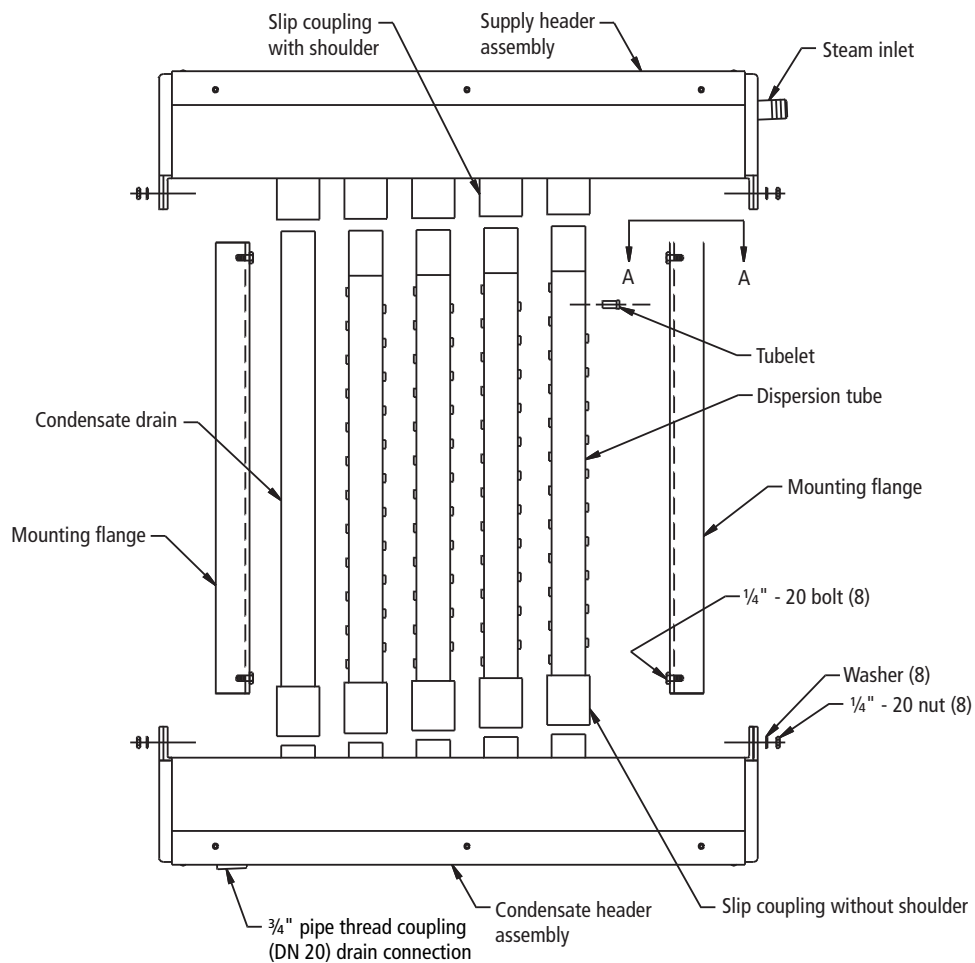
Unpack the Ultra-sorb components and verify that you have all items on the packing list.

Lay the components on a flat surface, and position the header assemblies as shown in Figure 7-1. Orient the condensate header assembly so the 3/4" half coupling drain connection is to your left, and orient the supply header assembly so the steam inlet (nipple or tubing) is to your right.

**Table 7-1:
Ultra-sorb Model LV components**

Description	Qty.
Supply header assembly with shouldered slip couplings	1
Condensate header assembly	1
Mounting flange	2
Dispersion tubes with slip couplings	varies
Condensate drain tube	1
1/4 - 20 x 3/4" bolt	8
1/4 - 20 nut	8
1/4 lock washer	8

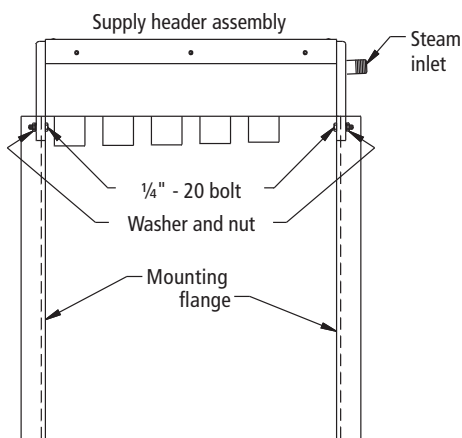
**Figure 7-1:
Ultra-sorb Model LV**



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Field assembly of Model LV

**Figure 8-1:
Supply header assembly**



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STEP 2 - Bolt the mounting flanges to the supply header assembly

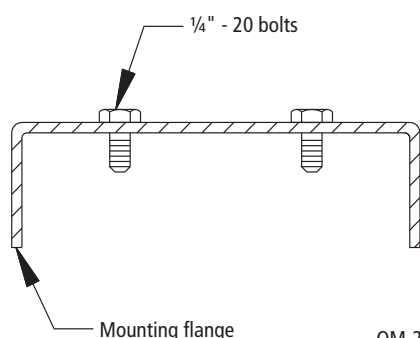
Refer to Figure 8-1 and 8-2. Attach the two mounting flanges as indicated using $\frac{1}{4}$ " - 20 bolts with the nuts only finger tightened.

STEP 3 - Insert the dispersion tubes

Refer to Figure 8-4. Insert the plain ends (no slip couplings) of the dispersion tubes into the slip coupling already mounted on the supply header assembly. The slip couplings are factory lubricated; if well aligned during insertion, no further lubrication should be needed. Push and twist the tube in until it bottoms out on the internal shoulder of the slip coupling. See Figure 8-3.

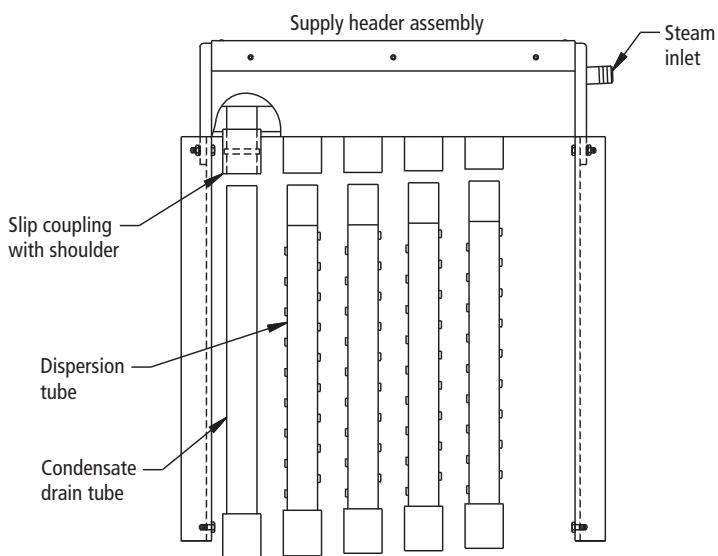
CAUTION! Use care to avoid cutting the internal O-rings of the slip couplings.

**Figure 8-2:
Detail view of mounting flange**



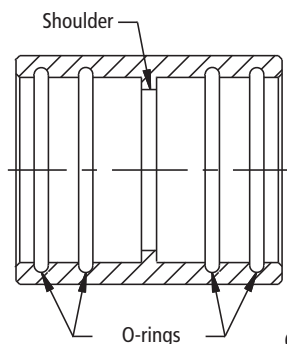
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**Figure 8-4:
Dispersion tubes**



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**Figure 8-3:
Detail view of slip coupling**



