

READ AND SAVE THESE INSTRUCTIONS

DRI-STEEM MODEL STS[®] and STS[®]-DI

STEAM-TO-STEAM HUMIDIFIERS

Installation Instructions
and
Maintenance Operations
Manual



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DRI-STEEM[®]
HUMIDIFIER COMPANY



TABLE OF CONTENTS

TO THE PURCHASER AND THE INSTALLER

Thank you for purchasing our STS humidification equipment. We have designed and built this equipment to give you total satisfaction and many years of trouble-free service. Observing the installation and operating practices described in this manual will assure you of achieving that objective. We urge you to become familiar with the contents of this manual.

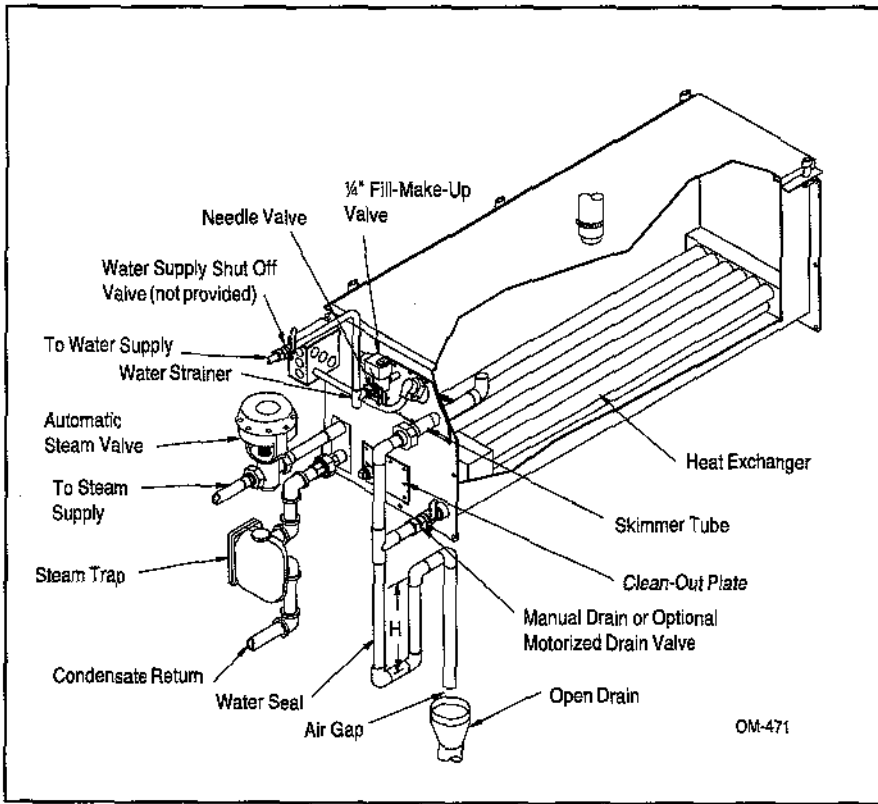
DRI-STEEM Humidifier Company

STS and STS-DI Humidifiers	3
Capacities and Dimensions	4
Installation	
• Selecting the Location	6
Mounting Methods	8
Steam Dispersion Installation	10
RAPID-SORB™ Assembly	12
Piping Methods	14
Piping Diagrams: Steam, Water and Drain	15
Electrical	16
Operation	17
Recommended Maintenance	18
Start-up Procedure	20
Trouble Shooting Guide	21
Replacement Parts	22
Maintenance Record	25
Two-Year Limited Warranty	27

STS® AND STS®-DI HUMIDIFIERS

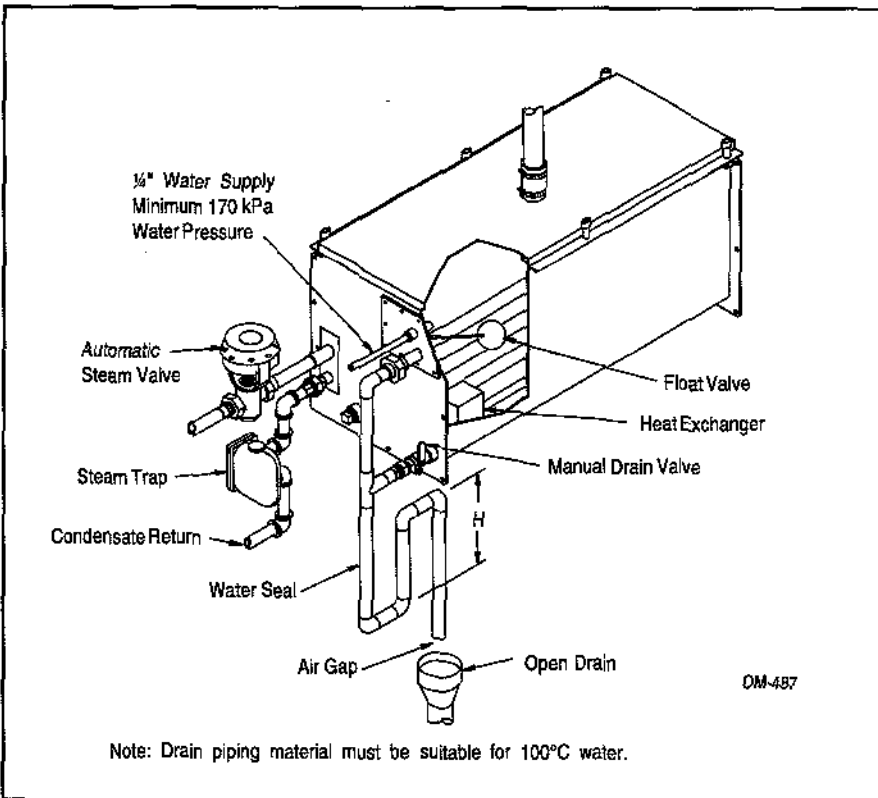
STS Humidifier (For use with softened or unsoftened water.)

This humidifier is designed for use with either softened or unsoftened water (preferably softened). The probe-type level control system requires water conductivity of 100 $\mu\text{S}/\text{cm}$ (34 mg/l) minimum to function, and therefore will not operate on water treated by reverse osmosis or deionization. However, STS humidifiers are available for use with these water types. The standard humidifier can be converted in the field to a STS-DI model. See below.



STS-DI Humidifier (For use with demineralized or reverse osmosis water.)

For use with deionized or reverse osmosis water. This unit produces chemical-free steam and reliable, accurate humidification control. It is virtually maintenance-free, with no wasted water, heat, or downtime.



CAPACITIES AND DIMENSIONS

Table 4-1: Capacities in kg/h with Copper Heat Exchangers

Model No.	*Steam Pressure (kPa)			
	34	69	90	103
STS-25C	9	32	45	54
STS-50C	23	68	91	109
STS-100C	45	136	181	218
STS-400C	136	263	322	358
STS-800C	295	578	680	726

* At connection to STS steam valve

Table 4-2: Capacities in kg/h with Stainless Steel Heat Exchangers

Model No.	* Steam Pressure (kPa)			
	34	69	90	103
STS-25	5	11	14	16
STS-50	14	25	34	36
STS-100	27	50	64	68
STS-200	68	132	163	177
STS-800	Consult Factory			

* At connection to STS steam valve

Note: All DI/RO and Standard Units are available with either Copper or Stainless Steel Heat Exchangers.

Table 4-3: Humidifier Weights

Model No.	Operating Weight (kg)	Shipping Weight (kg)
STS-25	79	43
STS-50	152	57
STS-100	159	63
STS-200	*386	111
STS-400	*431	145
STS-800	*658	186

* Suspending from overhead construction is not recommended due to operating weight of unit

Table 4-4: STS and STS DI/RO (Stainless Steel Heat Exchanger) Mechanical Specifications

Dimensions (millimetres)										
Model No.	A	B	C	D	E	F	G	H	J	K
STS-25	465	375	600	85	174	--	--	35	¾"	¾"
STS-50	465	375	1010	85	174	--	--	35	¾"	1"
STS-100	465	490	1010	85	174	--	--	35	¾"	1"
STS-200	465	720	1400	85	167	--	--	35	¾"	1½"
STS-800	725	720	1400	91	168	285	363	35	1¼"	1½"

Note: Above dimensions refer to drawings on page 5.

Table 4-5: STS and STS DI/RO (Copper Heat Exchanger) Mechanical Specifications

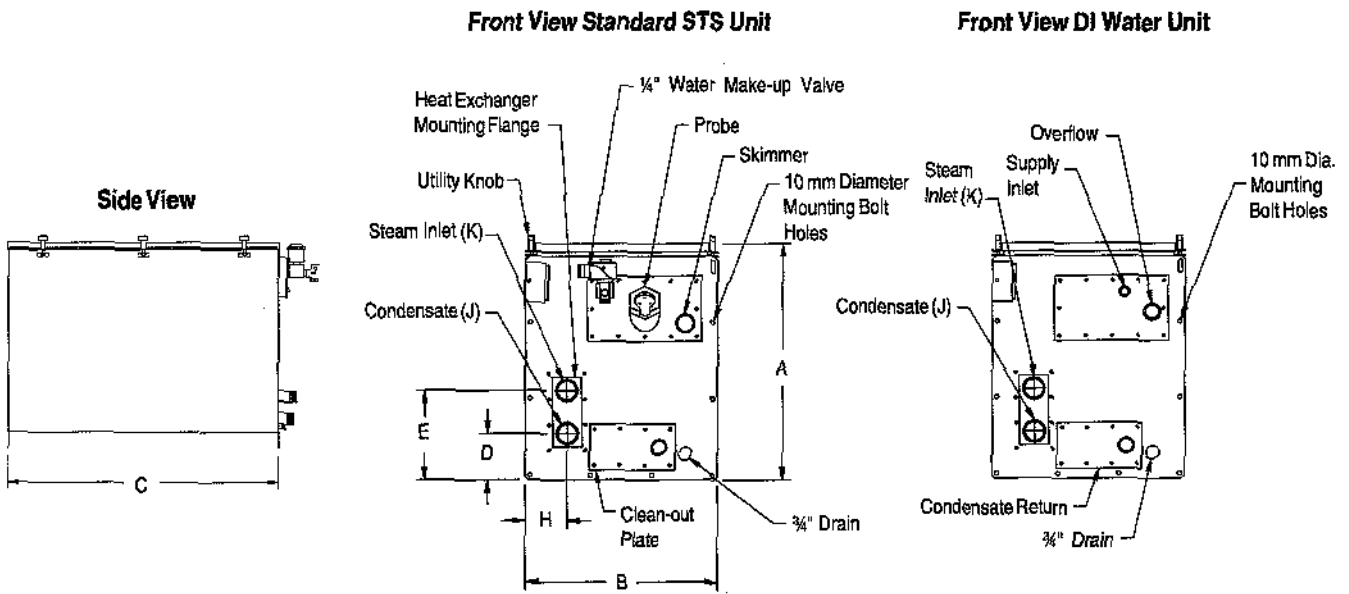
Dimensions (millimetres)										
Model No.	A	B	C	D	E	F	G	H	J	K
STS-25C	465	375	600	91	168	--	--	35	¾"	¾"
STS-50C	465	375	1010	91	168	--	--	35	¾"	1¼"
STS-100C	465	490	1010	91	168	--	--	35	1¼"	1¼"
STS-400C	465	720	1400	91	168	--	--	35	1¼"	1½"
STS-800C	725	720	1400	91	168	285	363	35	1¼"	1½"

Note: Above dimensions refer to drawings on page 5.

Dimensions and specifications subject to change without notice.

