Installation, Operation, and Maintenance

Air Heating and Cooling Coils

⚠ SAFETY WARNING

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.

March 2013

COIL-SVX01B-EN

Warnings, Cautions and Notices

Warnings, Cautions and Notices. Note that warnings, cautions and notices appear at appropriate intervals throughout this manual. Warnings are provide to alert installing contractors to potential hazards that could result in death or personal injury. Cautions are designed to alert personnel to hazardous situations that could result in personal injury, while notices indicate a situation that could result in equipment or property-damage-only accidents.

Your personal safety and the proper operation of this machine depend upon the strict observance of these precautions.

Read this manual thoroughly before operating or servicing this unit.

ATTENTION: Warnings, Cautions and Notices appear at appropriate sections throughout this literature. Read these carefully:

⚠WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠CAUTION	Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It could also be used to alert against unsafe practices.
NOTICE:	Indicates a situation that could result in equipment or property-damage only

Important Environmental Concerns!

Scientific research has shown that certain man-made chemicals can affect the earth's naturally occurring stratospheric ozone layer when released to the atmosphere. In particular, several of the identified chemicals that may affect the ozone layer are refrigerants that contain Chlorine, Fluorine and Carbon (CFCs) and those containing Hydrogen, Chlorine, Fluorine and Carbon (HCFCs). Not all refrigerants containing these compounds have the same potential impact to the environment. Trane advocates the responsible handling of all refrigerants-including industry replacements for CFCs such as HCFCs and HFCs.

Responsible Refrigerant Practices!

Trane believes that responsible refrigerant practices are important to the environment, our customers, and the air conditioning industry. All technicians who handle refrigerants must be certified. The Federal Clean Air Act (Section 608) sets forth the requirements for handling, reclaiming, recovering and recycling of certain refrigerants and the equipment that is used in these service procedures. In addition, some states or municipalities may have additional requirements that must also be adhered to for responsible management of refrigerants. Know the applicable laws and follow them.

⚠WARNING

Proper Field Wiring and Grounding Required!

All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/state electrical codes. Failure to follow code could result in death or serious injury.

⚠WARNING

Personal Protective Equipment (PPE) Required!

Installing/servicing this unit could result in exposure to electrical, mechanical and chemical hazards.

- **Before installing/servicing this unit, technicians MUST put on all Personal Protective Equipment (PPE) recommended for the work being undertaken. ALWAYS refer to appropriate MSDS sheets and OSHA guidelines for proper PPE.**
- **When working with or around hazardous chemicals, ALWAYS refer to the appropriate MSDS sheets and OSHA guidelines for information on allowable personal exposure levels, proper respiratory protection and handling recommendations.**
- **If there is a risk of arc or flash, technicians MUST put on all Personal Protective Equipment (PPE) in accordance with NFPA 70E or other country-specific requirements for arc flash protection, PRIOR to servicing the unit.**

Failure to follow recommendations could result in death or serious injury.

Revision Summary

COIL-SVX01B-EN. Added factory warranty information.

COIL-SVX01A-EN (20 Feb 2013). Clarified Supersede information on back cover.

COIL-SVX01A-EN (07 Sep 2012). New document. Supersedes COIL-IM-1A (01 Jan 1985), COIL-IM-2B (01 Aug 1986), COIL-IM-3A (01 Jan 1985).

Trademarks

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Model Number Descriptions

Digit 1 - Product

D = Heating and cooling coil

Digit 2, 3 – Coil Type

A0 5/8" tube Steam Coil
AA 5/8" tube Steam Coil
D0 5/8" tube Water Coil
D1 5/8" tube Water Coil
D2 5/8" tube Water Coil
DD 5/8" tube Water Coil
DL 5/8" tube Water Coil
F0 5/8" tube DX Coil
FD 5/8" tube DX Coil
HA 5/8" tube Refrig Heat Recovery Coil
HB 5/8" tube Refrig Heat Recovery Coil
H4 1/2" tube Refrig Heat Recovery Coil
K0 5/8" tube Water Coil
LL 1/2" tube Water Coil
N0 1" tube Steam Coil
NN 1" tube Steam Coil
NS 1" tube Steam Coil
OD 5/8" tube Water Coil
OK 5/8" tube Water Coil
OW 5/8" tube Water Coil
P2 5/8" tube Water Coil
P4 5/8" tube Water Coil
P8 5/8" tube Water Coil
RD 5/8" tube Water Coil
RK 5/8" tube Water Coil
RW 5/8" tube Water Coil
ST 5/8" tube WTR/STM Coil
T0 5/8" tube WTR/STM Coil
TT 5/8" tube Water Coil
UA 1/2" tube Water Coil
UF 1/2" tube DX Coil
UU 1/2" tube Water Coil
UW 1/2" tube Water Coil
W 5/8" tube Water Coil
WA 5/8" tube Water Coil
WC 5/8" tube Water Coil
WD 5/8" tube Water Coil
WL 1/2" tube Water Coil
WR 5/8" tube Water Coil
WS 5/8" tube Steam Coil
XW 5/8" tube Water Coil
5A 5/8" tube Water Coil
5D 5/8" tube Water Coil
5W 5/8" tube Water Coil
S0 Special Coil

Digit 4 – Development

B = Development "B"

Digit 5, 6 – Fin Width

12 = 12" Finned Coil Width TO
57 = 57" Finned Coil Width

Digit 7, 8, 9 – Fin Length

012 = 12" Finned Coil Length TO
168 = 168" Finned Coil Length

Digit 10,11 – Design sequence

F0 = Design sequence "F"