OM-238-6

Field assembly of Model LV

STEP 4 - Bolt the mounting flanges to the condensate header assembly

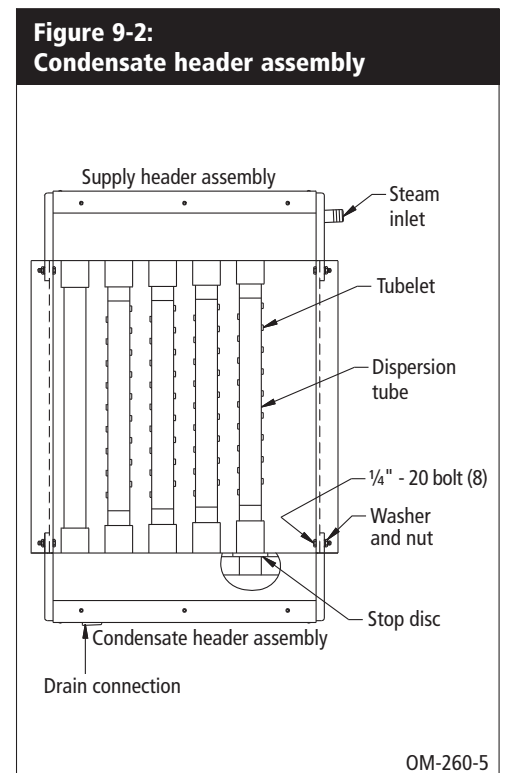
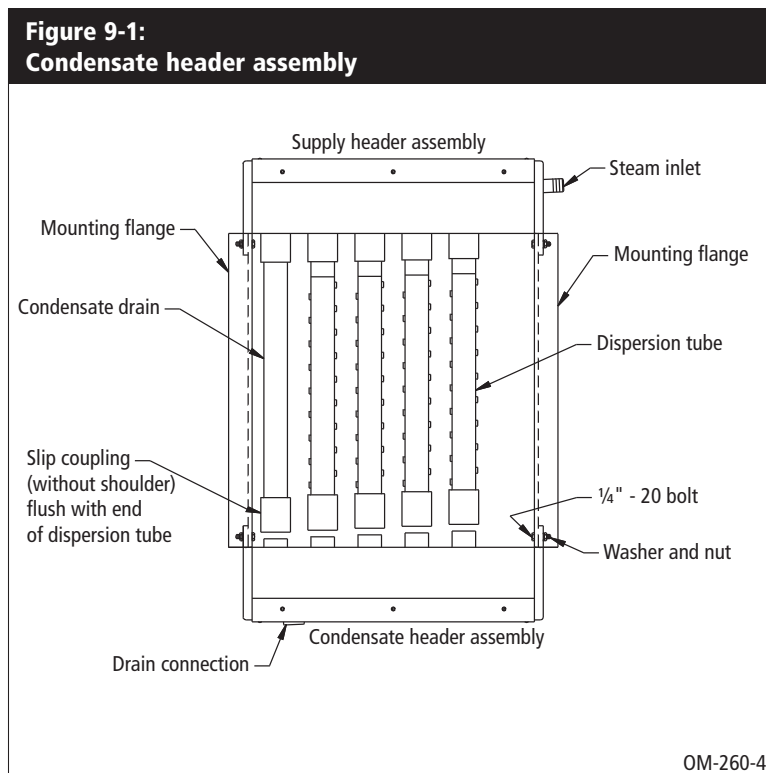
Refer to Figure 9-1. Push the slip couplings onto the dispersion tubes flush with the tube ends. Make sure the drain connection is properly oriented. Attach the mounting flanges using $\frac{1}{4}$ " - 20 bolts, and leave the nuts finger tight.

STEP 5 - Slide the slip couplings onto the condensate header assembly and orient the tubelets

SUGGESTION: Gripping the drain connection with vise grip pliers and applying a back and forth rolling motion to the header will assist in sliding the slip couplings into place.

Refer to Figure 9-2. It may be necessary to push and twist the slip couplings onto the condensate header. Again care must be taken to avoid cutting the internal O-rings. Slide the slip couplings on until they bottom out against the stop disc on the condensate header. The tubelets must be aimed so that they discharge the steam perpendicular to the airstream. Rotate the dispersion tubes as needed.

After tightening the $\frac{1}{4}$ " - 20 bolts at all 4 corners the Ultra-sorb panel is ready for installation. See page 10.



Installation

Selecting the location

Ultra-sorb steam dispersion panels need a steam supply and a method for trapping and removing condensate. See supply and drain connections information on Page 16.

When selecting the location, first consideration should be given to rapid, thorough absorption of the steam. The warmest air will most readily absorb the steam.

The distance that unabsorbed steam will travel within a given airstream has been cataloged by DRI-STEEM. See Figure 22-1.

- A. You must install the Ultra-sorb panel in a location where the water vapor being discharged will be absorbed by the airstream.
- B. In general, place the Ultra-sorb panel where the air temperature is capable of absorbing steam being discharged without causing condensation at or after the unit. This will normally be downstream of the heating coil or where the air temperature is warmest.
- C. Do not place the Ultra-sorb panel in an outside air intake unless the air is tempered with a preheat coil.
- D. Do not place the Ultra-sorb panel too near to the entrance of a high-efficiency filter. The filter will remove the visible moisture and become waterlogged. See Note 3 on page 22 for absorption (non-wetting) distance.
- E. Do not place the Ultra-sorb panel where discharged visible mist will impinge directly on a metal surface.

Note: To prevent leakage, use HVAC caulking or a similar weather sealant to seal all places where the Ultra-sorb installation hardware and fittings penetrate the wall of the duct.

Installation

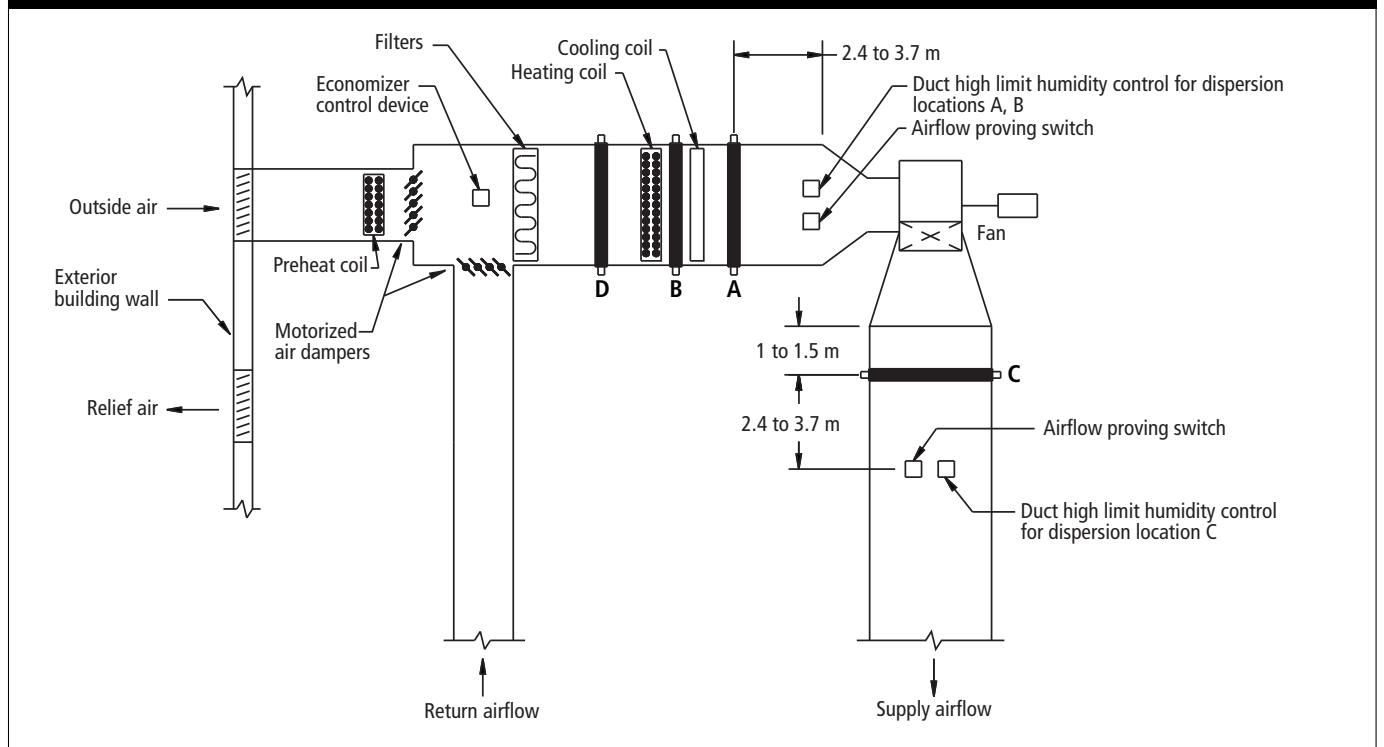
Determine humidifier placement

Check available non-wetting distance, and review the recommendations in Figure 11-1. Dispersed steam must be absorbed into the airflow before it comes in contact with duct elbows, fans, vanes, filters, or any object that can cause condensation and dripping.

Placement in an air handling unit

- **Location A is the best choice.** Installing downstream of heating and cooling coils provides laminar flow through the dispersion unit; plus, the heated air provides an environment for best absorption.
- **Location B is the second-best choice.** However, in change-over periods, the cooling coil will eliminate some moisture for humidification.
- **Location C is the third-best choice.** Air leaving a fan is usually very turbulent and can cause vapor to not absorb at the expected absorption distance. Allow for more absorption distance if installing downstream of a fan.
- **Location D is the poorest choice.** The cooler air at this location requires an increased absorption distance.

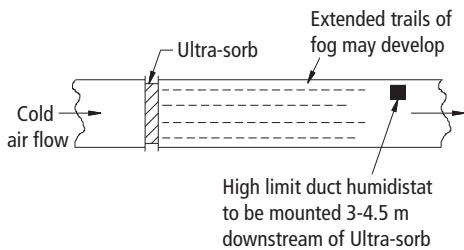
Figure 11-1:
Placing a dispersion assembly in an AHU



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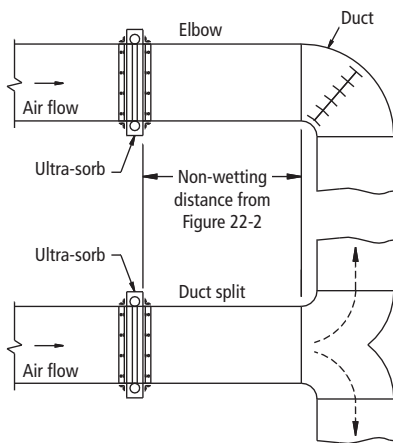
Installation

**Figure 12-1:
Installation in cold air stream**



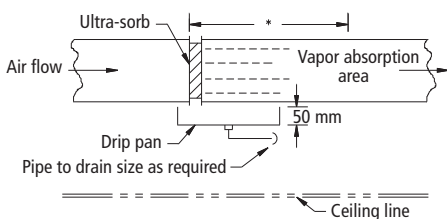
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**Figure 12-2:
Upstream placement**



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**Figure 12-3:
Installation above valuable equipment**



* This length of duct should have sealed seams and should be at least three times the height of the Ultra-sorb panel.