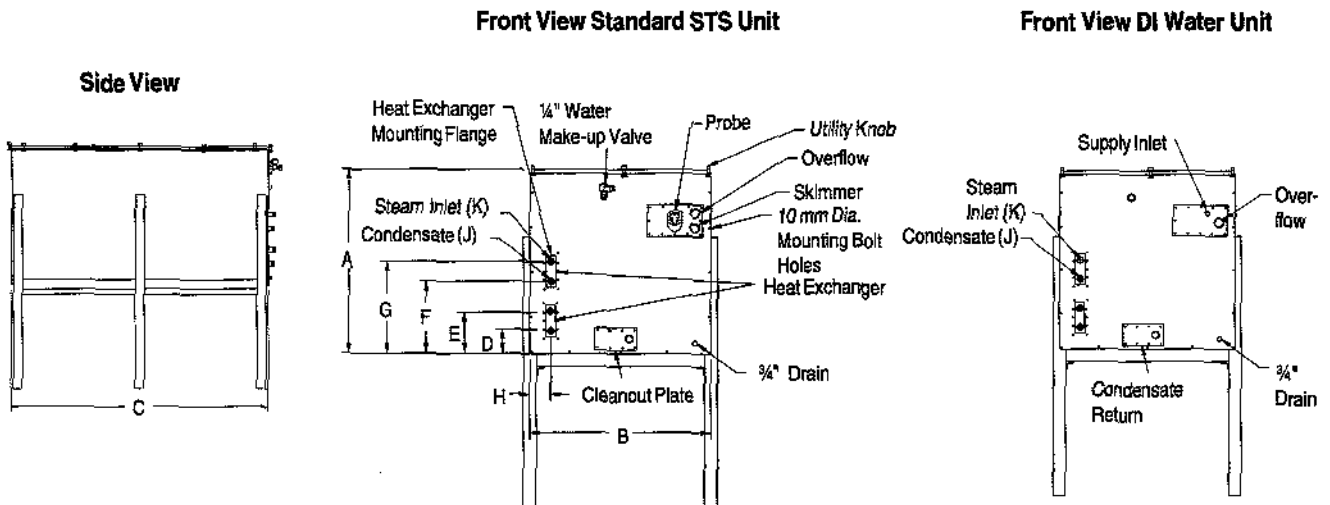
CAPACITIES AND DIMENSIONS

Figure 5-1: STS and STS DI sizes 25, 50, 100, 200, and 400



Note: For dimensions refer to table 4-4 on page 4.

Figure 5-2: STS and STS DI 800



Note: For dimensions refer to table 4-4 on page 4.

INSTALLATION

Selecting the Location

When selecting the location, first consideration should be given to rapid, thorough absorption of the steam. The warmest air will most readily absorb steam. The most active part of the air stream will provide the best mixing of the steam and air. Avoid dead spots such as the inside curve of an elbow or an area immediately downstream of a baffle plate. The "fog" will travel some distance before "disappearing" and will saturate objects it touches that are closer than your calculated absorption distance.*

When the remote mounting method with the vapor hose kit is used, condensate will drain into the duct unless the dispersion tube is positioned correctly and the tube and vapor hose are pitched properly. Preferably, the condensate should drain back to the humidifier via the vapor hose. When job conditions prevent this, an alternate method is used. Waterlogged low points in the hose will cause "gurgling" and in severe conditions periodically "slugs" of condensate may be discharged into the duct. (See page 10 for alternate methods.)

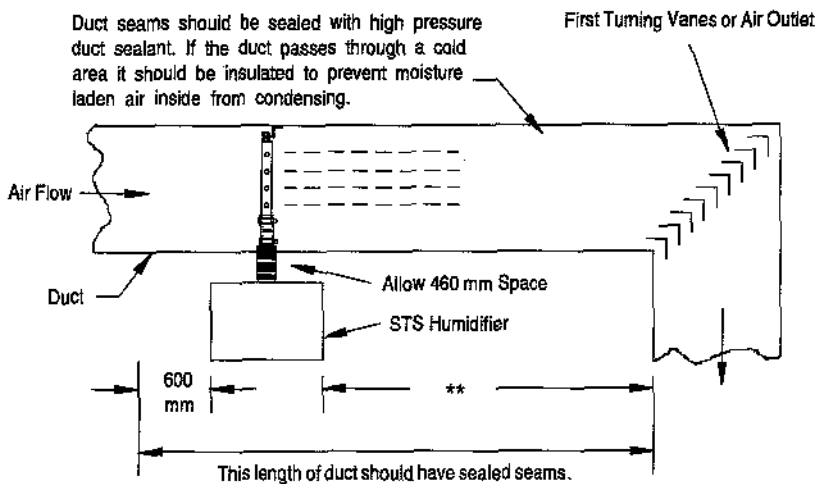
The location selected must also provide for electrical service, cold water for make-up and sanitary waste for drain.

Simply Stated:

- A. It is very important that the dispersion tube be located where the water vapor being discharged will be carried off with the airstream and will not cause condensation and dripping from the duct.
- B. In general, the STS® humidifier is best placed where the air can most readily absorb the moisture being added without causing condensation at or after the unit. This will normally be after the heating coil or where the air temperature is highest.
- C. Do not place the unit too close to the intake of a high efficiency filter. The filter may remove the visible moisture and become waterlogged.*
- D. Do not place unit where water vapor will impinge on a metal surface.
- E. Do not place the unit too close to a split in the duct. The unit may put more moisture in one branch than the other.

* When adequate distance is not available, you should use a rapid absorption tube bank. Refer to the STS catalog or contact DRI-STEEM or your local representative.

Figure 6-1: Vapor Absorption Distance



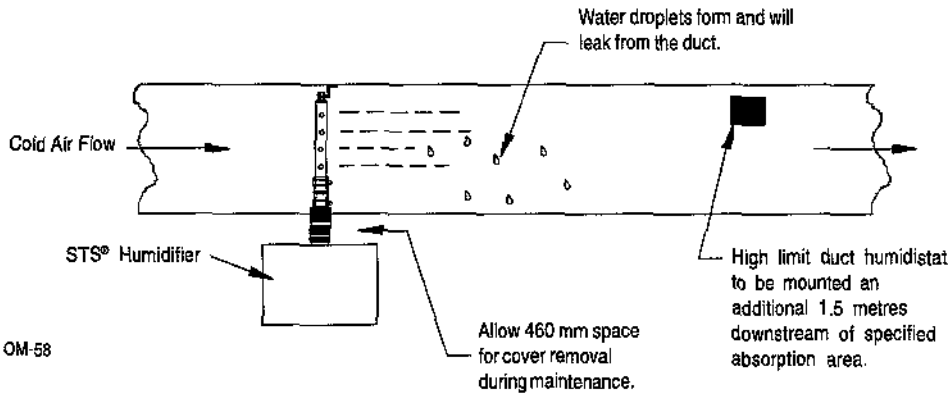
A distance of air travel is required for the steam to "disappear" or go into the gaseous state.

While visible, the steam may collect on internal devices, such as turning vanes, resulting in dripping.

**A distance of 2.5 metres is recommended, depending on temperature. (When duct air is cooler than 27°C, up to 4.0 metres should be allowed.)

INSTALLATION

Figure 7-1: Installation in Cool Air Stream



When a humidifier discharges into a duct that will carry cool air (under 21°C) periodically, the dew point temperature should be determined.

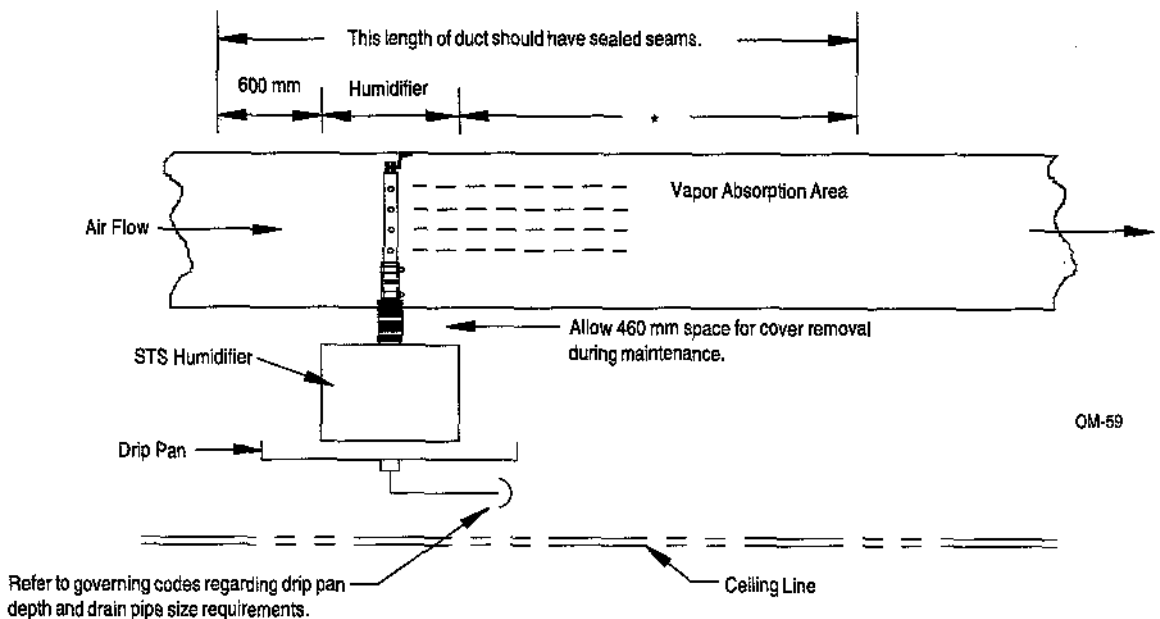
If the psychrometric chart reveals that saturation may occur, protection should be provided. A high limit humidistat or a thermostat, set to cut off the humidifier at a safe temperature, can be used for this purpose.

Water piping and humidifiers should not be installed above expensive apparatus or equipment. A broken water pipe, leaking valve gland, condensation or other water leaks may occur causing serious damage and costly repairs to the equipment below.

Where this type of installation cannot be avoided install a drip tray constructed of galvanized sheet under the humidifier, valve, etc. to catch any possible water drip.

It is advisable to terminate the drain above an open floor drain. The overflow from the STS should be piped separately to a floor drain rather than the drip pan.

Figure 7-2: Installation Above Valuable Equipment



OM-59

* The distance steam will travel within a given airstream is predictable and can be determined using the STS catalog. If this has already been done, the travel distance should be specified; if not, consult the STS catalog or contact your DRI-STEEM representative or the DRI-STEEM factory.

MOUNTING METHODS

Mounting Notes

1. For the electrode probe water level control and the skimmer system to properly operate, the humidifier must be mounted level in both directions.

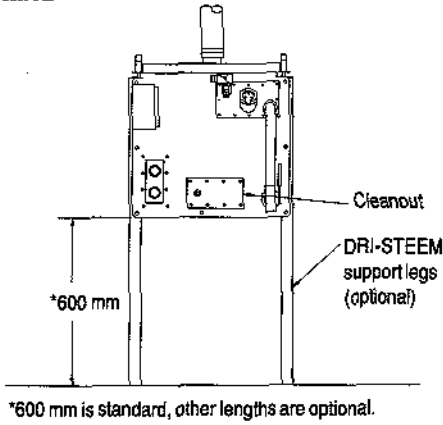
2. Access (460 mm minimum) for periodic removal of the top cover is recommended. In most cases, scale that forms on the heat exchangers continuously flakes off as it forms and the loose scale settles to the bottom. A

clean-out tray on the floor of the evaporator may be removed periodically through the front clean-out opening.