Digit 12 – Rows

A = 1 Row
B = 2 Rows
C = 3 Rows
D = 4 Rows
E = 6 rows
F = 8 rows
G = 10 rows
H = 12 rows
S = Special

Digit 13 – Application

A = Heating
B = Cooling with drain holes
C = Cooling without drain holes
S = Special

Digit 14, 15, 16 – Fin Spacing

072 = 72 Fins per foot To
168 = 168 Fins per foot

Digit 17 – Fin Type

C = Delta Flo™ E – Energy Efficiency
D = Delta Flo H – High Efficiency
B = Prima Flo™ E – Energy Efficiency
E = Prima Flo H – High Efficiency
A = Sigma Flo™

Digit 18 – Fin Material

A = Aluminum
B = Copper
S= Special

Digit 19 – Tube Material

A = 0.016" Copper ½" O.D.
B = 0.020" Copper 5/8" O.D.
C = 0.024" Copper 5/8" O.D.
G = 0.049" Red Brass 5/8"
H = 0.025" Copper ½" O.D.
J = 0.016" Copper ½" OD Internally Enhanced
S = Special

Digit 20 – Casing Material

A = Galvanized
B = Stainless Steel

Digit 21 – Fin Coating

C = CompleteCoat™
S = Special

Digit 22 – Turbulators

0 = None/Not Used
A = Turbulators
S = Special

Digit 23 – Coil Supply

A = RH – Horizontal side
B = LH – Horizontal side
S = Special

Digit 24 - DX Coil Circuiting Type

A = Standard single distributor
B = Horizontal Split
C = Vertically Split
D = Intertwined
E = Heat Pump / Intertwined
0 = Not a DX coil
S = Special

Digit 25 - Distributor Tube Size

A = 3/16" Diam Tubes
B = 1/4" Diam Tubes
C = 5/16" Diam Tubes
0 = Not a DX coil
S = Special

Digit 26

A = Full
B = Half
C = Quarter
D = Eighth
E = Sixteenth

Digit 27 Distributor Tube Size for Vertical (Leaving air side)

3 = 3/16" Diam Tubes
4 = 1/4" Diam Tubes
5 = 5/16" Diam Tubes
0 = Not a DX coil
S = Special

Digit 28 Number of circuits for vertically split

A = Full
B = Half
C = Quarter
D = Eighth
E = Sixteenth
0 = Not a DX coil
S = Special

Digit 29 – Test

0 = Standard Test
A = high Pressure Proof and Leak Test (450/300 PSI)
B = high Pressure Proof and Leak Test (6000/400 PSI)
S = Quarter

Digit 30 – Inspection

0 = Standard Inspection
A = Certification Required
B = Special

Digit 31 – 35 Special Supply Header Location Dimension

0 = Location
27.75 = Location

Digit 36 – 40 Special Return Header Location Dimension

0 = Location
27.75 = Location

Refrigerant Heat Recovery Coils Digits

Digit 31, 32 to 53,54 – Heat Recovery Coil (N) Compressor Circuit - No of Tubes/Circuit

00 = Tubes per Circuit To
36 = Tubes per Circuit

Digit 31 – 35 Special Supply Header Location Dimension

0 = Location
27.75 = Location

Refrigerant Coils Digits

Digit 55 – Packed Elbow

A = With Packed Elbow
0 = Not a DX coil

Digit 56 – Refrigerant Type

0 = None
A = R12
B = R22
C = R410A
D = Special

General Information

Shipping and Receiving

All coils are shipped assembled and packaged.

Upon receipt, inspect each coil for any in-transit damage. Freight claims must be filed for any shipping damage or shipping loss.

Claims for shipping damage must be filed immediately with the delivering carrier. Make specific notations concerning the damage on the freight bill. Concealed damage must be reported within 15 days of receipt.

Coil Information

Trane water, steam and refrigerant coils are identified according to specific types, fins per foot, widths and lengths.

Trane refrigerant coils, Type F, FD, H and H4 are factory dehydrated and sealed with a 10 – 20 psig dry Nitrogen holding change prior to shipment. A Schrader valve is installed to verify the holding pressure. Do not break the seals until the coil is installed.

General data is given in General dataTable 1, p. 7. Type F and FD refrigerant coils have certified ratings when used with Refrigerant R-22 and R-410A, and may be used with other refrigerant (see applications chart). There is no AHRI certification program for type H and H4 coils. Use a thermal expansion valve or other metering device to control refrigerant flow into the coil.

Applications

Table 1. General data

Coil Type	Rows	Tube material	Pressure PSI	Temp F
Heating and Cooling Water Coils				
W	1	Copper 0.020 in. 0.024 in. 0.035 in.	200	325
		Red Brass 0.049 in.	200	388
	3	Copper 0.020 in. 0.024 in. 0.035 in. Red Brass 0.049 in	200	220
	4, 6, 8, 10, 12	Copper 0.020 in. 0.024 in. 0.035 in. Red Brass 0.049 in.	200	220
WL	2, 4, 6, 8	Copper 0.016 in. 0.025in.	200	220
UW	2, 4, 6, 8	Copper 0.016 in. 0.025 in.	200	220
5W	1	Copper 0.020 in. 0.024 in. 0.035 in. Red Brass 0.049 in.	200	250
	2		200	220
WA	1	Copper 0.020 in. 0.024 in. 0.035 in.	200	325
		Red Brass 0.049 in.	200	388
WD	6, 8, 10, 12	Copper 0.020 in. 0.024 in. 0.035 in. Red Brass 0.049 in.	200	220
LL	4, 6, 8	Copper 0.016 in. 0.025 in.	200	220
UU	4, 8	Copper 0.016 in. 0.025 in.	200	220