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Installation in a cold air stream

When a humidifier is installed in a duct that will carry cold air periodically, determine the dew point temperature.

If the psychrometric chart reveals that saturation may occur, protection should be provided. A high limit humidistat or thermostat set to cut off the humidifier at a safe temperature can be used for this purpose.

Placement upstream of an elbow or duct split

Due to the rapid steam absorption performance of the Ultra-sorb panels, installation upstream from elbows or duct splits can be done with confidence. However, all mechanical equipment is subject to accidental failure. Therefore, if the installation is above expensive or irreplaceable objects, a galvanized drip pan should be installed to prevent accidental spillage. See Figure 12-3.

Installation above valuable equipment

Water piping and humidifiers should not be installed above expensive equipment. A leaking water pipe, condensation, or other accidental water spillage could cause serious damage to the equipment below.

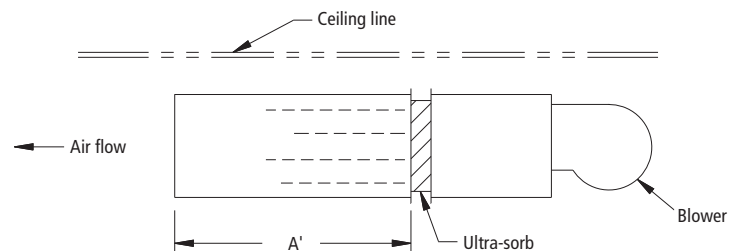
When such an installation cannot be avoided, install a galvanized drip pan under the humidifier, valve, etc. to catch and drain away the spill.

The condensate from the Ultra-sorb panel should be piped as shown on Page 16 and should not be discharged into the pan.

Recirculation unit

In an application where no duct system exists, or if the duct air is too cool for proper humidity absorption, a recirculation fan can be used. The fan circulates room temperature air across the humidifier and discharges humidified air into the space. Select the air discharge point carefully to avoid condensation on surfaces of the building or equipment. See Figure 12-4.

**Figure 12-4:
Recirculation unit**

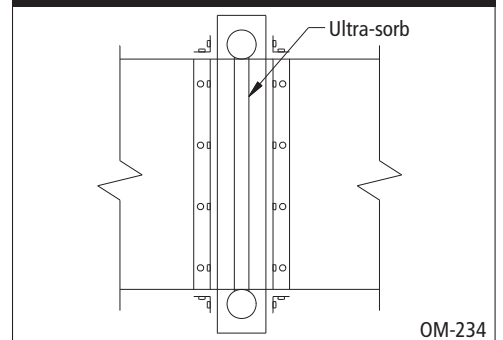


Installation

Mounting in a horizontal duct

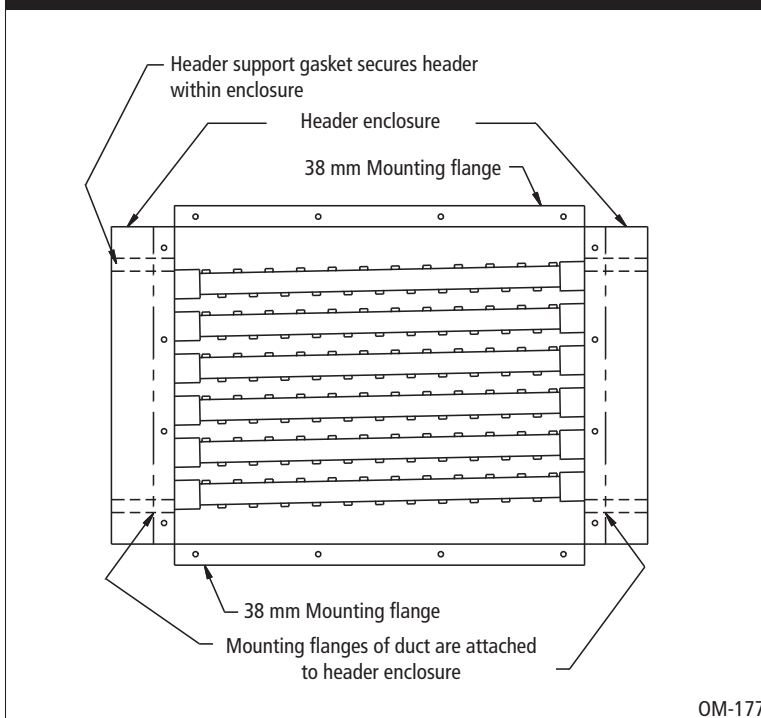
The Ultra-sorb panel is contained within a mounting frame. A mounting flange 38 mm wide is provided on all four sides of the unit. The 38 mm wide portion of the header enclosure is intended to be a mounting flange. See Figures 13-1 and 13-2. A matching flange or metal frame is required on the ductwork for connection to the Ultra-sorb flanges. The recommended fastener is a #12 x 3/4" self-drilling and tapping screw, spacing not to exceed 305 mm. If an angle-iron frame is provided on the duct section, a longer screw may be required. **Note: To avoid puncturing the header, screw penetration into the header enclosure should not exceed 20 mm.**

**Figure 13-2:
Elevation view**



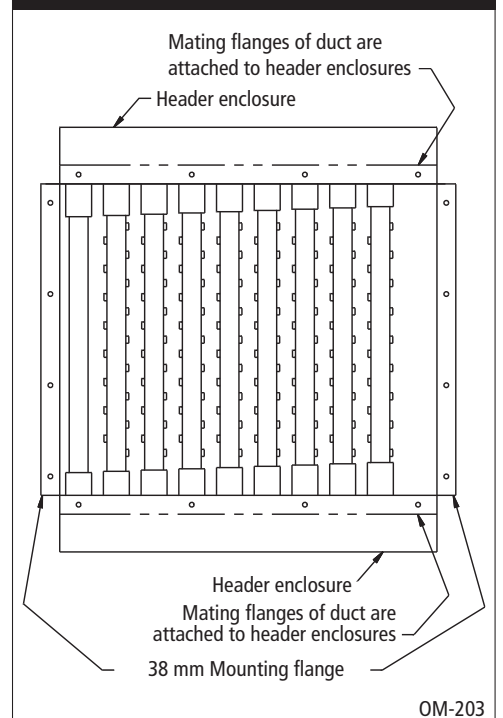
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**Figure 13-1:
Model LH**



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**Figure 13-3:
Model LV**

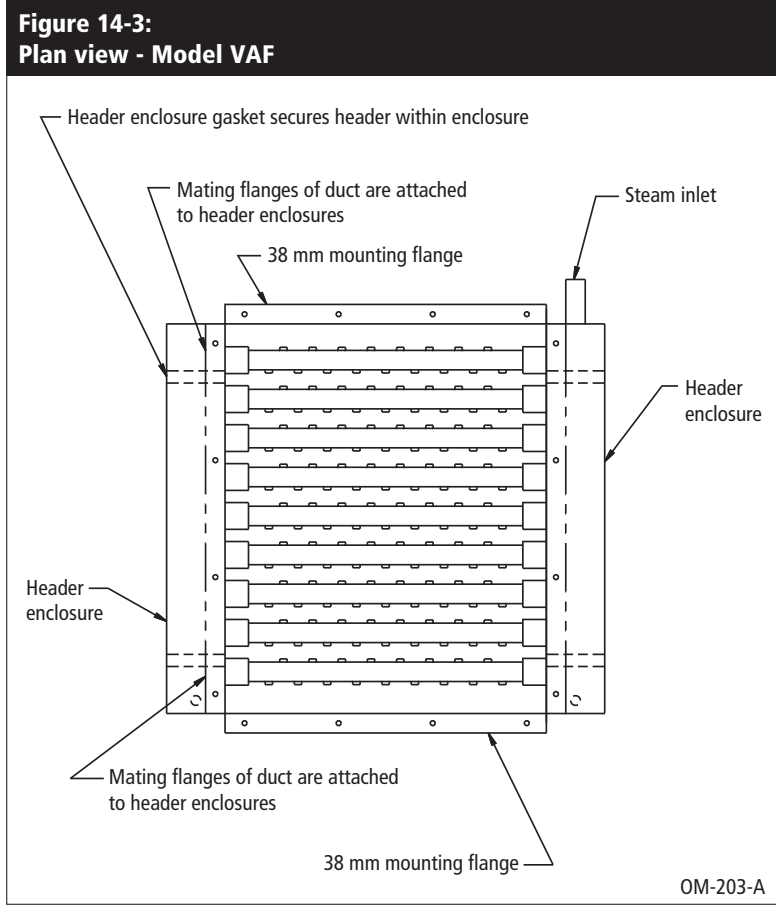
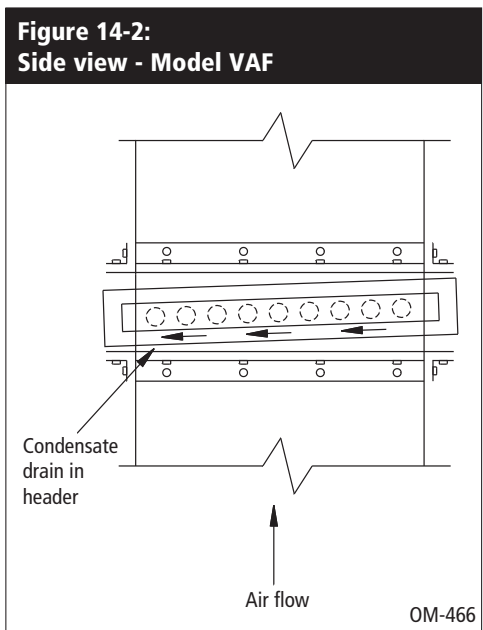
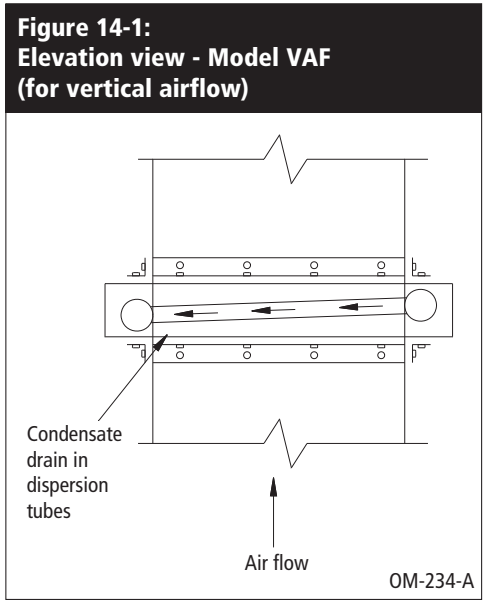