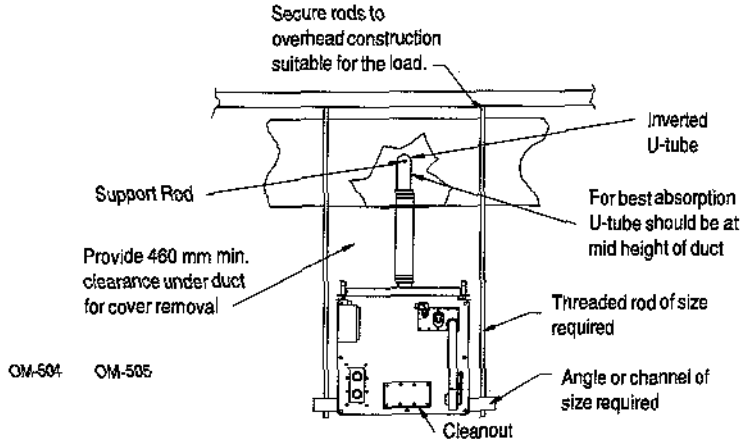
3. Due to the size and weight of the STS® 200, 400 and 800 units, the trapeze hanger and wall brackets are not recommended.

Figure 8-1: Mounting Support Methods

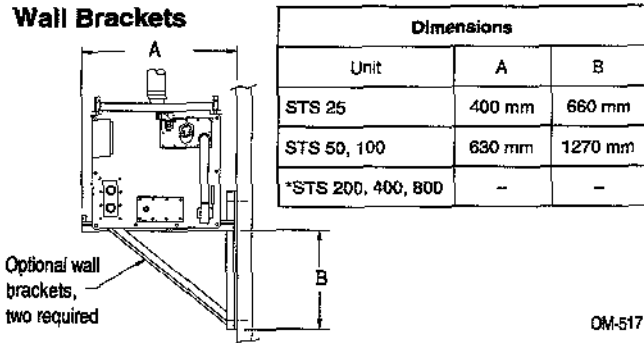
Floor Stand



Trapeze Hanger



Wall Brackets



Cradle

Models STS 200S, STS 400C and STS 800C require cradle.

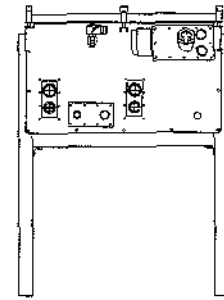
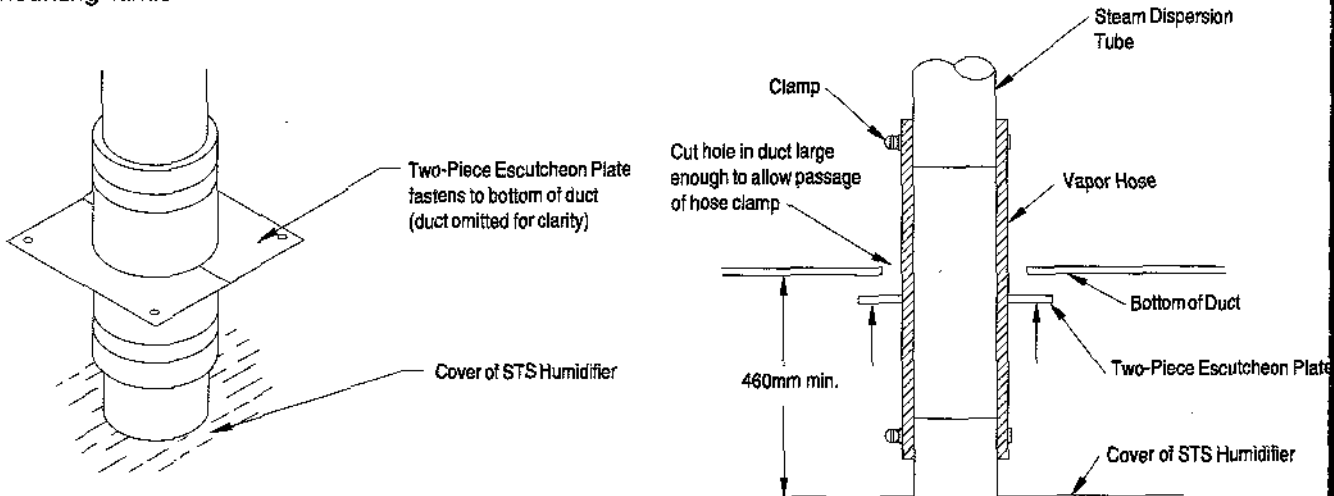


Figure 8-2: Mounting Unit on Underside of Duct

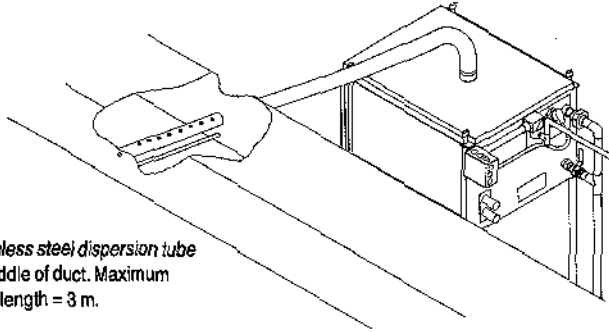
Mounting humidifier 460 mm below duct recommended to facilitate cover removal.



MOUNTING METHODS

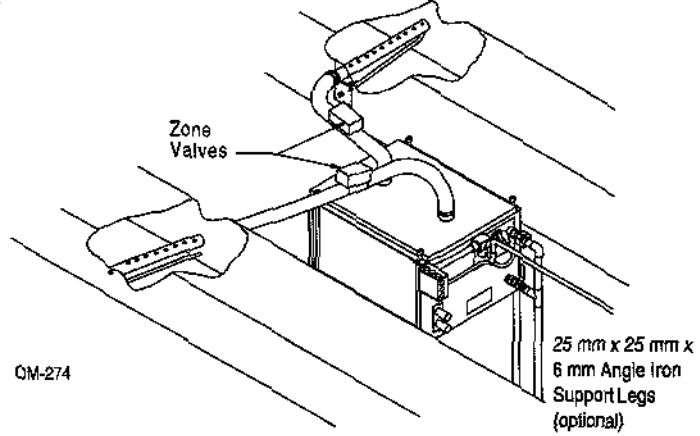
Figures 9-1 and 9-2: Mounting Units Away from Duct(s) Using Vapor Hose

Vapor hose (pitch back min. 50 mm per metre to humidifier with supports to prevent pockets). Maximum length 3 m. Humidifier must be mounted level.



OM-50

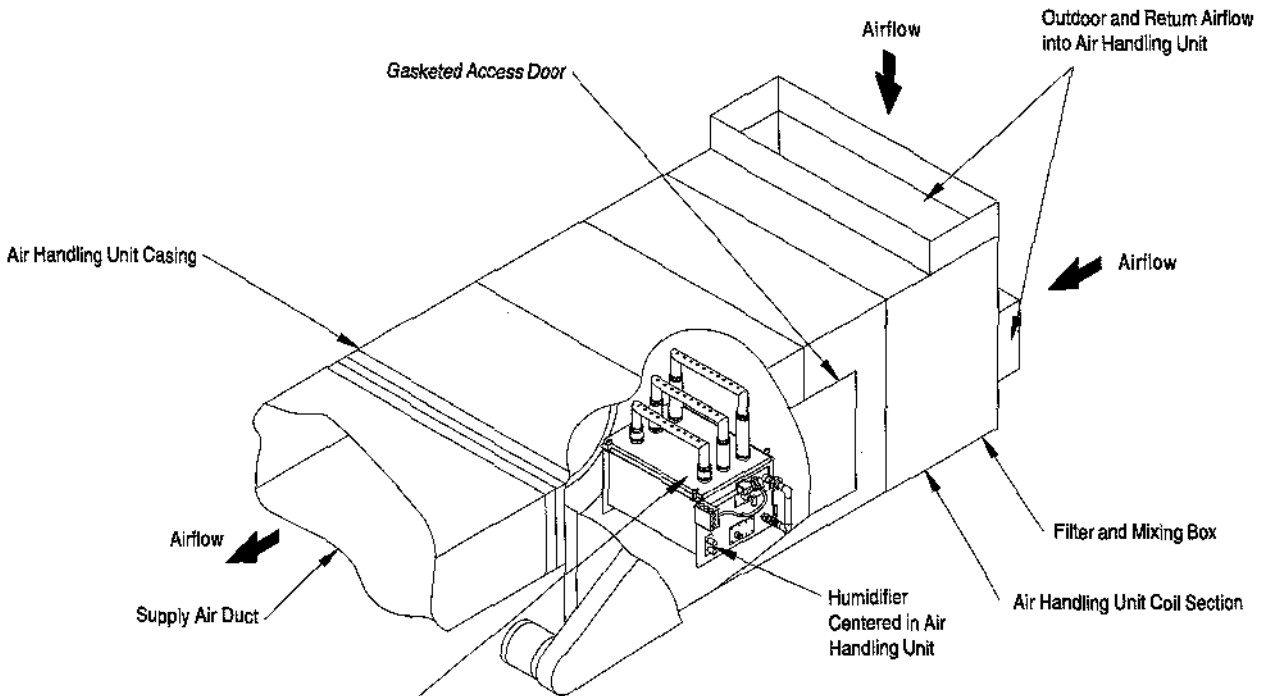
Vapor hose (pitch back 50 mm per metre to humidifier with supports to prevent pockets). Maximum length 3 m.



OM-274

Humidifier should be mounted level

Figure 9-3: Mounting In Air Handling Unit



Set unit level. Locate unit so that steam dispersion assembly is in the most active part of the air stream.

OM-276

STEAM DISPERSION INSTALLATION

Dispersion Tube Installation with Condensate Drain (over 13 kg/h per dispersion tube)

Vapor Hose

- Vapor hose should be supported to prevent sags or low spots and to maintain a minimum pitch of 50 mm per metre back to the humidifier.
- When mounting the humidifier above the level of dispersion tube, see page 14, figure 14-2.

Failure to follow the above recommendation may result in excessive back pressures being imposed on the humidifier. This in turn may lead to dispersion tube(s) spitting, lost water seals or leaking gaskets. When distance between the humidifier and the dispersion tube(s) exceeds 3 metres, consult factory for special recommendations.

Vapor Rigid Piping (when used)

- Vapor piping should have a minimum I.D. of 38 mm.
- A minimum pitch of 50 mm per metre back to the humidifier should be maintained.
- 90° elbows are not recommended; use two 45° elbows 305 mm apart instead.
- Thin wall tubing will heat up faster and cause less start up loss than heavy wall pipe.
- Insulating the rigid piping will reduce the loss in output caused by condensation.

Tube Mounting

- Mount dispersion tubes without condensate return lines with outboard end 50 mm higher than supply end (figure 10-1, example A).
- Mount dispersion tube level for tubes with condensate return lines (figure 10-1, example B).
- Best vapor absorption occurs when dispersion tube discharges against the air flow.

**Return line piping material must be suitable for 100°C water.

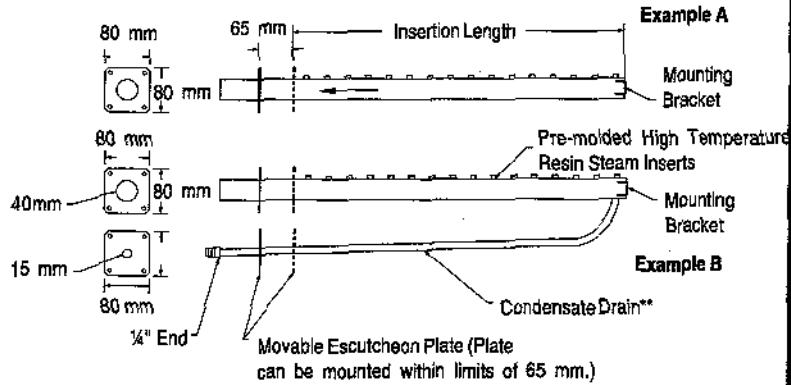
Minimum Condensate Drain Line Sizing

- One or two tubes: 19 mm I.D.
- Three or more tubes - 25 mm I.D.