Table 1. General data (continued)

Coil Type	Rows	Tube material	Pressure PSI	Temp F
5D	6, 8, 10	Copper 0.020 in. 0.024 in. 0.035 in. Red Brass 0.049 in.	200	220
DD	4, 6, 8, 10, 12	Copper 0.020 in. 0.024 in. 0.035 in. Red Brass 0.049 in.	200	220
D	3, 4, 6, 8, 10, 12	Copper 0.020 in. 0.024 in. 0.035 in. Red Brass 0.049 in.	200	220
D1	3, 4, 6, 8, 10, 12	Copper 0.020 in. 0.024 in. 0.035 in. Red Brass 0.049 in.	200	220
D2	6, 8, 10, 12	Copper 0.020 in. 0.024 in. 0.035 in. Red Brass 0.049 in.	200	220
K	2, 3, 4, 6, 8, 10, 12	Copper 0.020 in. 0.024 in. 0.035 in. Red Brass 0.049 in.	200	220
P2	2, 4, 6	Copper 0.020 in. 0.024 in. 0.035 in. Red Brass 0.049 in.	200	220
P4	2, 4, 6, 8	Copper 0.020 in. 0.024 in. 0.035 in. Red Brass 0.049 in.	200	220
P8	4, 8	Copper 0.020 in. 0.024 in. 0.035 in. Red Brass 0.049 in.	200	220

Table 1. General data (continued)

Coil Type	Rows	Tube material	Pressure PSI	Temp F
UA	2	Copper 0.016 in. 0.025 in.	200	220
TT	1, 2	Copper 0.020 in. 0.024 in.	225	325
		Copper 0.035 in.	225	325
		Red Brass 0.049 in.	350	400
T, ST	1, 2	Copper 0.020 in. 0.024 in.	225	325
		Copper 0.035 in.	225	325
		Red Brass 0.049 in.	350	400
Steam Coils				
T, ST	1, 2	Copper 0.020 in. 0.024 in. 0.035 in.	100	400
		Red Brass 0.049 in.	200	450
NS, N	1	Copper 0.031 in.	100	400
		Red Brass 0.049 in.	200	400
A	1	Copper 0.020 in. 0.024 in. 0.035 in.	100	400
		Red Brass 0.049 in.	200	400
Refrigerant coils				
H	1, 2, 3, 4, 6	Copper 0.020 in.	300	n/a
H4	2, 4, 6	Copper 0.016 in.	300	n/a
		Copper 0.025 in.	650	n/a
FD	4, 6	Copper 0.016 in. smooth 0.016 in. internally enhanced 0.025 in.	480	n/a
UF	4, 6, 8	Copper 0.016 in. smooth tubes 0.016 in. internally enhanced 0.025 in.	480	n/a

Table 1. General data (continued)

Coil Type	Rows	Tube material	Pressure PSI	Temp F
F	2, 3, 4, 6, 8	Copper 0.020 in. 0.024 in.	300	n/a
Replacement and Special Coils				
OW	2, 3, 4, 6, 8, 10, 12	Copper 0.020 in. 0.024 in. 0.035 in. Red Brass 0.049 in.	200	220
OD - Old style D coil replacement (copper header)	2, 3, 4, 6, 8, 10, 12	Copper 0.020 in. 0.024 in. 0.035 in. Red Brass 0.049 in.	200	220
OK- Old style K coil replacement (copper header)	2, 3, 4, 6, 8, 10, 12	Copper 0.020 in. 0.024 in. 0.035 in. Red Brass 0.049 in.	200	220
WC	1	Copper 0.020 in. 0.024 in. 0.035 in. Red Brass 0.049 in.	200	250
WS	1	Copper 0.020 in. 0.024 in. 0.035 in. Red Brass 0.049 in.	200	250
XW - Old style WA coil	2	Copper 0.020 in. 0.024 in. 0.035 in. Red Brass 0.049 in.	200	220
NN (NSN) - One N coil header and one NS header (dual steam fed - special coil)	1	Copper 0.031 in.	100	400
		Red Brass 0.049 in	200	400
5A	2	Copper 0.020 in. 0.024 in. 0.035 in. Red Brass 0.049 in.	200	220

⚠WARNING

Hazard of Explosion and Deadly Gases!

Failure to follow all proper safe refrigerant handling practices could result in death or serious injury. Never solder, braze or weld on refrigerant lines or any unit components that are above atmospheric pressure or where refrigerant may be present. Always remove refrigerant by following the guidelines established by the EPA Federal Clean Air Act or other state or local codes as appropriate. After refrigerant removal, use dry nitrogen to bring system back to atmospheric pressure before opening system for repairs. Mixtures of refrigerants and air under pressure may become combustible in the presence of an ignition source leading to an explosion. Excessive heat from soldering, brazing or welding with refrigerant vapors present can form highly toxic gases and extremely corrosive acids.

Water Coils

Consider the following when selecting coil location:

- Allow sufficient space for access to the coil for maintenance.
- Coil piping and condensate drain requirements must be observed.

Coil Installation

Refer to Figure 1 and Figure 2.