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Installation

Mounting in a vertical duct

Vertical airflow Ultra-sorb panels must be ordered for this application. Headers and tubes are pitched to accommodate vertical mounting. The Ultra-sorb panel is contained within a mounting frame. A mounting flange 38 mm wide is provided on all four sides of the unit. The 38 mm wide portion of the header enclosure is intended to be a mounting flange. See Figure 14-3. A matching flange or metal frame is required on the ductwork for connection to the Ultra-sorb flanges. The recommended fastener is a #12 x 3/4" self-drilling and tapping screw, spacing not to exceed 305 mm. If an angle-iron frame is provided on the duct section, a longer screw may be required. **Note: To avoid puncturing the header, screw penetration into the header enclosure should not exceed 20 mm.**



Installation

Installation inside an air handling unit

See placement recommendation in Figure 11-1.

The metal support frame should be anchored to the air handler casing. Recommended fasteners for mounting the Ultra-sorb to a metal support frame are 1/4 - 20 nuts and bolts or #12 self drilling and tapping screws. Due to the possible forces exerted on this application, DRI-STEEM recommends fastener spacing not to exceed 150 mm. On larger Ultra-sorb installations, vertical channels may be required on both the inlet and outlet ends of the humidifier to provide proper support. See Figure 15-2.

Figure 15-1:
Ultra-sorb installed inside an air handler

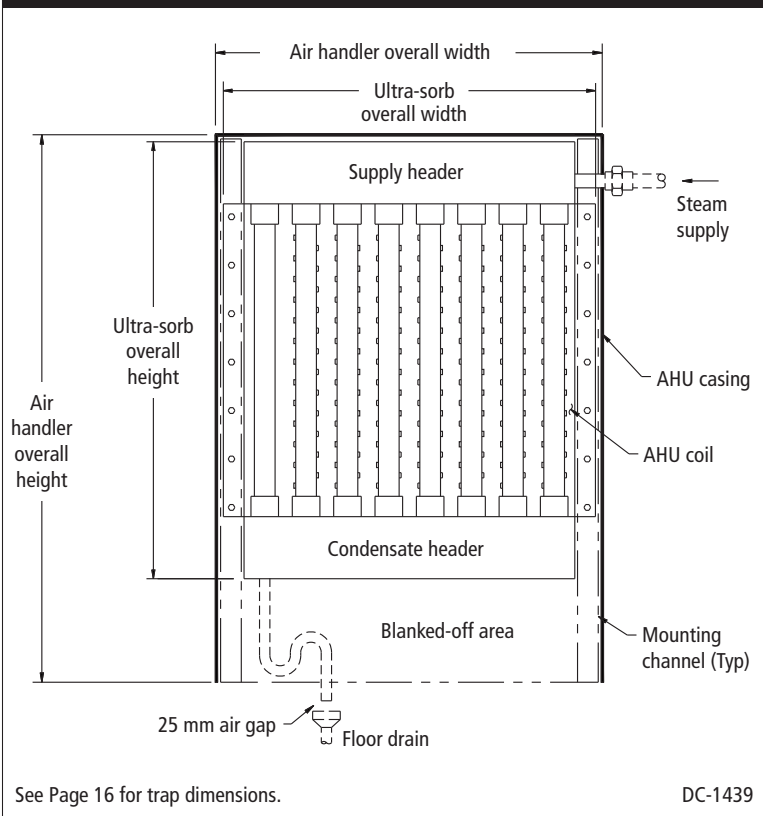
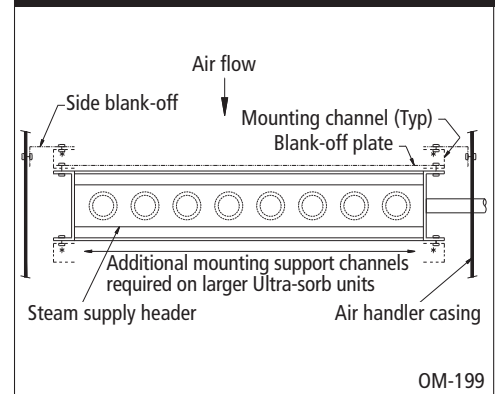


Figure 15-2:
Vertical channels



Supply and drain connections and dimensions

Figure 16-2:
P-trap water seal dimensions

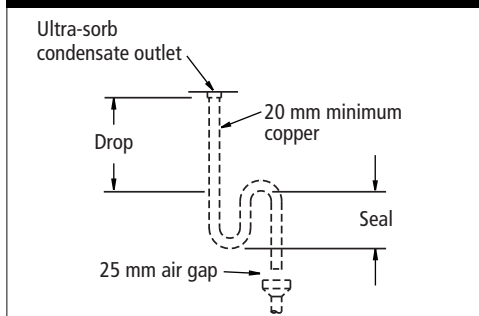


Figure 16-3:
F&T trap dimensions

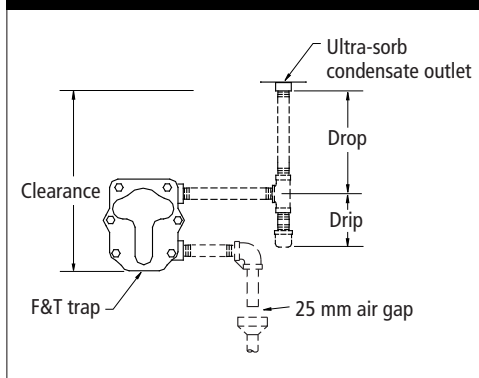


Figure 16-4:
Lifting condensate

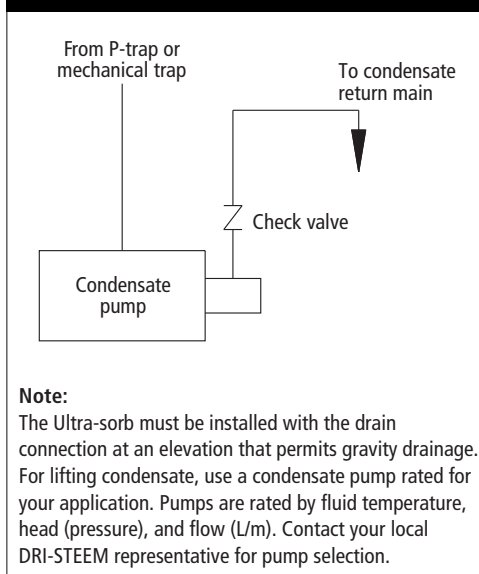
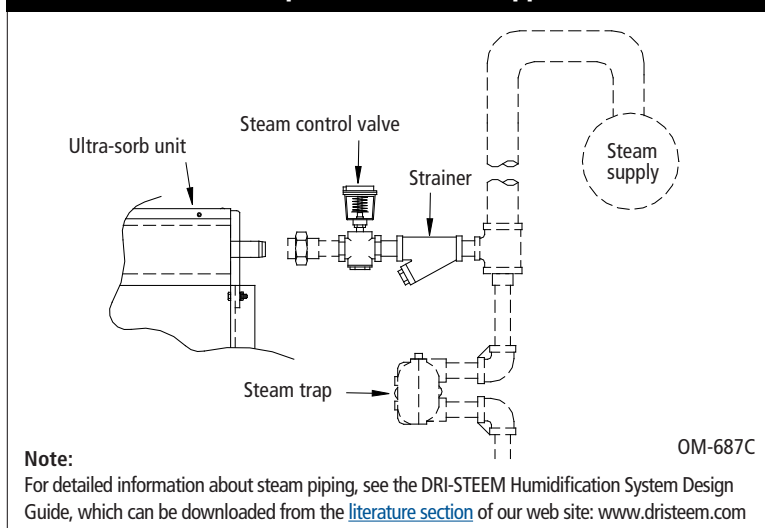