Table 10-1: Dispersion Tube Capacities

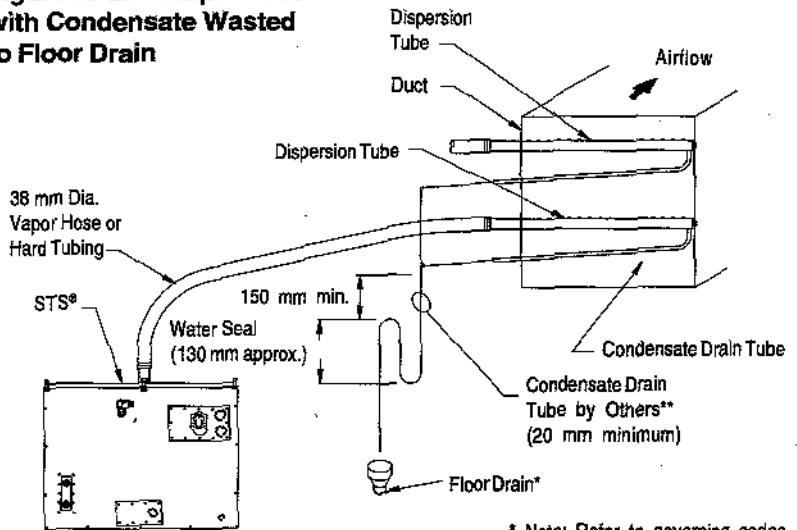
Tube Dia.	Capacity		A	B
	Without Drain	With Drain		
38 mm	13 kg/h	26 kg/h	83 mm	38 mm
50 mm	26 kg/h	39 kg/h	127 mm	51 mm

Figure 10-1: Single Tube



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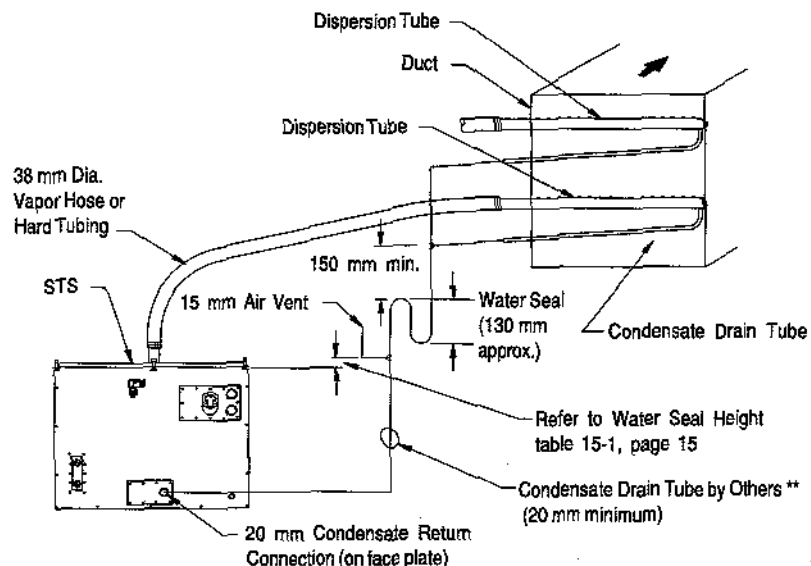
Figure 10-2: Multiple Tube with Condensate Wasted to Floor Drain



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* Note: Refer to governing codes for drain pipe size requirements.

Figure 10-3: Multiple Tube with Condensate Return to Humidifier

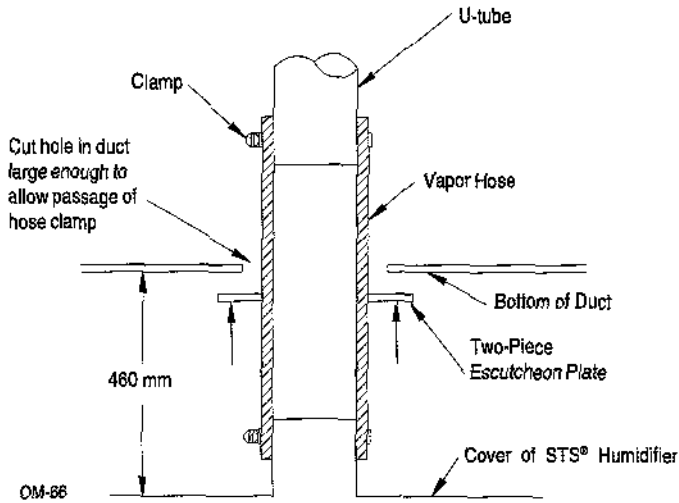


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STEAM DISPERSION INSTALLATION

U-Tube Installation

Figure 11-1: Detail of Connection to U-Tube



Note: Local regulations may not permit combustibles (steam hose) inside of duct. When necessary U-tubes can be specified to have extended legs of length necessary to reach below floor of duct.

Figure 11-2: U-tube Spacing for Tall Ducts Improves absorption in 'tall' air streams.

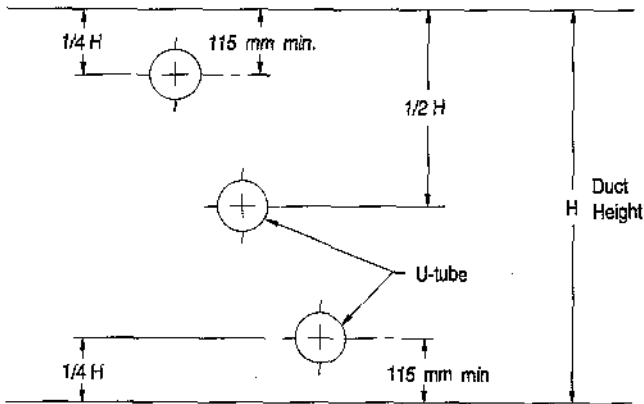


Figure 11-3: Multiple Inverted U-tubes Provides extra steam dispersion capacity needed for larger STS units.

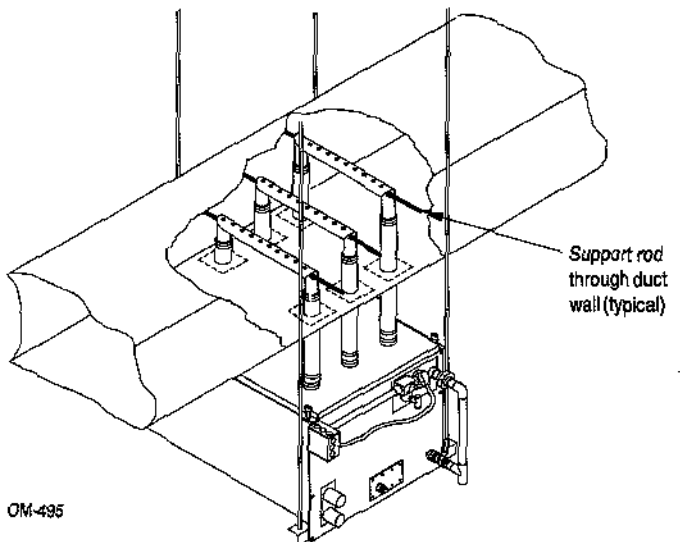


Table 11-1: U-tube Spacing for Improved Absorption

Duct Height	Number of U-Tubes
Up to 305 mm	1
306 to 610 mm	2
611 to 915 mm	3

RAPID-SORB™ ASSEMBLY AND INSTALLATION

Horizontal Duct Installation

1. Unpack shipment and verify receipt of all RAPID-SORB components with packing list. Report any shortages to the DRI-STEEM factory immediately.
2. Provide necessary access in and around duct work.
3. Locate 25 mm x 38 mm stainless steel channel inside the duct. Hang the channel from the top of the duct, centered between duct side walls, with the two mounting holes provided.
4. If hose cuffs are used, slide cuffs over the open end of each tube. Install a pair of hose clamps on each tube.
5. Note direction of air flow within duct, then arrange each dispersion tube so steam will be discharged perpendicular to the air flow. Use the hex bolts provided to attach tubes to overhead 25 mm x 38 mm channel. Do not secure. If the header is outside the duct (see figure 12-2), punch-out necessary clearance holes in the base of the duct to slide dispersion tubes up from bottom.
6. **For a Header Inside the Duct** (See figure 12-1.): Punch or cut out necessary clearance holes for RAPID-SORB header. Slide header into the duct, position header and slide the dispersion tube hose cuffs or slip couplings over the header dispersion tube nipples.

Position the header so vertical dispersion tubes are perpendicular to duct and pitch the header toward condensate drain. Secure header to the mounting bracket. Use escutcheon plates to secure header where it enters the duct.

Check that the dispersion tubes release steam perpendicular to the air flow. Secure tubes to the overhead channel. Secure the channel to the duct, and secure hose cuffs or slip couplings over tube and header tube nipples.

For a Header Under the Duct (See figure 12-2.): Position header under dispersion tubes, then slide hose cuffs or slip couplings over header dispersion tube nipples.

Position the header so dispersion tubes are perpendicular to duct and pitch the header to condensate drain. Secure dispersion tubes in place with the tube escutcheon plates provided.

Check the position of the tubes for steam release perpendicular to the air flow. Secure tubes to the overhead channel, and secure channel to the duct. With header pitched to condensate drain, slip hose cuffs or slip couplings over tube nipples and secure.

7. Connect a condensate drain to the header, provide the water trap as shown, and run to open drain, sized according to governing codes.

8. Attach the header steam supply connector to main header using the hose cuff and clamps provided, but do not secure.

9. Route the necessary number of vapor hoses or pipes from the humidifier tank, position connector to accept the hoses or pipes and secure.

Note: Refer to page 10 for vapor hose information on routing and for alternate vapor hose installation methods.

Figure 12-1: RAPID-SORB Unit Header Inside Duct

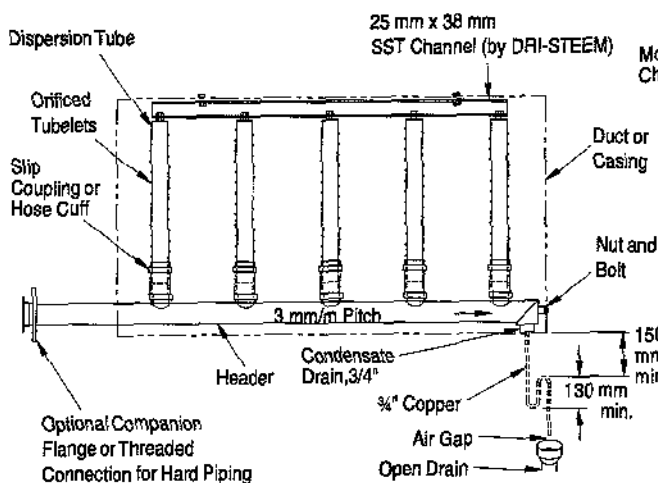
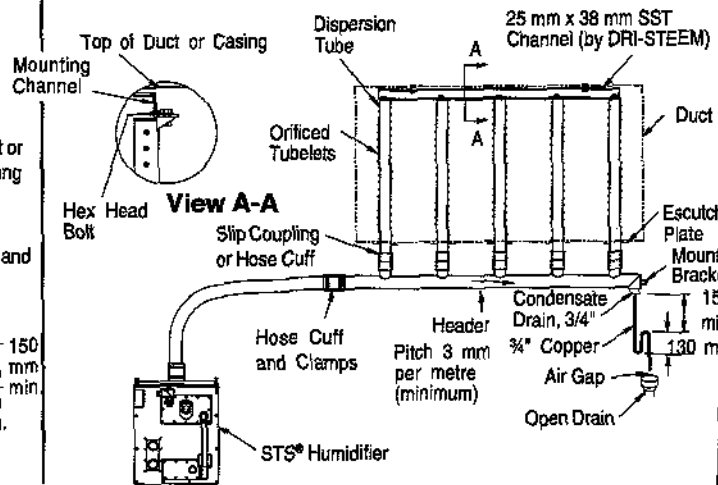


Figure 12-2: RAPID-SORB Unit Header Under Duct



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RAPID-SORB ASSEMBLY AND INSTALLATION

Vertical Duct Installation

Install the RAPID-SORB with dispersion tubes and header pitched to condensate drain as shown in figures 13-1, 13-2, and 13-3.