1. Install coil with airflow as indicated by arrow on nameplate or coil casing.
2. Drain and vent piping connections are provided as standard on most coils. It is the installers responsibility to locate and use the appropriate header taps to adequately drain these coils.
3. Check for fin damage and straighten fins, if necessary.
4. If necessary, coils may be stacked. Stacking channels or bar stock (supplied by installer) are recommended when stacking coils more than three high.
5. Position stacking channels (if used) under both ends of the coil and at each center support.
6. To insure no unconditioned air bypasses the coil when stacking, caulk or install sheet metal blockoffs (supplied by installer) between and around coils on the entering air side.
7. Drain pans are used as one method of condensate removal. Figure 3 illustrates a typical drain pan installation.

Important: *Before operating equipment, install filters to insure maximum coil performance.*

Figure 1. Type W coil with vent and mounting hole locations

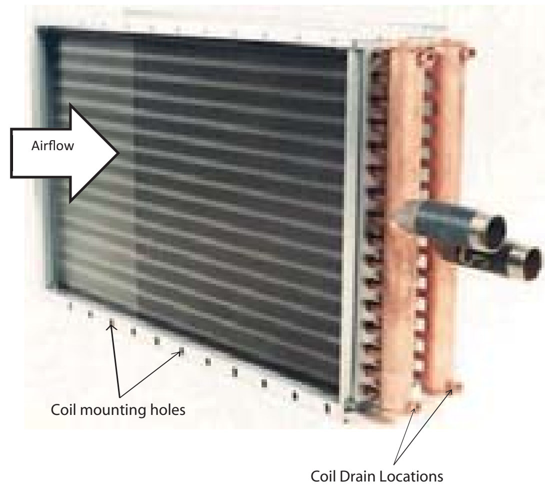


Figure 2. Typical DD coil piping, center connections

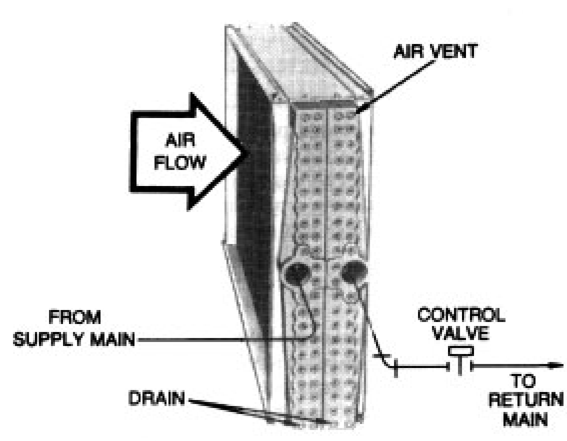
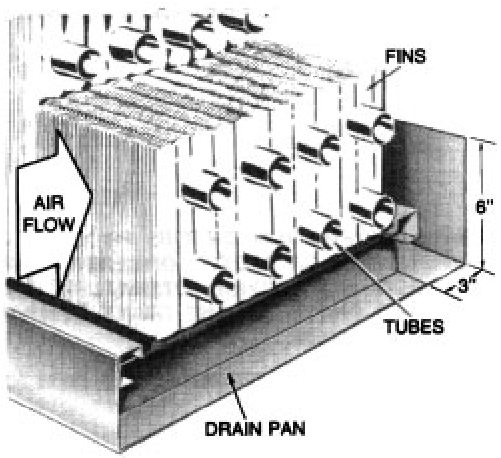


Figure 3. Typical drain pan installation



Refrigerant Coils

***Note:** Type F, FD, H, H4 and UF coils have been dehydrated and charged with a holding charge. To prevent leaks and system contamination, do not break the seals until the coil is installed.*

To determine which side of the coil the piping connections should be on, look at the fin surface on the downstream side and with the air blowing in your face, call out right or left hand connections.

Install the coil with airflow in the same direction as indicated on the coil nameplate or casing. Be careful not to damage the coil fins while handling.

NOTICE:

Coil Damage!

Do not use slots in coil casing to lift coils weighing more than 750 pounds. Failure to follow this instruction could result in damage to coil and coil casing.

The suction connection must be at the bottom of the suction header. Refrigerant distributor must be in a vertical down-feed position. *A refrigerant coil should not be used for vertical upward or downward airflow or in a vertical tube position.*

When stacking more than three coils, stacking channels or bar stock (supplied by the installer) should be used. If used, stacking channels should be positioned under both ends of the coil and at each center support. To ensure that no unconditioned air bypasses the staked coils, install caulk or metal blockoffs between and around the coils, on the entering air side.

***Note:** Straighten coil fins at the time of installation to maintain maximum heat transfer. For additional information refer to Maintenance Section.*

Provide means for condensate collection and removal. Figure 3 illustrates the dimensional recommendations for drain pans.

Be sure that filters are installed upstream of the coil. Clean, efficient filters will minimize the need for frequent coil cleaning and will help keep the coils operating at maximum performance.

⚠WARNING

Hazard of Explosion!

Failure to follow proper safe leak test procedures could result in death or serious injury or equipment or property-only-damage. NEVER use an open flame to detect gas leaks. You MUST use a leak test solution for leak testing.

Leak-test the entire refrigeration system after all piping is complete. Charge the unit according to approximate weight requirements, operating pressures and superheat/ subcooling measurements.

Coil Piping and Connections

General Recommendations

Proper installation, piping, and trapping is necessary to ensure satisfactory coil operation and to prevent operational damage:

- Support all piping independently of the coils.
- Provide swing joints or flexible fittings on all connections that are adjacent to heating coils to absorb thermal expansion and contraction strains.