Table 16-1:
Condensate drain piping for Ultra-sorb steam dispersion panels

	Evaporative steam		Pressurized steam	
	Standard	Clean-steam	Standard	Clean-steam
P-trap water seal (See Figure 16-2)	Drop: 150 mm Seal: 130 mm	Stainless steel Drop: 150 mm Seal: 130 mm	<u>Recommended method</u> Drop: 205 mm Seal: 255 mm	Stainless steel Drop: 205 mm Seal: 255 mm
F&T trap (See Figure 16-3)	No	No	<u>Alternate method *</u> Drop: 305 mm Drip: 105 mm	No
Inverted bucket trap	No	No	No	No
Stainless steel thermostatic trap	No	No	No	No
Condensate to open drain	Yes	Yes	Yes	Yes
Condensate return by condensate pump	Yes	Yes stainless steel pump recommended	Yes	Yes stainless steel pump recommended
Condensate return to humidifier by gravity	Yes	Yes	NA	NA
Condensate return to boiler via return line	NA	NA	No	No

* Provide 460 mm vertical clearance for future P-trap substitution if required.

Figure 16-1:
Connection to a boiler (pressurized steam applications)



OM-687C

Piping

Steam from a boiler

Ultra-sorb panels for boiler steam have a threaded pipe nipple that extends outside the framework for a steam supply connection. The steam supply line should be dripped immediately ahead of the steam valve through a steam trap.

Recommended drip trap type: (See Page 16 for trap dimensions)

Low pressure: Less than 100 kPa — Float and Thermostatic (F&T)

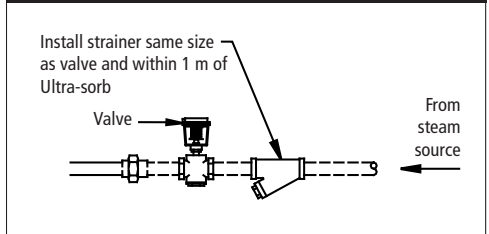
High pressure: More than 100 kPa — Inverted Bucket

Install wye strainer ahead of the steam valve.

Two 20 mm F&T traps, one for each header, are required on the horizontal dispersion tube (Model LH) Ultra-sorb. One float and thermostatic trap is required on the lower header of the vertical tube (Model LV) Ultra-sorb.

1. To ensure driest steam, take the humidifier steam supply off the top of the steam main (instead of side or bottom).
2. An air flow proving switch is recommended to prevent the steam valve from opening if air is not moving in the duct.
3. To prevent over saturation when duct air is cooler than 21 °C, high limit (duct mounted) humidistat at least 4.5 m downstream and set at 80-90% is recommended.
4. Steam from the dispersion tube tubelets must be discharged at right angles to the airstream for best non-wetting results.

**Figure 17-1:
Ultra-sorb strainer**



**Table 17-2:
O.D. of pipe and tubing**

Nom. Dia.	Standard pipe	Tubing copper	Tubing SST	I.D. of hose
30 mm	1.660	1.375	-	-
38 mm	1.900	1.625	1.500	1.50
50 mm	2.375	2.125	2.000	2.00
65 mm	2.875	2.625	3.000	3.00

Note: Pipe thread and flange tubing adapters are available from DRI-STEEM.

**Table 17-1:
Maximum steam carrying capacity and length of interconnecting vapor hose, tubing, and pipe***

Vapor 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 [†]
DN	kg/h	m	DN	kg/h	m
40 (1½")	68	3	40 (1½")	68	6
50 (2")	113	3	50 (2")	100	9
			80 (3") ^{††}	204	24
			100 (4") ^{††}	340	30
			125 (5") ^{††}	635	30
			150 (6") ^{††}	1043	30

* Based on total maximum pressure drop in hose, tubing, or piping of 1244 Pa

** Maximum recommended length for vapor hose is 3 m. Longer distances can cause kinking or low spots.

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

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

†† Requires flange connection

††† When using vapor hose, use DRI-STEEM vapor 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 vapor hose for outdoor applications.

Piping

Steam from an evaporative humidifier

Hard pipe or tubing

Standard steam hose connections on DRI-STEEM evaporative humidifiers are 38 mm stainless steel tubing. Two inch tubing connections are available as an option on higher capacity evaporative units. Hose cuffs are available for connecting hard pipe to the tubing connection on the vaporizing humidifier and to the Ultra-sorb (see Figure 18-2). If specified, DRI-STEEM can also provide threaded connections on the vaporizing humidifier and on the Ultra-sorb (see Figure 18-3).

When non-threaded pipe is used, connections at both ends are completed with rubber vapor hose. Due to the difference in O.D. of pipe and tubing compared to I.D. of hose, multiple hose clamps may be required.

Vapor hose

- Support vapor hose to prevent sags or low spots, and pitch at least 50 mm/m back to the humidifier.

Vapor rigid piping

- Pitch at least 165 mm/m back to the humidifier.
- 90° elbows are not recommended. Use two 45° elbows one foot apart (see Figures 18-2 and 18-3).

Failure to follow the above recommendations may result in excessive back pressure on the vaporizing humidifier. This may lead to loss of water seal or leaking gaskets. When the distance between the Ultra-sorb and the vaporizing humidifier exceeds 6 m, consult the factory for special recommendations.

- Thin wall tubing will heat up with less start up heat loss than heavy wall pipe.
- Insulating the tubing or piping will reduce the loss in output caused by condensation in the tubing or piping.

Condensate Drainage

Since Ultra-sorb panels operate with virtually zero internal pressure, condensate cannot be piped directly into a return main. It must be wasted to a floor drain or piped into a small condensate pump and returned to the steam source.

To prevent steam from escaping down the drain line, install a water seal or steam trap in the drain line. The water seal must be of sufficient height to contain the pressure in the humidifier.

See Page 16 for trap dimensions.

Figure 18-1:
Vapor hose

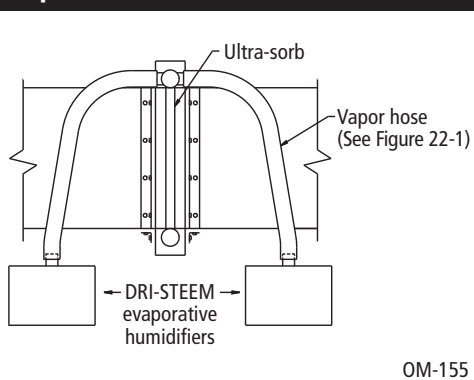


Figure 18-2:
Hose cuff installation

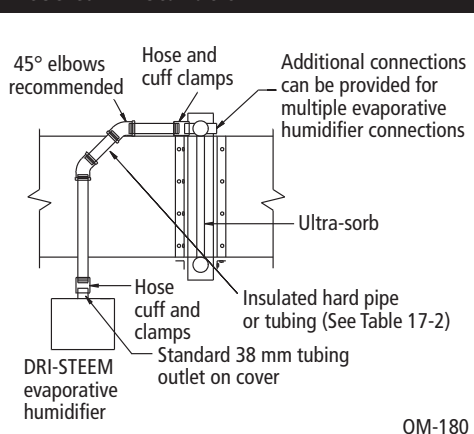
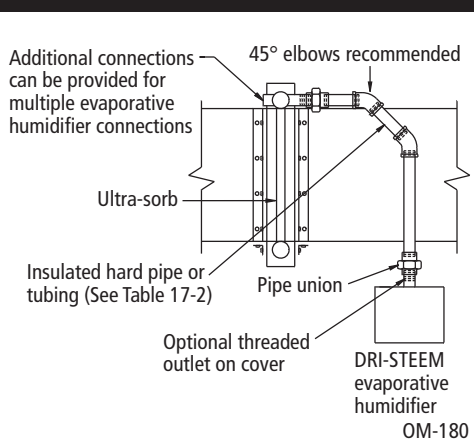


Figure 18-3:
Threaded connections



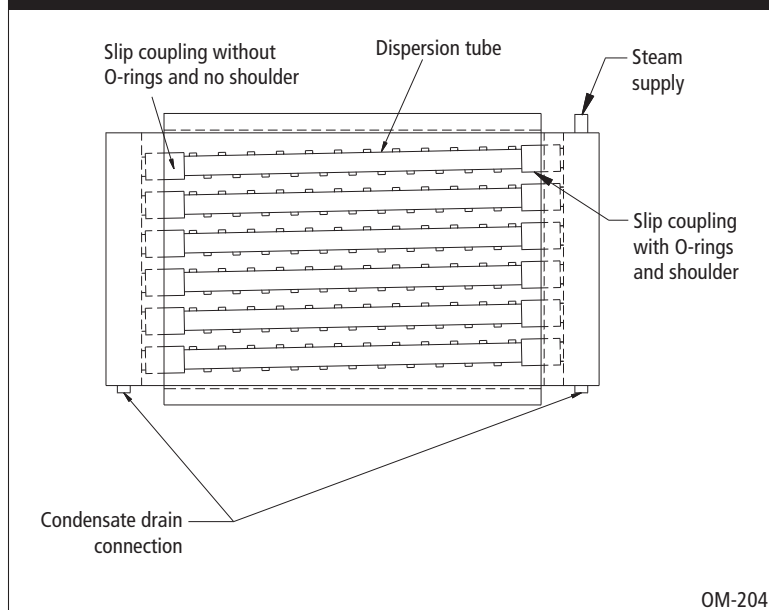
Mounting

The Ultra-sorb panel can operate with air flow in either direction; however, the steam supply must be connected to the top of the assembly, and condensate must be drained from the bottom of the assembly.