See "Instructions for Horizontal Duct" for additional information, as applicable.

Figure 13-1: Plan View

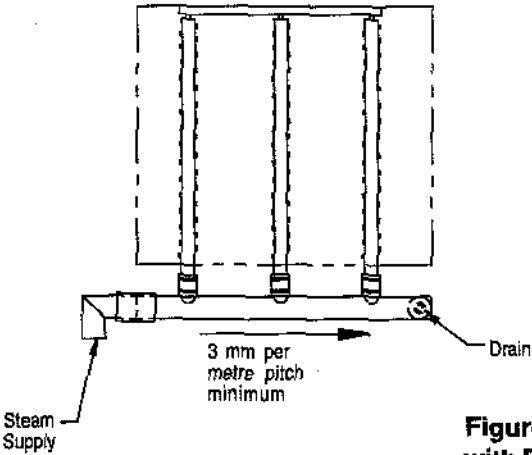


Figure 13-2: Elevation View Tube without Drain

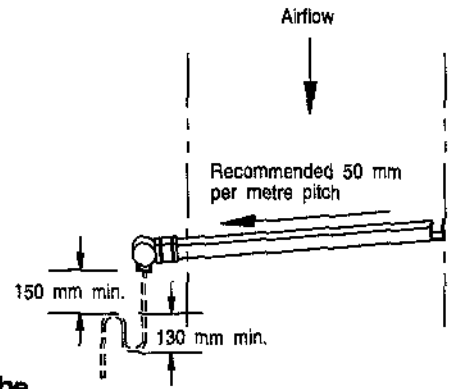
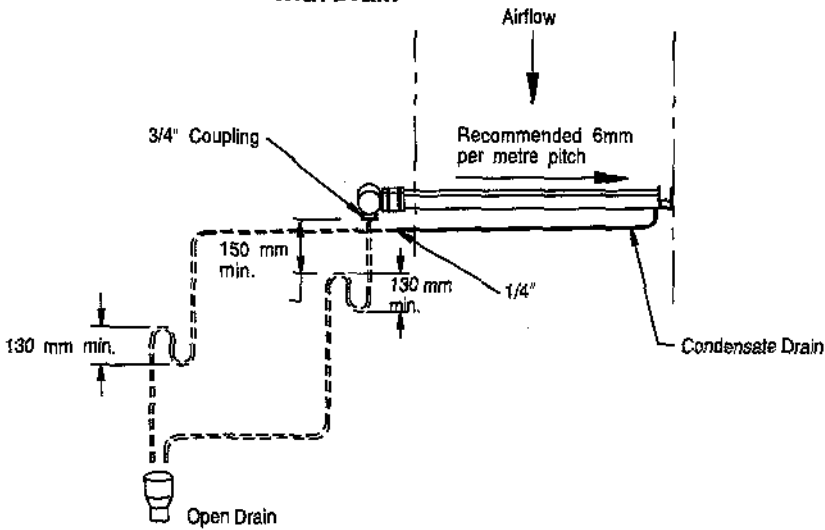


Figure 13-3: Elevation View Tube with Drain



----- Dashed line indicates field piping.

PIPING METHODS

Make-up Water Piping and Material

Either cold or hot water can be used for make-up. If the water pressure is above 400 kPa and/or water hammer would be objectionable, a pressure reducing valve or shock arrester should be installed. Even though the STS has an inner 25 mm air gap, some local codes may require a vacuum breaker in the water supply pipe.

When non-metallic water piping is used, it must be rated to withstand 100°C or greater temperature. If not, the final metre connected to the humidifier should be metallic and should not be insulated.

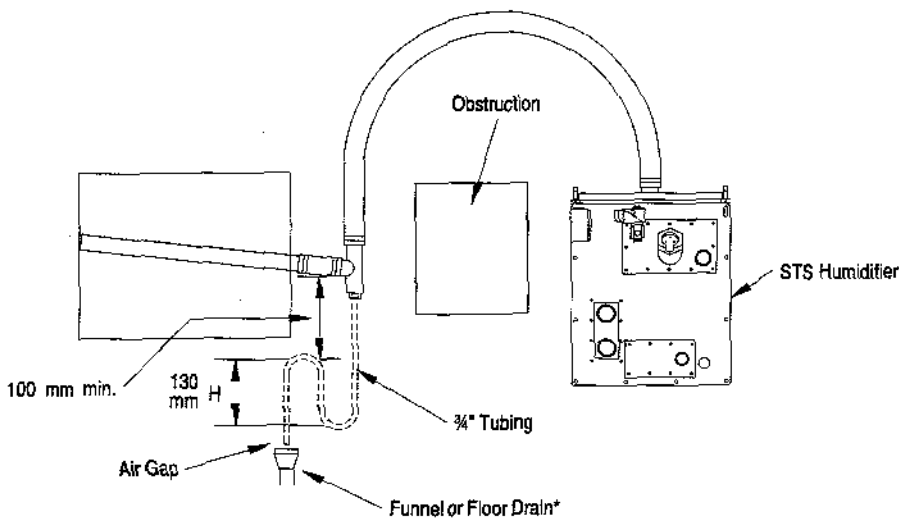
As part of the fill valve assembly, a needle valve is provided. It restricts the rush of cold water entering the evaporating chamber during each fill cycle. The needle valve should be adjusted to minimize output disruption and potential valve noise.

Drain Piping and Material

See illustration on page 15. If non-metallic pipe or hose is used, it must be capable of withstanding temperatures up to 100°C.

To prevent steam from escaping out the drain line, a water seal must be provided in the drain line of sufficient height to contain the pressure developed within the humidifier and steam dispersion system. To determine the proper height of the water seal, see table 15-1.

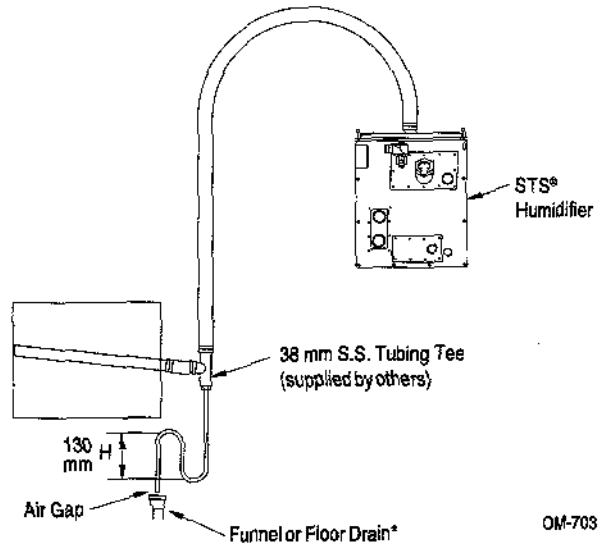
Figure 14-1: This piping method is recommended when obstruction prevents dispersion tube from being continuously pitched back to the humidifier.



Steam Supply

The heat exchanger in the STS standard humidifier is designed for a maximum steam pressure of 100 kPa. The steam valve, trap and strainer are shipped loose for field installation.

Figure 14-2: This piping method is recommended when humidifier must be mounted higher than the duct.



PIPING DIAGRAMS: STEAM, WATER AND DRAIN

Figure 15-1: Standard STS®

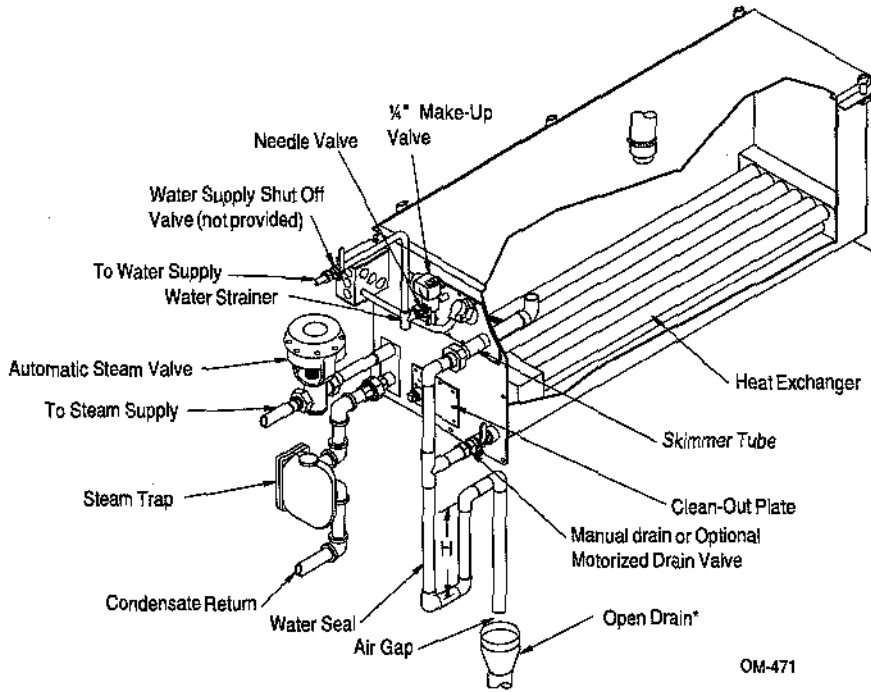


Figure 15-2: Standard STS-DI

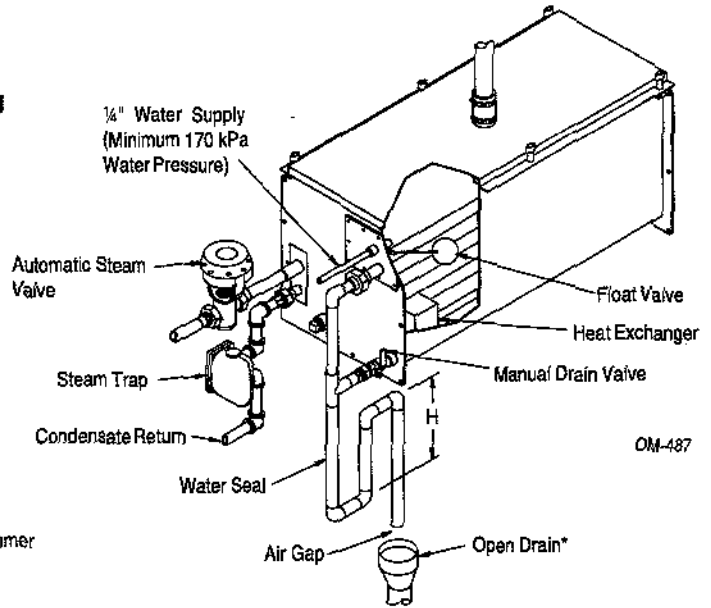


Figure 15-3: Alternate Water Seal and Valve Piping
Used when water seal must be elevated above flow line of drain connection (Humidifier near floor). Water seal height recommendations refer to table 15-1.