Note: *The contractor is responsible for supplying the installation hardware.*

- For best results, use a short pipe nipple on the coil headers prior to making any welded flange or welded elbow type connections.
- Pipe coils counterflow to airflow.

NOTICE:

Connection Leaks!

Use a backup wrench when attaching piping to coils with copper headers to prevent damage to the coil header. Do not use brass connectors because they distort easily and could cause connection leaks.

- When attaching the piping to the coil header, make the connection only tight enough to prevent leaks. Maximum recommended torque is 200 foot-pounds.

NOTICE:

Over Tightening!

Do not use teflon-based products for any field connections because their high lubricity could allow connections to be over-tightened, resulting in damage to the coil header.

- Use pipe sealer on all thread connections.

NOTICE:

Leakage!

Properly seal all penetrations in unit casing. Failure to seal penetrations from inner panel to outer panel could result in unconditioned air entering the unit, and water infiltrating the insulation, resulting in equipment damage.

- After completing the piping connections, seal around pipe from any casing enclosing the coil from inner panel to outer panel.

NOTICE:

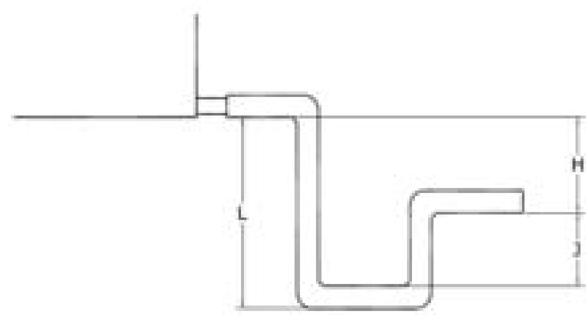
Header Damage!

Bottoming out of the connecting pipe in header results in extreme stresses that could cause the header to crack.

Drain Pan Trapping

- 3-30: 1 inch
- 35-57: 1-1/4 inch
- 66-1201: 1/2 inch

Figure 4. Drain pan trapping for negative and positive pressure applications



Drain pan trapping for section under negative pressure

L = H + J + pipe diameter where:

H = 1 inch for each inch of negative pressure plus 1 inch

J = 1/2 H

Drain pan trapping for section under positive pressure

L = H + J + pipe diameter where:

H = 1/2 inch (minimum)

J = 1/2 H plus the unit positive static pressure at coil discharge (loaded filters)

Steam Coil Piping

Air handlers fitted with steam coils have labeled holes for piping penetrations. Figure 5, p. 12 illustrates a typical steam coil piping configuration. See Table 2 for the codes of system components in these figures.

The coil condensate return line must be piped full size of the condensate trap connection, except for a short nipple screwed directly into the coil header's condensate return tapping. Do not bush or reduce the coil return trapping size.

Table 2. Code of system components for piping figures

Code	System Component
FT	Float and thermostatic steam trap
GV	Gate valve
OV	Automatic two-position (ON-OFF) control valve
VB	Vacuum breaker
ST	Strainer
AV	Automatic or manual air vent
MV	Modulating control valve

Figure 5. Typical piping for Type NS steam coils and horizontal tubes for horizontal airflow

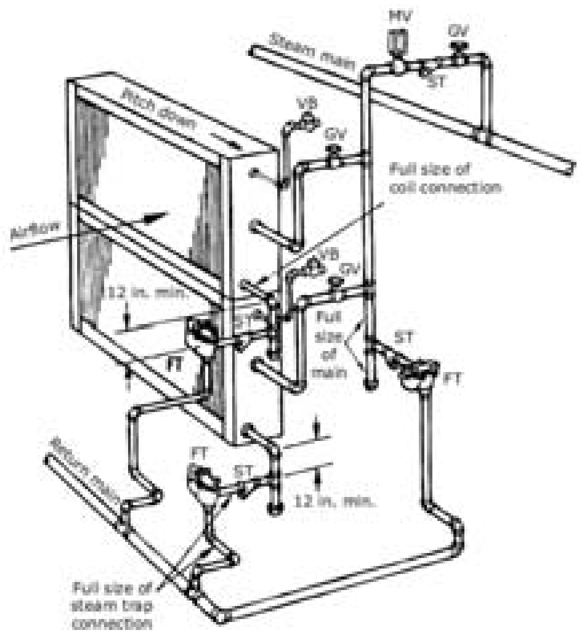


Figure 6. Typical piping for type NS steam coils, vertical tubes for horizontal airflow

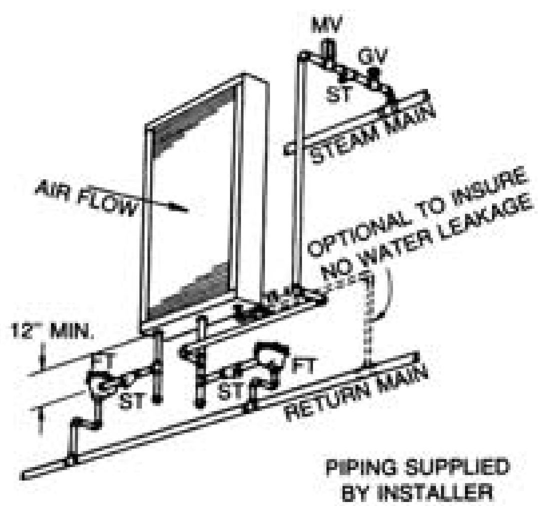


Figure 7. Typical piping for type A or N steam coils, horizontal tubes for horizontal airflow