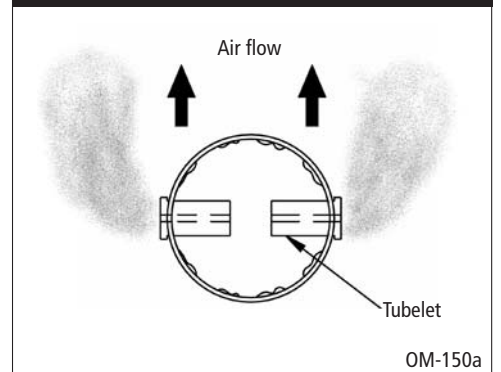
The duct section and Ultra-sorb panel must be properly supported to carry the weight of the assembly. The weight of the piping must be supported by the building structure rather than by the Ultra-sorb unit. Otherwise, the weight may impose stress on the connections, causing them to fracture and leak. Before start up, verify that all steam discharge tubelets are pointed perpendicular to the airstream (see Figure 19-2). The slip couplings provide easy rotation of the dispersion tubes for proper tubelet orientation.

When removing and installing slip couplings, verify that the O-rings are seated in their grooves and lubricated. When sliding the dispersion tube into the slip coupling, be careful not to cut the O-rings.

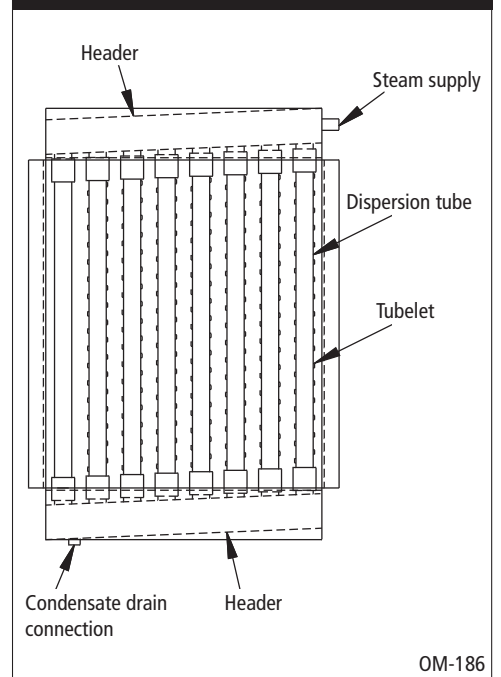
**Figure 19-1:
Ultra-sorb Model LH**



**Figure 19-2:
Proper dispersion tube orientation**



**Figure 19-3:
Ultra-sorb Model LV**



Retrofitting an existing Ultra-sorb

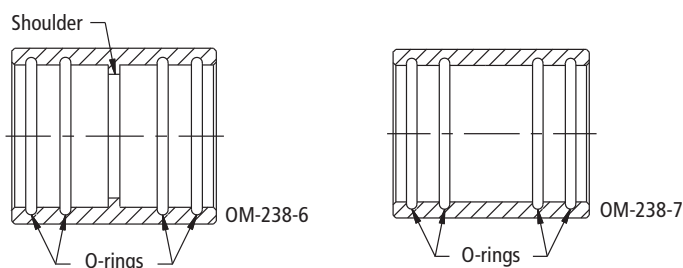
Figure 20-1:
PVDF insulating material



Before retrofitting an existing Ultra-sorb panel with high-efficiency tubes, shut off steam to the system, and let all hot surfaces cool. See the Warning below.

Note: Replacement slip couplings with internal O-rings are shipped with retrofit high-efficiency tube orders. There are two types of slip couplings: with shoulders and without. Slip couplings with shoulders must go on the supply header end of the dispersion tube. See Figure 20-2.

Figure 20-2:
Dispersion tube slip couplings

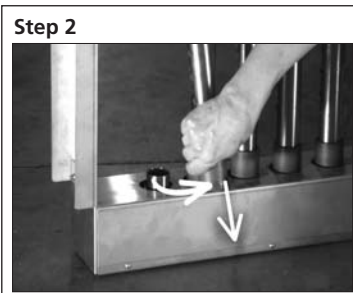
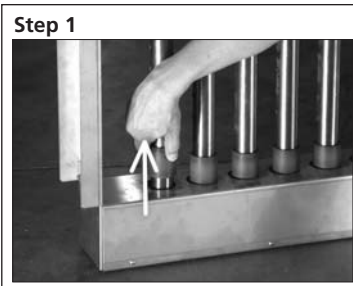


Removing uninsulated tubes

Note: The photos below depict Ultra-sorb Model LV (vertical tubes). The supply header is on the top, and the condensate header is on the bottom. If retrofitting an Ultra-sorb Model LH (horizontal tubes), pay attention to the location of the supply and condensate headers.

Perform the following steps for each uninsulated tube being removed:

1. With a pulling and twisting motion, slide the slip coupling off the condensate header far enough to reveal the end of the dispersion tube.
2. Swing the dispersion tube away from the condensate header; pull the dispersion tube and slip coupling off the supply header.



WARNING!

Steam humidification systems have extremely hot surfaces.

To avoid burns, allow humidifier, steam pipes, and dispersion assembly to cool before touching any part of the system.

Retrofitting an existing Ultra-sorb

3. Remove the dispersion tube.
Make sure nothing loose falls into the header.



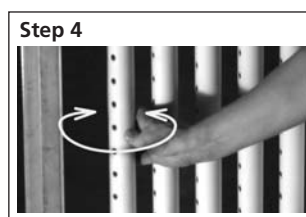
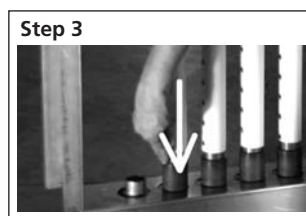
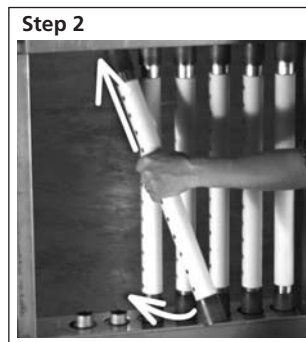
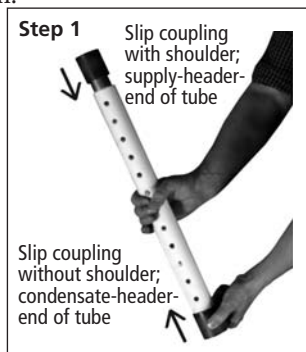
Note:
See maintenance instructions for high-efficiency tubes on Page 23.

Installing High-efficiency tubes

Note: The photos below show the High-efficiency tubes **without the clear poly film** for demonstration purposes only. To prevent dirty insulating material, install the High-efficiency tubes before tearing off the clear poly film.

Perform the following steps for each insulated tube being installed:

1. Slide the new slip couplings onto the high-efficiency dispersion tube as shown.
2. Push and twist the dispersion tube onto the supply header until the slip coupling shoulder bottoms out. Connect the dispersion tube to the condensate header with the other slip coupling.
3. Push the shoulderless slip coupling against the stop disc on the condensate header.
4. Rotate the dispersion tube to point the tubelets perpendicular to the airstream.