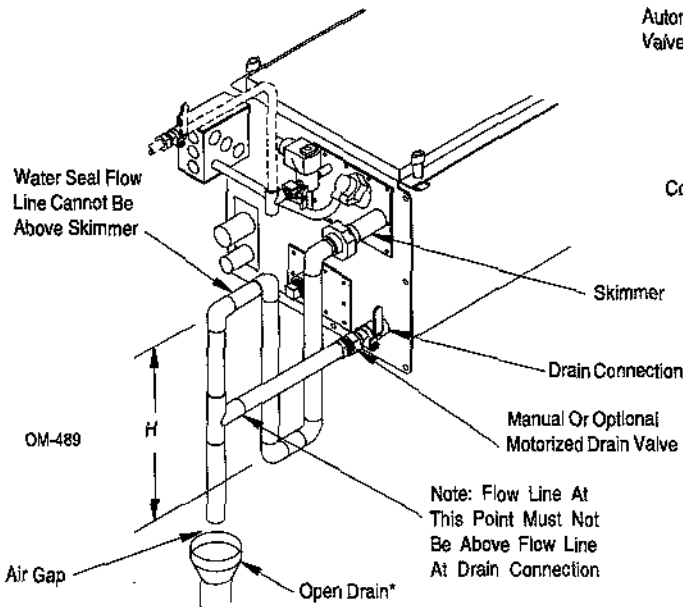


Table 15-1: Water Seal Height Recommendations

Water Seal Height (H)	
Total kg/h steam	H (mm)
2.0 - 62.0	305
63.0 - 83.0	380
83.5 and higher	460

* Refer to governing codes on drain pipe sizing requirements.

Note: Drain piping material must be suitable for 100°C water.

ELECTRICAL

The electrical supply rating is specified on the STS® Control Cabinet and may be either 230 or 400 VAC. The Control Cabinet should be mounted in a location for service. The external fused power disconnect supplied by the contractor should accommodate a minimum wire size of 2.5 KcMIL(mm²) and a maximum fuse size of 15 Amps. (The recommended combination is 2.5 KcMIL(mm²) power supply wire and 3 Amp fusing. Size 20 conduit is the minimum recommended size for all wiring conduit. The connections to the Control Cabinet should be made in the locations specified on the cabinet. A wiring diagram is provided inside of the Control Cabinet. The wiring between the Control Cabinet and the humidifier must be 105° C rated copper wire minimum.

The STS standard humidifier is designed for use with either softened or unsoftened water. The probe type level control system requires water conductivity of 100 µS/cm (34 mg/l) minimum to function and therefore will not operate with water treated by the reverse osmosis or deionizing process. However, special design STS-DI humidifiers are available for use with these water types, and do not require electrical power except when a VAPOR-LOGIC₂ microprocessor is used.

Caution: Only qualified electrical personnel should perform installation and start-up procedures.

Figure 16-1: Typical STS Connection Layout

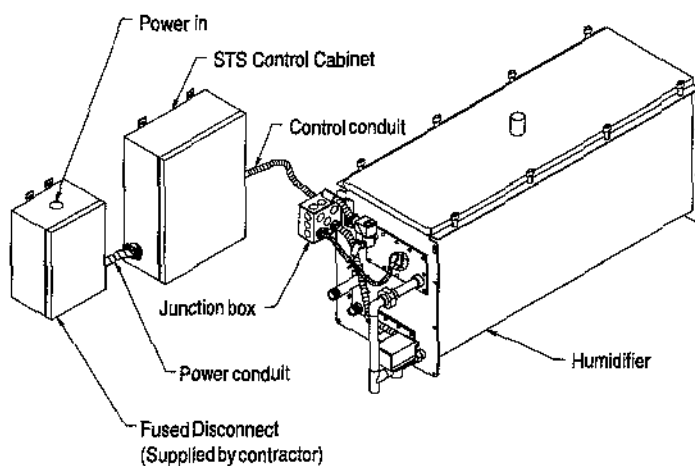
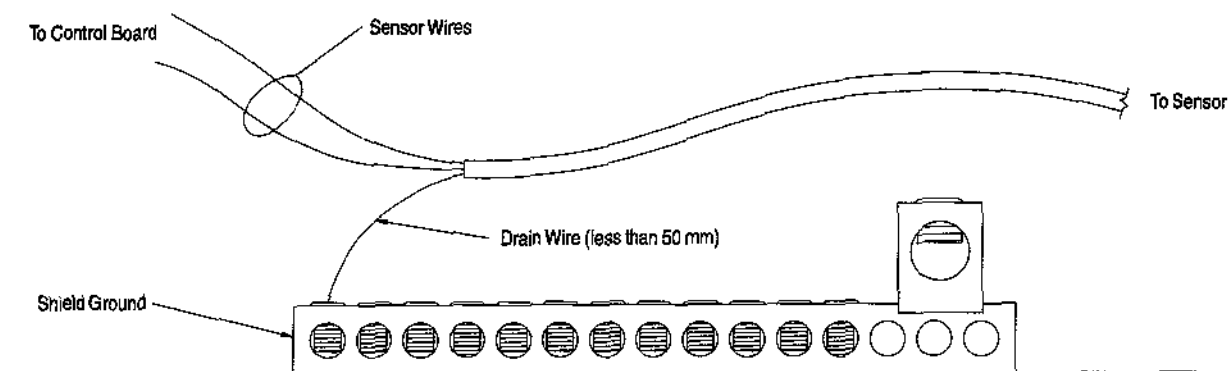


Figure 16-2: Earth Bar Wiring



For maximum E.M.C. effectiveness, all humidity, temperature and air flow controls should be wired using multi-conductor shielded plenum-rated cable with a drain wire for the shield. The drain wire should be connected to the shield ground terminal with its length kept to less than 50 mm.

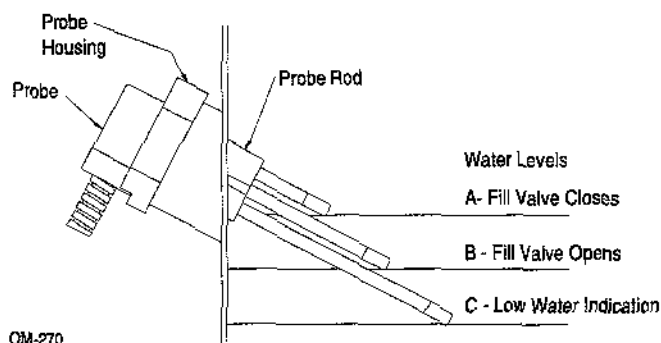
• When selecting a space to install the humidifier, avoid areas close to sources of electromagnetic emissions such as KVA transformers and variable frequency drives.

• Control wiring and power wiring must be run in dedicated or separate earthed metal conduit, cable trays, or trunking.

• Grounding requirements - The earth must be made by solid metal to metal connections. The ground must be good radio frequency earth. Ground wire should be the same size as power wiring.

OPERATION

Figure 17-1: Reliable Electronic Probe Control Maintains Water Level



A simple three-probe conductivity sensor cycles a solenoid-operated water fill valve to maintain the proper water levels.

The STS® humidifier is available with either the standard LW 415 Electronic Water Level Control Module or the optional VAPOR-LOGIC₂ microprocessor control system. If the system is equipped with the VAPOR-LOGIC₂ system, see the VAPOR-LOGIC₂ Operations and Maintenance Manual for more information. Then continue reading this manual beginning at the maintenance section on page 18.

LW415 Electronic Water Level Control Module

When the power is activated the solenoid-operated water fill valve will open, filling the evaporating chamber. Filling will continue until water reaches level A, at which time the fill valve will close. To ensure that the water seal is filled with water, disconnect probe plug and cable from probe rod assembly (located on face plate), allowing the fill valve to re-energize and overflow humidifier tank. This process will take only seconds; probe plug and cable must then be reconnected.

Water Refill

During operation, the water line will drop to level B. At this level the fill valve opens, and remains open until the water line returns to level A.

Adjustable Surface Skimmer

Each time the evaporating chamber refills, the upper 6 mm of water is immediately drained off through the skimmer. This carries away the mineral residue formed during the previous evaporating cycle. This skimming action effectively removes most of the mineral concentration in much the same way as the surface blowdown does in a steam boiler. This simple device greatly reduces the frequency of cleaning the evaporating chamber.

Note: Preferably this humidifier should be supplied with softened water. However, the probe type level control system requires water conductivity of 100 $\mu\text{S}/\text{cm}$ (34 mg/l) minimum to function and may not operate in water treated by the reverse osmosis or deionizing process. Specially designed STS Model DI humidifiers are available for use with these water types.

Drain/Flush Feature

This control module contains an integral electronic timer which tracks the humidifying time of the unit. When this accumulated time reaches what has been set in the timer, the drain/flush cycle is activated. Upon activation, the following sequence occurs:

1. The drain valve opens and begins to drain surface water and minerals from the evaporating chamber.
2. When the height of the water drops to the "REFILL" level, the fill valve opens.
3. The drain and fill valves remain open for ten more minutes, thus flushing the chamber.
4. The drain valve then closes, the chamber refills, and the fill valve closes. The timer begins to track the time as the unit resumes normal operation.

The electronic timer comes factory-set for drainage after 40 hours of operation time. Alternate settings of 20 hours and 80 hours can be made. See wiring diagram(s) attached to the unit for timer board location and instructions for changing the timer setting.

OPERATION

Test Cycling the Drain/Flush System

The timer board contains four pairs of terminal pins which are marked 20, 40, 80 and "T" (TEST). To test:

1. Pull the pin block off the pair of pins in use, move it to the "T" pair, and push it on.
2. Set the humidistat high enough so that unit will remain "on call" for at least one hour.
3. After about 35 minutes of operation, a drain/flush cycle will take place.
4. Once the test cycle is completed, move the pin block back to the desired pair of pins. Failure to do so will result in a drain/flush cycle every 35 minutes.

Table 17-1: Recommended Hours of Operation

mg/l	Hours of Operation*
85	80
170	40
289	20

*Due to various types of waters, these are starting points. Field adjustments may be made to suit a particular water condition.

Table 17-2: Drain Duration

Total (kg/h)	Drain Duration (minutes)
3 - 11	5
12 - 33	10
38 - 54	15
57 - 82	20
87 - 109	25
109 and higher	30

RECOMMENDED MAINTENANCE

Caution: Allow unit to cool before performing any maintenance. Manually open the drain valve and the fill valve will be energized. Let the fill water run until the tank is cooled then shut off the contractor/field installed supply water valve.

Model STS®

STS is designed to deal with dissolved minerals in one of two ways depending on the degree of hardness. For light to moderate hardness (up to 170 mg/l) the surface skimmer action plus periodic cleaning is usually adequate. For high mineral content water (above 170 mg/l) a time clock and motorized ball type "dump" valve are recommended in addition to the surface skimmer, and along with periodic cleaning. If the STS was originally purchased without a timer and drain valve they usually can be added in the field. Consult DRI-STEEM or your local distributor for details.

The frequency of cleaning will be dictated by water condition and evaporation load.

Caution: When performing maintenance on the STS always turn off electric power to control panel. Close steam stop and water makeup valves.

Seasonally or as Required

1. Cleaning the Evaporating Chamber

This should be done before the build-up reaches the underside of the heat exchanger(s).

2. Cleaning Probes

Remove cap assembly and unscrew the probe holder from the STS unit. The scale will easily flake off from the sensing probes. The sensing portion (bottom 10 mm) of the probe should be brushed clean with stainless steel wool. Re-install the probe holder with arrows up and "top" marking at the top.

3. Cleaning Surface Skimmer

Remove the elbow section of the skimmer and rotate tube so that loosened material will drop out. Loosen deposits with a long tool such as a screwdriver or section of small diameter pipe and reassemble elbow. Skimmer drainage should be verified by visual inspection once per week. Some water should drain from skimmer drain pipe after each fill cycle.