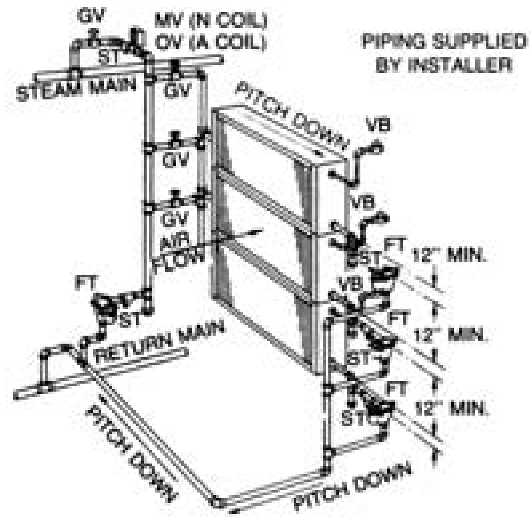


Figure 8. Typical piping for type A or N steam coils, vertical tubes for horizontal airflow

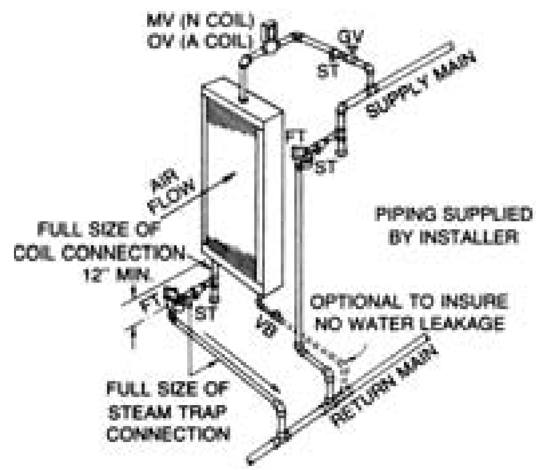
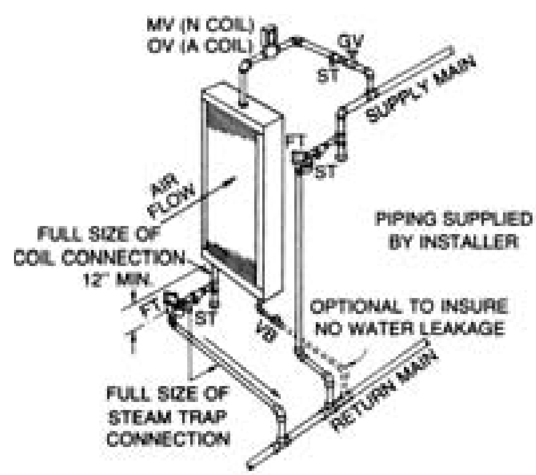


Figure 9. Typical piping for type T steam coils, horizontal tubes for horizontal airflow



NOTICE:

Breaker Cracking Pressure!

The 1/2-inch NPT, 15 degree swing check valve vacuum breaker is recommended because other vacuum breakers, such as spring-loaded ball-check breakers, have cracking pressures as high as 1.25 inches Hg (17 inches of water). Vacuum breakers with fitting sizes smaller than 1/2 inch NPT are too small to relieve vacuum quick enough to ensure complete condensate drainage. Other types of swing check valve vacuum breakers are acceptable if the fittings size is not smaller than 1/2-inch NPT and the cracking pressure is not larger than 0.25 inches Hg (3.4 inches of water). Failure to follow these instructions could result in equipment damage.

To prevent coil damage, complete the following recommendations:

- Install a 1/2-inch NPT, 15 degree swing check valve vacuum breaker with cracking pressure of 0.25 inches Hg (3.4 inches water) or lower at the top of the coil. This vacuum breaker should be installed as close to the coil as possible.
- For coil type NS, install the vacuum breaker in the unused condensate return tapping at the top of the coil.
- Vent the vacuum breaker line to atmosphere or connect it into the return main at the discharge side of the steam trap

Note: *Vacuum breaker relief is mandatory when the coil is controlled by a modulating steam supply or automatic two position (ON-OFF) steam supply valve. Vacuum breaker relief is also recommended when face-and-bypass control is used.*

NOTICE:

Equipment Damage!

Condensate must flow freely from the coil at all times to prevent coil damage from water hammer, unequal thermal stresses, freeze-up and/or corrosion. In all steam coil installations, the condensate return connections must be at the low point of the coil. Failure to follow these instructions could result in equipment damage.

Proper steam trap installation is necessary for satisfactory coil performance and service life. For steam trap installation:

1. Install the steam trap discharge 12 inches below the condensate return connection. Twelve inches provides sufficient hydrostatic head pressure to overcome trap losses and ensures complete condensate removal.
   a. Use float and thermostatic traps with atmospheric pressure gravity condensate return, with automatic controls, or where the possibility of low-pressure supply steam exists. (Float and thermostatic traps are recommended because of gravity drain and continuous discharge operation.)
   b. Use bucket traps only when the supply steam is not modulated and is 25 psig or higher.

Note: *Trane steam coils require a minimum of 2 psi of pressure to assure even heat distribution.*

2. Trap each coil separately to prevent holding up condensate in one or more of the coils.
3. Install strainers as close as possible to the inlet side of the trap.
4. If installing coils in series airflow, control each coil bank independently with an automatic steam-control valve. Size the traps for each coil using the capacity of the first coil in direction of airflow.
5. Use a modulating valve that has linear flow characteristics to obtain gradual modulation of the coil steam supply.