Performance data

**Table 22-1:
Ultra-sorb air pressure loss**

Duct air velocity (13 °C at sea level)		Tube spacing	
		75 mm	150 mm
Uninsulated tubes	m/s	Pa	Pa
	2.54	5.1	1.1
	5.08	20.5	4.2
High-efficiency tubes	m/s	Pa	Pa
	2.54	8.3	1.3
	5.08	30.2	5.1
	7.62	59.2	11.5

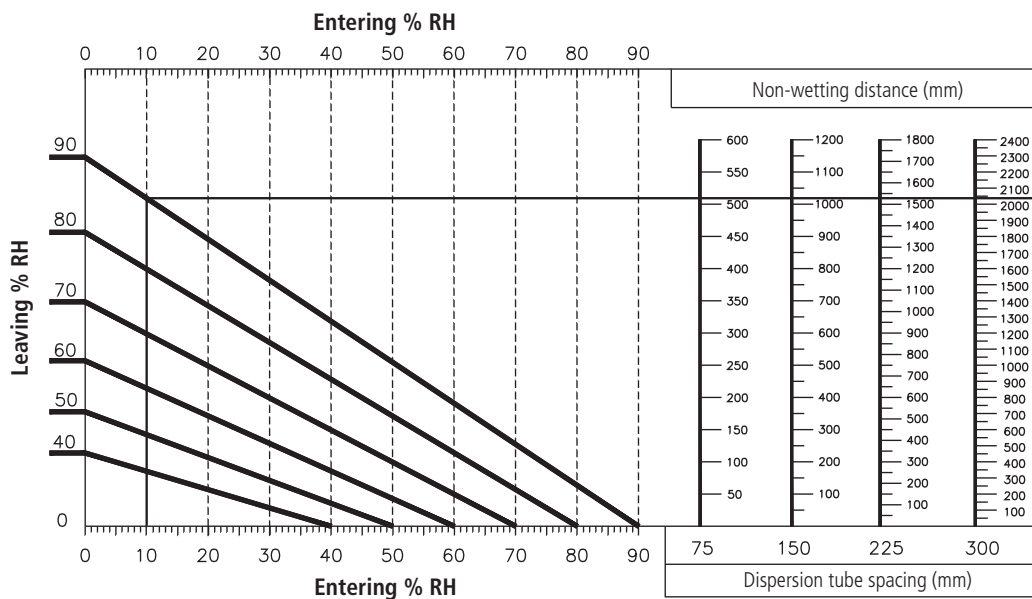
Notes:

- Ultra-sorb panels with 225 mm or 300 mm tube spacings have no measurable air pressure loss.
- Use DRI-STEEM's Dri-calc sizing and selection software to calculate your specific air pressure loss.

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1. Non-wetting distance is the distance downstream from the leaving side of the Ultra-sorb panel that wetting will not occur. Although wisps of steam may be present, solid objects at duct air temperature, such as coils, dampers, fans, etc., downstream from this point will remain dry.
2. Note that the rise 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; thus, the non-wetting distance increases.
3. **CAUTION!** Non-wetting distances described in this catalog do not apply when installing an Ultra-sorb panel upstream of filter media. If you must install an Ultra-sorb panel upstream of filter media, consult your local DRI-STEEM representative or DRI-STEEM directly for special recommendations.
4. Uneven airflow over the cross-section of an Ultra-sorb may result in nonuniform mixing of steam with air, which may adversely affect the absorption distance.
5. A small but measureable amount of duct air pressure loss will be present downstream from the Ultra-sorb panel, depending on air velocity, tube spacing, and whether the tubes are insulated. See the pressure loss table at left.

**Figure 22-1:
Ultra-sorb non-wetting distances**



Note: The above data applies to all air velocities up to 7.6 m/s and is based on air leaving the zone of humidification at conditions of 13 °C and the stated % RH.

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Maintenance

Strainer

- Inspect the strainer screen at least twice during the first year. If fouled, inspect it more frequently.

Steam trap

- At least twice a year verify that the steam trap is functioning properly. A blocked steam trap is cold. A "blowing" steam trap is hot and noisy, and the discharge pipe from it is hot for 9 meters. A properly operating steam trap is hot and makes noise at intervals, and the discharge pipe is progressively cooler beginning at the trap.

Valves

- **Pneumatic**
Inspect annually to be sure the valve closes off steam tightly, the stem packing is not leaking steam, and the diaphragm in the actuator is not leaking air.
- **Electric modulating**
Inspect annually to be sure that the valve operates freely and closes off steam tightly and the stem packing is not leaking.
- **Solenoid type**
Inspect annually to verify proper functioning with steam-tight shut off.

O-Rings (slip couplings)

- Inspect after two or three years of service, replace if necessary.

High-efficiency tubes

- If the insulating material gets torn, repair the tear with our Insulating Material Repair Kit before dispersing steam or moving air through the air handler to prevent further damage. This available kit uses tested and proven PVDF as repair material; do not use other adhesives or repair methods in place of the kit.
- If the insulating material gets dirty or smudged, gently clean it with a damp cloth and a solution of soapy water or diluted non-toxic, biodegradable cleaner/degreaser.
- Do not clean the insulating material with a pressure washer. The direct spray could cause damage.
- If using a torch in the vicinity of the dispersion panel, keep the flame away from the insulating material to avoid damage.
- PVDF is inherently resistant to UV light. Indirect, low-intensity UV-C light from germicidal lamps will not cause the insulating material to degrade.
- Do not tighten mounting clamps or fasteners to any part of the dispersion tube.

Troubleshooting guide

**Table 24-1:
Ultra-sorb troubleshooting guide**

Problem	Possible cause	Action
Humidifier discharges water in duct	<ul style="list-style-type: none"> • Steam main overloaded with water due to boiler discharging water with steam (priming) 	<ul style="list-style-type: none"> • Locate cause of priming and correct.
	<ul style="list-style-type: none"> • Steam trap not draining properly 	<ul style="list-style-type: none"> • Replace, repair, or clean trap as required. • If condensate return main is overloaded, find an alternative method for draining.
	<ul style="list-style-type: none"> • Humidifier improperly piped 	<ul style="list-style-type: none"> • Correct the piping as shown on Page 16. For horizontal airflow, steam inlet should be at the top of the assembly and condensate outlet at the bottom of the assembly. For vertical airflow, see Page 14.
	<ul style="list-style-type: none"> • Surges of condensate in steam supply due to condensate collecting at low, undripped point in steam main 	<ul style="list-style-type: none"> • Install drips and steam traps as required. See Page 16.
	<ul style="list-style-type: none"> • Inadequate steam trap capacity 	<ul style="list-style-type: none"> • Replace with larger trap.
Slip couplings leak water	<ul style="list-style-type: none"> • Defective o-rings in slip couplings 	<ul style="list-style-type: none"> • Replace o-rings.
Humidity exceeds setting of humidistat	<ul style="list-style-type: none"> • Automatic valve not fully closing 	<ul style="list-style-type: none"> • Foreign matter holding valve open; clean valve. • Valve spring broken; replace spring. • Valve steam packing too tight; loosen and/or replace packing. • Steam pressure exceeds close-off rating of valve spring; replace actuator or valve spring with one that is compatible with the higher steam pressure. • Valve installed backwards; re-install. • Adjust valve linkage.
	<ul style="list-style-type: none"> • Electric control system malfunctioning 	<ul style="list-style-type: none"> • Calibrate or replace.
	<ul style="list-style-type: none"> • Faulty or inaccurately placed humidity controller 	<ul style="list-style-type: none"> • Replace controller or relocate per catalog recommendations.
	<ul style="list-style-type: none"> • Poor location of control components 	<ul style="list-style-type: none"> • Relocate per catalog recommendations.
	<ul style="list-style-type: none"> • Incompatible control components 	<ul style="list-style-type: none"> • Replace per specified recommendations.
	<ul style="list-style-type: none"> • Automatic valve is hunting 	<ul style="list-style-type: none"> • Humidifier capacity is oversized; change to smaller valve. • Pressure reducing valve is not accurately controlling steam pressure; repair or replace. • Boiler pressure is swinging too widely; adjust.
	<ul style="list-style-type: none"> • Excessive outside air volume 	<ul style="list-style-type: none"> • Check fans, dampers, VAV, etc. See formula below. <p>Mixed Air Inlet formula:</p> $\begin{aligned} & \quad (\% \text{ outside air } \times \text{ moisture content}) \\ & + (\% \text{ return air } \times \text{ moisture content}) \\ & = \text{ mixed air inlet in kg/100 m}^3\text{/h} \end{aligned}$
Control system malfunctioning	<ul style="list-style-type: none"> • Incorrect control voltage 	<ul style="list-style-type: none"> • Replace transformer.
	<ul style="list-style-type: none"> • Incorrect control signal 	<ul style="list-style-type: none"> • Replace components.
	<ul style="list-style-type: none"> • Improper wiring connections 	<ul style="list-style-type: none"> • Rewire.
	<ul style="list-style-type: none"> • Incorrect humidity sensor 	<ul style="list-style-type: none"> • Replace.
	<ul style="list-style-type: none"> • Humidity controller out of calibration 	<ul style="list-style-type: none"> • Recalibrate.
Air cannot absorb steam quantity being discharged	<ul style="list-style-type: none"> • Humidifier operates when blower is off 	<ul style="list-style-type: none"> • Provide interlock.
	<ul style="list-style-type: none"> • Valve is hunting 	<ul style="list-style-type: none"> • See above.
	<ul style="list-style-type: none"> • Air temperature in duct too low for steam quantity being emitted 	<ul style="list-style-type: none"> • Raise duct air temperature.
Humidifier is noisy	<ul style="list-style-type: none"> • Steam pressure too high 	<ul style="list-style-type: none"> • Reduce pressure.
	<ul style="list-style-type: none"> • Header vibrating within header shell 	<ul style="list-style-type: none"> • Tighten hardware.