4. Inspect Gaskets

Replacement procedures are provided with new gaskets.

RECOMMENDED MAINTENANCE

Summer Maintenance

After the humidification season, a complete inspection and cleaning of the heat exchanger, probe control, skimmer, and water chamber is recommended. After cleaning, the unit should remain empty until humidification is required. **On units with TEFLON® coated heat exchangers, do not use a sharp object when cleaning.** Cuts or scratches on the heat exchanger will impair its ability to shed scale during operation, and could cause the TEFLON to separate from the metal surface.

Adjusting the Surface Skimmer

The elevation of the lip of the skimmer tube in respect to the water line determines the quantity of "skimming" that takes place with each fill cycle. The height is field adjustable by a small amount of rotation of the tube.

As evaporation takes place, a portion of the dissolved minerals precipitate (come out of solution) and float on the water surface. Each time the STS® refills, it fills to an elevation above the lip of the skimmer tube. A portion of the refill water then flows to drain, carrying the floating material with it. This action constantly reduces the mineral concentration thereby reducing the frequency of cleaning needed.

The heated water that flows to drain is a cost of operation. Cleaning the humidifier is also a cost, as well as an inconvenience. It is therefore recommended that the user, at the time of the initial start-up, observe and adjust the skimming quantity. By doing so, a balance between minimized mineral build-up and water conservation can be achieved.

The quantity of skimming water drained off per fill cycle is adjusted by rotation of the skimmer tube which alters the height of the overflow lip. It is factory set to

skim about 5-10% of the total evaporating capacity of the unit.

To adjust, loosen the union nut and rotate the tube to the desired percentage of skimming rate.

Allow the STS to operate five or ten days and then inspect it. If a mineral build-up is evident, increase the skim amount. If not, it should be reduced. Repeat the above process until the proper skim amount has been attained.

Adjusting the Surface Skim Bleed-Off Quantity (VAPOR-LOGIC₂ microprocessor control option only)

The skim time determines the quantity of water skimmed with each fill cycle. The skim time is field adjustable using the VAPOR-LOGIC₂ keypad.

Model STS®-DI Only

The humidifier should be inspected for leaks at least annually. All safety devices in the control cabinet should be cycled on and off to verify that they are functioning.

Make-up Water Piping

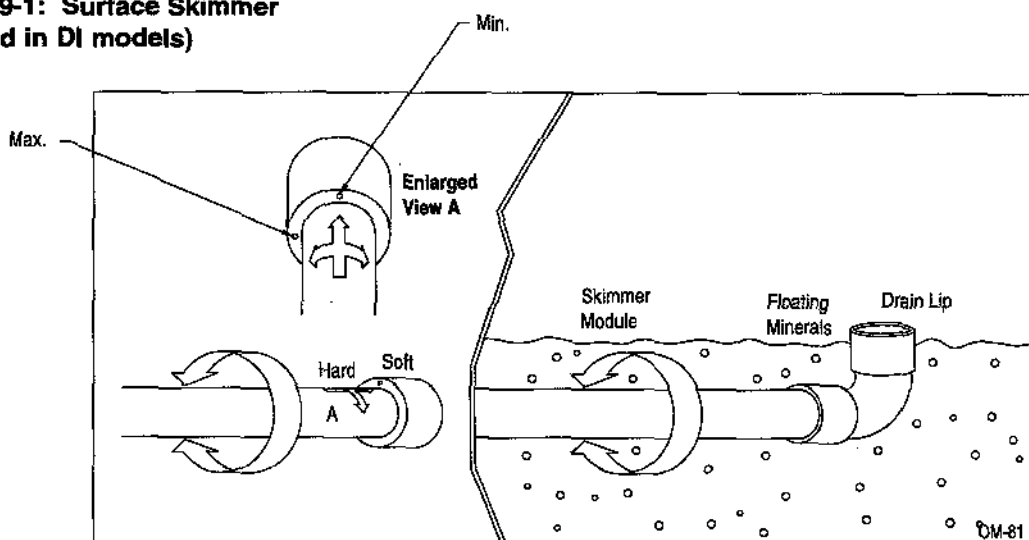
Either cold or hot make-up water may be used. If the water pressure is above 415 kPa and/or water hammer would be objectionable, a pressure-reducing valve or shock arrester should be installed. Although the STS-DI humidifier has an internal 25 mm air gap, some local codes may require a vacuum breaker.

Caution: Minimum water supply pressure is 170 kPa.

Cleaning the Evaporating Chamber

As long as mineral-free water is used in the STS-DI humidifier, no cleaning or flushing of the evaporating chamber should be necessary.

Figure 19-1: Surface Skimmer (not used in DI models)



By rotating the skimmer tube, the height of the drain lip is adjusted. This alters the amount of the bleed-off that occurs with each refill.

START-UP PROCEDURE

Introduction

After the system has been properly installed and connected to both electrical and water supplies, it may then be started.

Mounting

Check mounting to see that unit is level and securely supported before filling with water.

Piping

Verify that all piping connections have been completed as recommended and that steam and water pressures are available.

Electrical

Verify that all wiring connections have been made in accordance with all governing codes and the enclosed STS® wiring diagram.

Control System

For your particular humidifier control system, refer to the Operations and Maintenance Manual enclosed with the product shipment (LW415 control module, VAPOR-LOGIC®, or VAPOR-LOGIC₂®).

Control Circuits (for STS®-DI only)

1. Adjust humidistat to "call" setting.
2. Open shut-off valve on water supply line. Water should flow through float valve.
3. After evaporating chamber has filled, turn electric power on to control cabinet.
4. Fill the water seal in drain line by manually opening drain valve for a few seconds.
5. Open steam stop valve. Steam should be heard passing through the automatic steam valve into the humidifier heat exchanger.
6. Check out function of field installed air flow switch, high limit duct humidistat, and controlling humidistat to ensure they are controlling the control valve.

Recommended Maintenance

STS-DI System (deionized water)

The STS-DI humidifier does not require regular maintenance. A periodic visual inspection is recommended to identify gasket or piping leaks. Control circuit and safety switches should be checked to verify they properly control the valve.

Caution: Only qualified personnel should perform start-up procedure.

Caution: Overtightening cover will cause leaks. All cover knobs are turned down at the factory until the bottom of the knob makes contact with the flange, then one half turn further. If more compression is required, turn all knobs a half turn more. Do not turn knobs more than a half turn before identifying that a leak still exists.

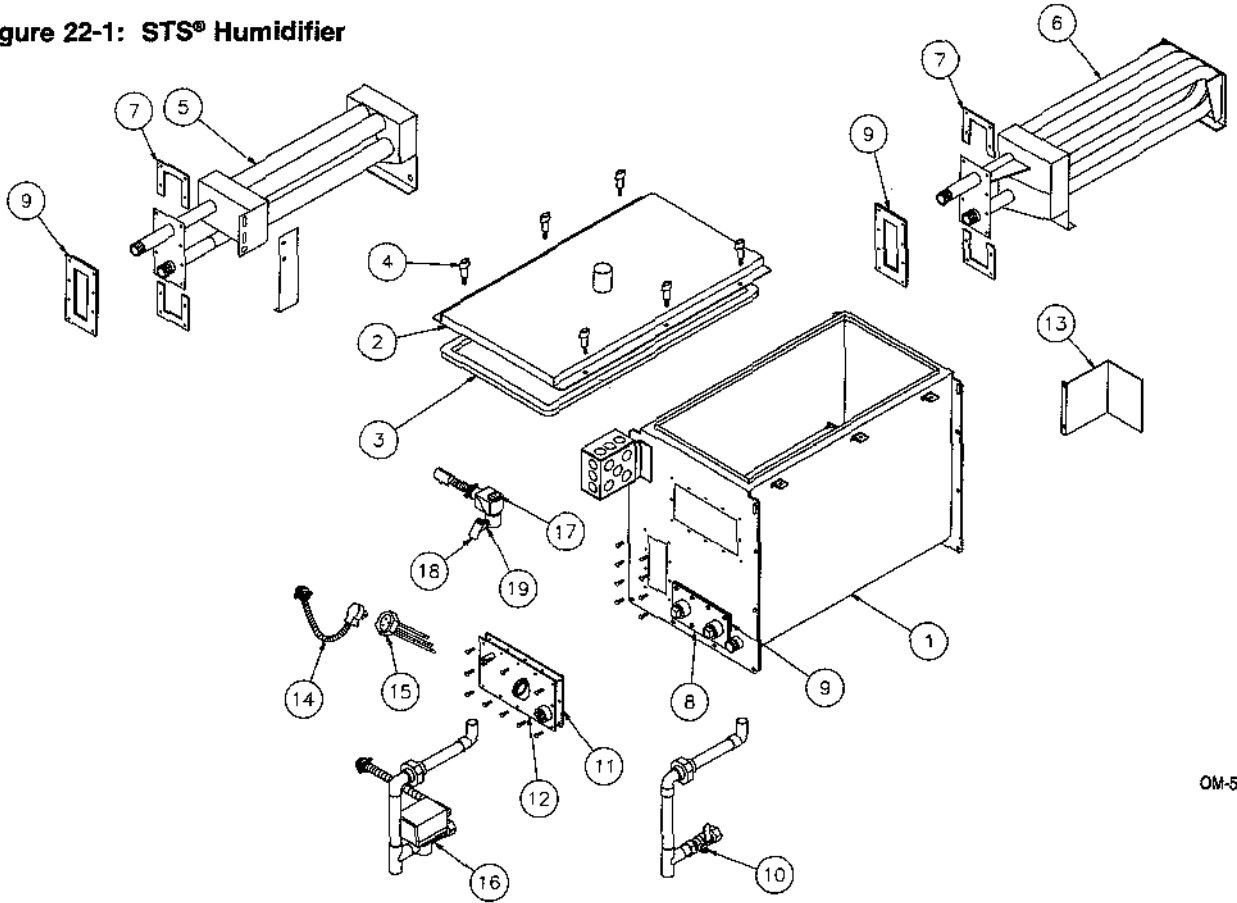
TROUBLE SHOOTING GUIDE

PROBLEM	POSSIBLE CAUSE	RECOMMENDED ACTION
Humidifier Will Not Heat	No control transformer output. Humidistat is not calling	Verify control voltage. Set humidistat to "call". Inspect for faulty humidistat.
	Safety controls open (high limit, air proving, etc...) Faulty control board	Check safety controls. Verify control voltage and probe. Wires are connected correctly.
Humidifier Will Not Fill	Probe corrosion Steam stop valve closed Steam trap plugged Low or no steam Steam strainer plugged	Replace probes*. Verify valve is opened. Clean trap body. Verify steam is present. Clean strainer.
	No water pressure Faulty water fill valve	Verify manual water supply valve is open. Verify action of fill solenoid valve, verify control voltage present at coil. Audible click should be heard as solenoid operates.
Humidifier Does Not Stop Filling	Plugged water strainer Plugged valve Faulty control board	Open strainer. Clean valve. Verify control voltage.
	Lack of tank-to-probes continuity Water conductivity 100 μ S/cm minimum (34 mg/l) Manual drain is not fully closed Fill valve is stuck open Fill valve installed backwards	Jumper terminals 1 & 3 if water stops, verify tank ground to term 3; check water supply conductivity; then consult factory. Close manual ball valve. Check valve for foreign matter. Check for correct water flow, through valve, note arrow.
Low Output	Automatic drain valve not seating Manual drain is not fully closed	Clean ball and seat of valve. Close manual ball valve.
	Excessive skimming amount Fill valve is stuck open Low steam pressure Steam valve not opening fully Steam trap not passing condensate Scale coated heat exchanger	Reduce skim time or skimmer drain amount. Check valve for foreign matter. Check steam supply pressure. Verify that valve strokes fully open. Check trap for foreign matter. Clean heat exchanger.
Makeup Water Valve Short Circuits	Electrode probes may be incorrectly wired	Confirm that wiring agrees with diagram.
	Probes are scale coated	Clean probes.