Note: *Do not modulate systems with overhead or pressurized returns unless the condensate is drained by gravity into a receiver, vented to atmosphere, and returned to the condensate pump.*

6. Pitch all supply and return steam piping down 1 inch for every 10 feet in the direction of the steam or condensate flow.

Note: *Do not drain the steam mains or take-offs through the coils. Drain the mains ahead of the coils through a steam trap to the return line*

7. Ensure overhead returns have 1 psig of pressure at the steam trap discharge for every 2 feet of elevation for continuous condensate removal.
8. At start-up on units with fresh air dampers, slowly turn the steam on full for at least 10 minutes before opening the fresh air intake.

Water Coil Piping

Figure 10 and Figure 11 illustrate typical water coil piping configurations. Type 5A, 5W, D1, OD, OK, OW, P2, P4, P8, T, TT, UA, UW, W, WC and WS water coils are self-venting only if the water velocity exceeds 1.5 feet per second (fps) in the coil tubes. Type D2, DD, LL, UU, and WD water coils are self-venting only if the water velocity exceeds 2.5 fps in the coil tubes. See the unit submittals for coil water velocity. If the water velocity is below these minimums, vent the coil by one of the following methods:

1. Install an air vent in the top pipe plug tapping of the return header.
2. When the return line rises above the top of the coil, vent from the top of the return header horizontally to the return piping.

Note: *When installing coils in a duct mounted application, air leakage through the tube and U-bend penetrations in the coil casing should be expected. Capping over the coil ends or sealing around the tubes with a pliable sealant such as silicone will minimize this leakage.*

Figure 10. Typical piping for type 5W (1-row), WC and WS water coil

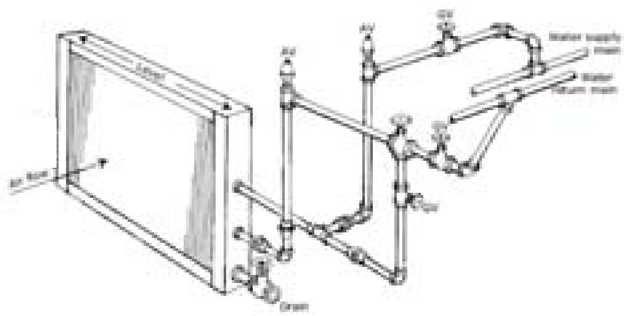


Figure 11. Typical piping for type 5A, 5W (2-row), D, DD, D1, D2, K, LL, OD, OK, OW, W3 (to 12-row), WA (2-row), WD, and WL water coils

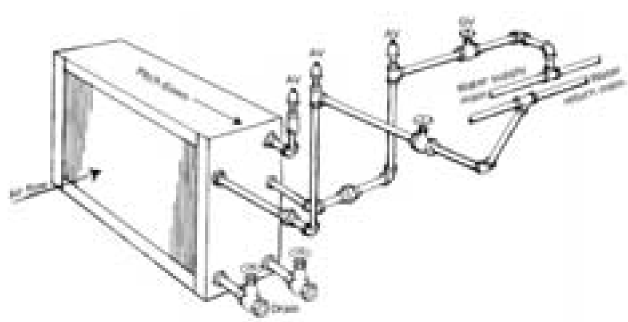


Figure 12. Typical piping for stacked water coils

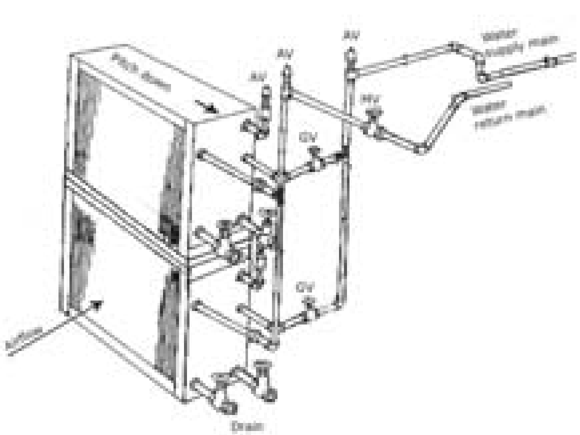


Figure 13. Type T and ST water coil

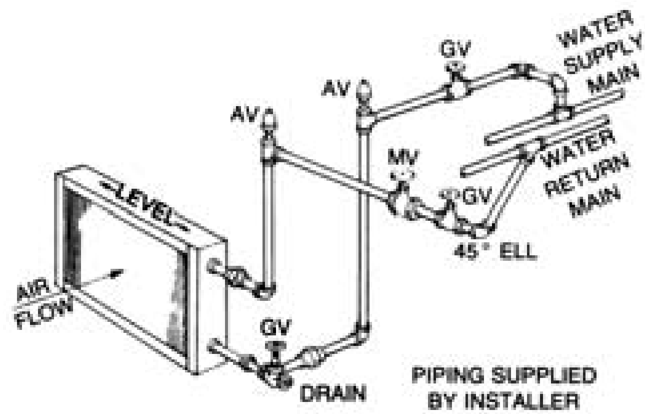
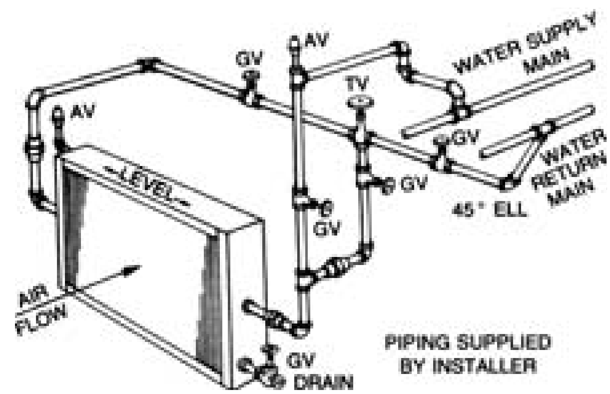