Troubleshooting guide

**Table 25-1:
Ultra-sorb troubleshooting guide**

Problem	Possible cause	Action
Space humidity will not rise to humidistat set point	• Steam pressure too low	• Increase.
	• Manual steam valve partially closed	• Open.
	• Strainer screen partially clogged	• Clean.
	• Boiler pressure too low	• Adjust control.
	• Pressure reducing valve not accurately controlling steam pressure	• Repair or replace.
	• Boiler pressure swinging too widely	• Adjust controls.
	• Incorrect piping	• Repipe. See Page 16.
	• Undersized steam piping	• Replace.
	• Undersized humidifier	• Replace valve with larger capacity valve. • Replace with larger humidifier. • Add additional humidifier.
	• Automatic steam valve not fully opening	• Valve packing is adjusted too tightly, loosen and/or replace packing. • Adjust valve linkage. • Recalibrate humidistat.
	• Electric control system malfunctioning	• Change transformer.
	• Incorrect control circuit voltage	• Replace component(s) to make all components compatible.
	• Incorrect control signal	• Replace components.
	• Improper wiring	• Rewire.
	• Incorrect humidity sensor	• Replace sensor.
	• Humidity controller out of calibration or malfunctioning	• Repair or replace.
	• Malfunctioning humidifier temperature switch not allowing humidifier valve to open	• Replace or readjust.
	• Pneumatic control system malfunctioning	• Repair or replace.
	• Obstructed air line	• Remove obstruction.
	• Malfunctioning pneumatic temperature switch	• Replace switch.
• Air leak in actuator	• Repair or replace diaphragm.	
• Compressed air pressure is too low	• Adjust pressure.	
Condensate in duct	• Foreign matter preventing valve from closing	• Clean or replace valve.
	• Humidifier is mounted too close to internal devices (dampers, turning vanes, etc.) in duct	• Move humidifier tubes to a point further upstream of internal devices. • Add more dispersion tubes for shorter non-wetting distance. Consult DRI-STEEM to determine the total number of tubes required.
	• Non-insulated duct passing through unheated area (duct surface temperature too low)	• Insulate ductwork.

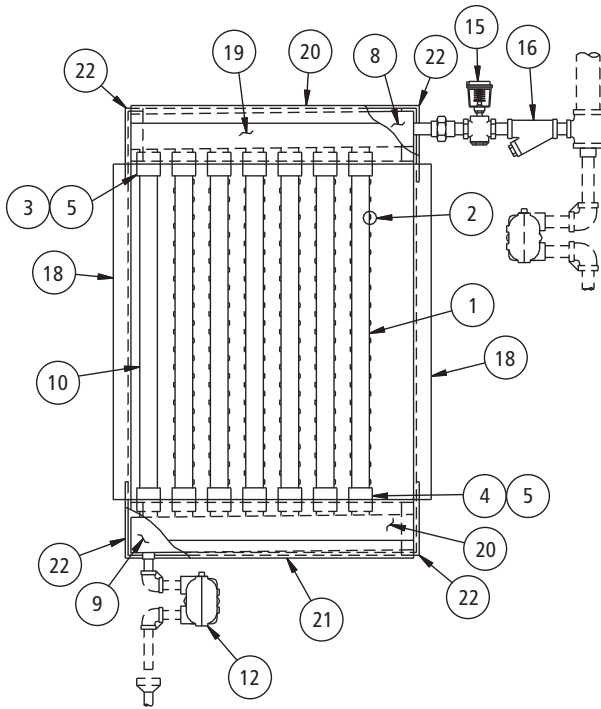
Replacement parts

**Table 26-1:
Ultra-sorb replacement parts**

No.	Description	Part no.
1	1½" High-efficiency tube	Consult factory
1	1½" Dispersion tube	Consult factory
2	1/16" Tubelet	310165-001
2	5/64" Tubelet	310165-002
2	3/32" Tubelet	310165-003
3	Slip coupling with shoulder, 1½"	162727-002
4	Slip coupling without shoulder, 1½"	162727-001
5	O-rings	300400-006
6	Supply header, LH	Consult factory
7	Return header, LH	Consult factory
8	Supply header, LV	Consult factory
9	Return header, LV	Consult factory
10	1½" Drain tube, LV	Consult factory
12	Steam trap	Consult factory
13	Hose cuff	Consult factory
14	Hose clamp	Consult factory
15	Steam valve	Consult factory
16	Strainer	Consult factory
17	Steam connector	Consult factory
18	Mounting flange, LH-LV	Consult factory
19	Header enclosure, LH	Consult factory
20	Header enclosure, LV	Consult factory
21	Return header cover, LV	Consult factory
22	Header enclosure cap, LH-LV	Consult factory

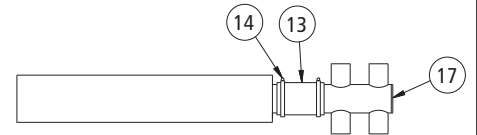
Replacement parts

**Figure 27-1:
Ultra-sorb Model LV**

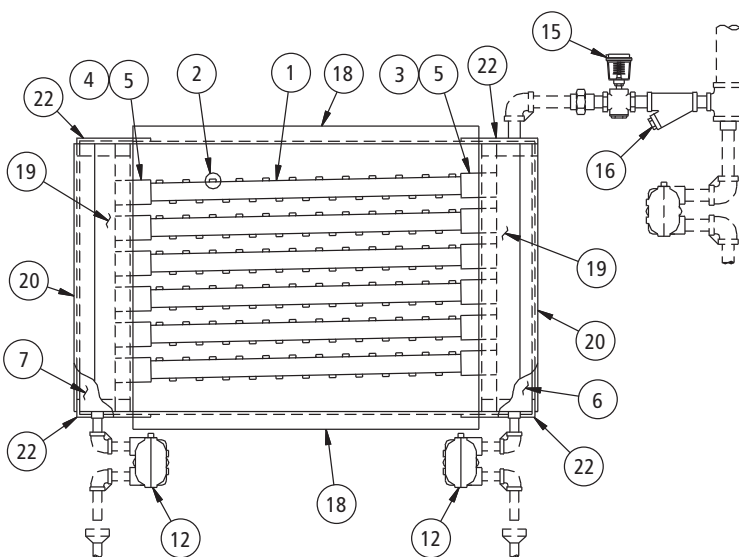


OM-207

**Figure 27-3:
Header (evaporative humidifier)**



**Figure 27-2:
Ultra-sorb Model LH**



OM-206

Expect quality from the industry leader

For 40 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 Ultra-sorb, which features stainless steel construction and an industry-leading two year warranty that covers all parts.

For more information

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sales@drsteem.com

For the most recent production information, visit our web site, www.drsteem.com

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Form No. US-IOM-M-0808

Part No. 890000-602 Rev A

Two-year Limited Warranty

DRI-STEEM Corporation ("DRI-STEEM") warrants to the original user that its products will be free from defects in materials and workmanship for a period of two (2) years after installation or twenty-seven (27) months from the date DRI-STEEM ships such product, whichever date is the earlier.

If any DRI-STEEM product is found to be defective in material or workmanship during the applicable warranty period, DRI-STEEM's entire liability, and the purchaser's sole and exclusive remedy, shall be the repair or replacement of the defective product, or the refund of the purchase price, at DRI-STEEM's election. DRI-STEEM shall not be liable for any costs or expenses, whether direct or indirect, associated with the installation, removal or reinstallation of any defective product. The Limited Warranty does not include cylinder replacement for electrode steam humidifiers.

DRI-STEEM's Limited Warranty shall not be effective or actionable unless there is compliance with all installation and operating instructions furnished by DRI-STEEM, or if the products have been modified or altered without the written consent of DRI-STEEM, or if such products have been subject to accident, misuse, mishandling, tampering, negligence or improper maintenance. Any warranty claim must be submitted to DRI-STEEM in writing within the stated warranty period. Defective parts may be required to be returned to DRI-STEEM.

DRI-STEEM's Limited Warranty is made in lieu of, and DRI-STEEM disclaims all other warranties, whether express or implied, including but not limited to any IMPLIED WARRANTY OF MERCHANTABILITY, ANY IMPLIED WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, any implied warranty arising out of a course of dealing or of performance, custom or usage of trade.

DRI-STEEM SHALL NOT, UNDER ANY CIRCUMSTANCES BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, LOSS OF PROFITS, REVENUE OR BUSINESS) OR DAMAGE OR INJURY TO PERSONS OR PROPERTY IN ANY WAY RELATED TO THE MANUFACTURE OR THE USE OF ITS PRODUCTS. The exclusion applies regardless of whether such damages are sought based on breach of warranty, breach of contract, negligence, strict liability in tort, or any other legal theory, even if DRI-STEEM has notice of the possibility of such damages.

By purchasing DRI-STEEM's products, the purchaser agrees to the terms and conditions of this Limited Warranty.

Extended warranty

The original user may extend the term of the DRI-STEEM Limited Warranty for a limited number of months past the initial applicable warranty period and term provided in the first paragraph of this Limited Warranty. All the terms and conditions of the Limited Warranty during the initial applicable warranty period and term shall apply during any extended term. An extended warranty term of an additional twelve (12) months or twenty four (24) months of coverage may be purchased. The extended warranty term may be purchased until eighteen (18) months after the product is shipped, after which time no extended warranties are available.

Any extension of the Limited Warranty under this program must be in writing, signed by DRI-STEEM, and paid for in full by the purchaser.

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