*Although the three stainless steel electrode probes may eventually erode, they are usually functional for up to approximately 5000 hours of operation.

REPLACEMENT PARTS

Figure 22-1: STS® Humidifier



OM-518

Table 22-1: STS Humidifier

No.	Description	Part No.
1	Tank, STS-25	164404-025 *
1	Tank, STS-50	164404-050 *
1	Tank, STS-100	164404-100 *
1	Tank, STS-200/400	164404-400 *
1	Tank, STS 800	164404-800 *
2	Cover, STS-25	165359 *
2	Cover, STS-50	165360 *
2	Cover, STS-100	165365 *
2	Cover, STS-200/400/800	165369 *
3	Gasket, Cover, STS-25	160690-224 *
3	Gasket, Cover, STS-50	160690-240 *
3	Gasket, Cover, STS-100	160690-340 *
3	Gasket, Cover, STS 200/400/800	160690-200 *
4	Knob, T-Handled Utility	700725
5	Heat Exchanger, STS-25S	164420-101 *
5	Heat Exchanger, STS-50S	164420-102 *
5	Heat Exchanger, STS-100S	164420-103 *
5	Heat Exchanger, STS-200S	164420-104 *

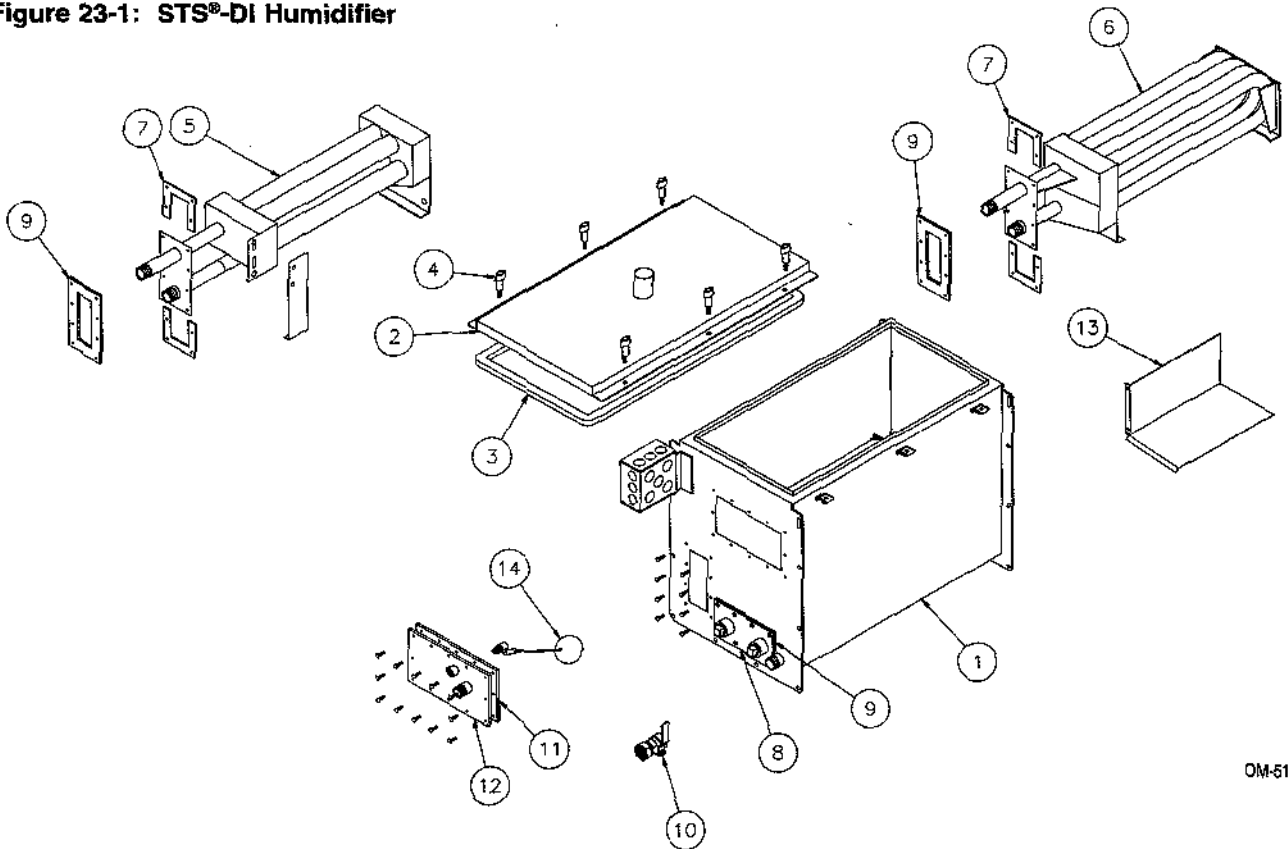
Table 22-1: continued

No.	Description	Part No.
6	Heat Exchanger, STS-25C	164436-101 *
6	Heat Exchanger, STS-50C	164436-102 *
6	Heat Exchanger, STS-100C	164436-103 *
6	Heat Exchanger, STS-400/800C	164436-104 *
7	Support, Heat Exchanger Mtg Plate	124497
8	Clean Out Plate	165470
9	Gasket, Clean Out and Mtg Plate	308220
10	Valve, 3/4" Ball (Manual Drain)	505011
11	Gasket, Probe/Float Plate	308220-001
12	Probe Plate, STS-25/50/100	164411
12	Probe Plate, STS-200/400/800	164411-002
13	Baffle, Probe Plate	124449
14	Probe Plug	406050-002
15	Probe Assembly	406060
16	Valve, 3/4" Electric (Auto Drain)	505400-001
17	Fill Valve, 1/4" Solenoid, .125, STS-25, 50, 100	505084
17	Fill Valve, 1/4" Solenoid, .281, STS-400, 800	505085
18	Strainer, 1/4" Sediment	300050
19	Valve, Needle 1/4"	505070-001

* Specify humidifier model and serial numbers when ordering.

REPLACEMENT PARTS

Figure 23-1: STS®-DI Humidifier



OM-519

Table 23-1: STS-DI Humidifier

No.	Description	Part No.
1	Tank, STS-25	164404-025 *
1	Tank, STS-50	164404-050 *
1	Tank, STS-100	164404-100 *
1	Tank, STS-200/400	164404-400 *
1	Tank, STS 800	164404-800 *
2	Cover, STS-25	165359 *
2	Cover, STS-50	165360 *
2	Cover, STS-100	165365 *
2	Cover, STS-200/400/800	165369 *
3	Gasket, Cover, STS-25	180690-224 *
3	Gasket, Cover, STS-50	180690-240 *
3	Gasket, Cover, STS-100	180690-340 *
3	Gasket, Cover, STS 200/400/800	180690-200 *
4	Knob, T-Handled Utility	700725
5	Heat Exchanger, STS-25S	164420-101 *
5	Heat Exchanger, STS-50S	164420-102 *
5	Heat Exchanger, STS-100S	164420-103 *
5	Heat Exchanger, STS-200S	164420-104 *

Table 23-1: continued

No.	Description	Part No.
6	Heat Exchanger, STS-25C	164436-101 *
6	Heat Exchanger, STS-50C	164436-102 *
6	Heat Exchanger, STS-100C	164436-103 *
6	Heat Exchanger, STS-400/800C	164436-104 *
7	Support, Heat Exchanger mtg Plate	124437
8	Clean Out Plate	165470
9	Gasket, Clean Out and Mtg Plate	308220
10	Valve, 3/8" Ball (Manual Drain)	508011
11	Gasket, Probe/Float Plate	308220-001
12	Float Plate, STS-25/50/100	164410
12	Float Plate, STS-200/400/800	164410-002
13	Baffle, Float Plate	124442
14	Float Valve Assy. STS-25 thru 400	505210
14	Float Valve Assy. STS-800	505300

* Specify humidifier model and serial numbers when ordering.

REPLACEMENT PARTS

Figure 24-1: STS® Control Cabinet

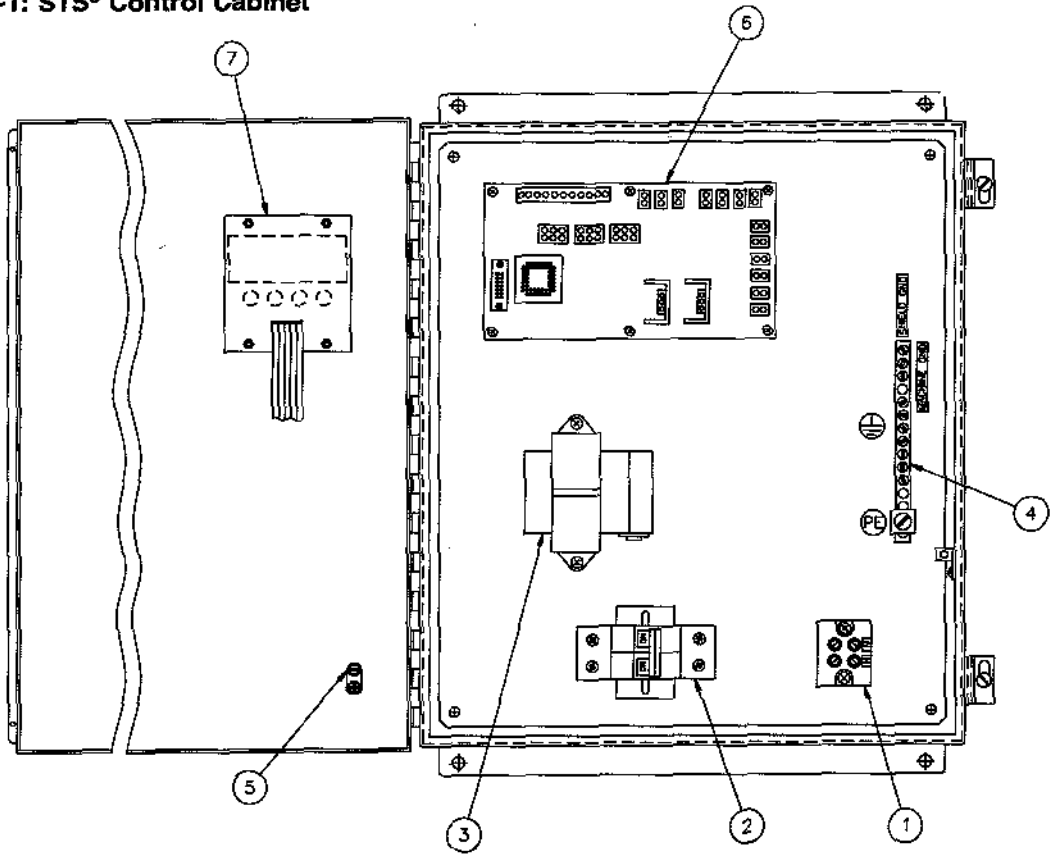


Table 24-1: STS Control Cabinet

No.	Description	Part No.
1	Power Block	408300-001
2	Circuit Breaker	406775
3	Transformer	408960
4	Grounding Bar	408225
5	Ground Lug	409250-017
6	LW 430, Microprocessor Board	408641
7	LW 440, Display Board	408651

TWO-YEAR LIMITED WARRANTY

DRI-STEEM Humidifier Company ("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 re-installation of any defective product.

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.

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

Continuous product improvement is a policy of DRI-STEEM Humidifier Company. Therefore, product features and specifications are subject to change without notice.

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