Figure 14. Type W or WA, 1-row water coil

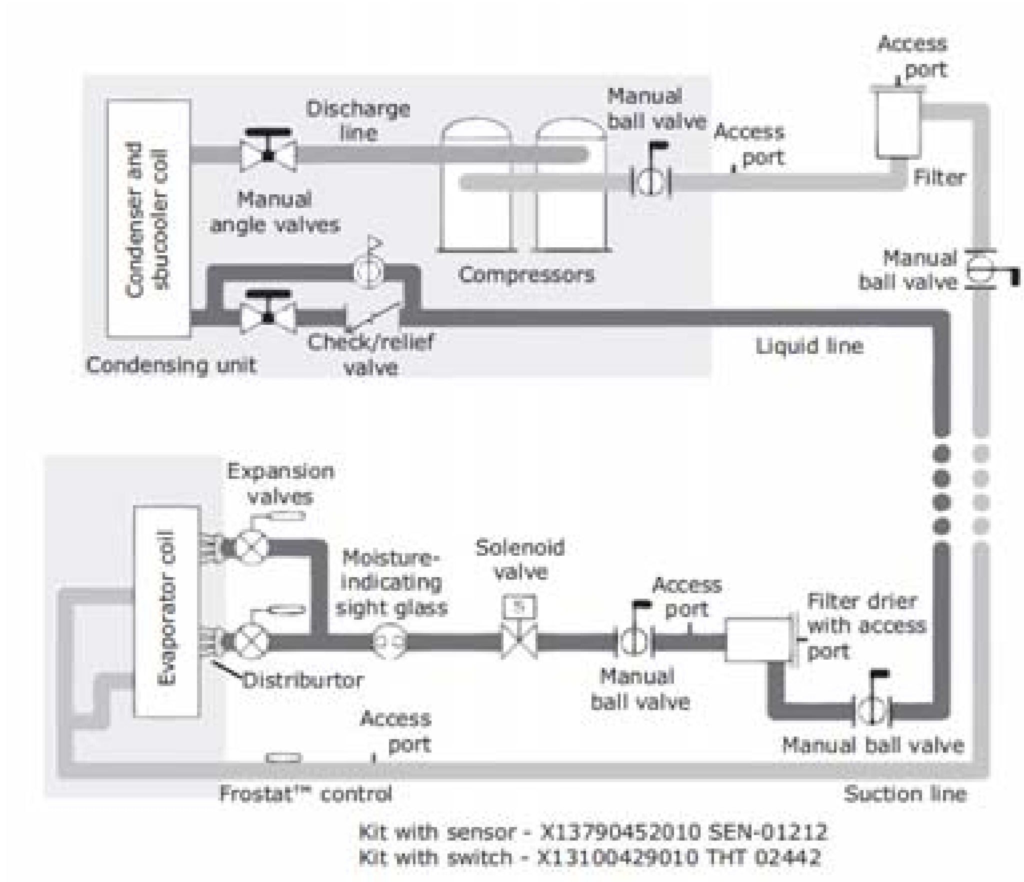


Refrigerant Coil Piping

Note: *Refer to the Warnings, Cautions and Notices page under the "Responsible Refrigerant Practices" section.*

Use Figure 15 to determine the proper, relative sequence of the components in the refrigerant lines that connect the condensing unit to an evaporator coil. Refer to "Examples of Field-Installed Evaporator Piping" on p. 17 for more detailed schematics of evaporator piping.

Figure 15. Example of placement for split-system components



Liquid Lines

Line Sizing

Properly sizing the liquid line is critical to a successful split-system application. The selected tube diameter must provide at least 5°F [2.7°C] of subcooling at the expansion valve throughout the operating envelope. Increasing the size of the liquid line will not increase the available subcooling.

Routing: Install the liquid line with a slight slope in the direction of flow so that it can be routed with the suction line. Minimize tube bends and reducers because these items tend to increase pressure drop and to reduce subcooling at the expansion valve. Liquid line receivers, other than those that are factory-installed, are not recommended.

Insulation

The liquid line is generally warmer than the surrounding air, so it does not require insulation. In fact, heat loss from the liquid line improves system capacity because it provides additional subcooling.

Components

Liquid-line refrigerant components necessary for a successful job include a filter drier, access port, solenoid valve, moisture-indicating sight glass, expansion valve(s), and ball shutoff valves. Figure 15 illustrates the proper sequence for positioning them in the liquid line. Position the components as close to the evaporator as possible.

- *Filter drier:* There is no substitute for cleanliness during system installation. The filter drier prevents residual contaminants, introduced during installation, from entering the expansion valve and solenoid valve.
- *Access port:* The access port allows the unit to be charged with liquid refrigerant and is used to determine subcooling. This port is usually a Schraeder® valve with a core.
- *Solenoid valve:* In split systems, solenoid valves isolate the refrigerant from the evaporator during off cycles; under certain conditions, they may also trim the amount of active evaporator as compressors unload. Generally, the "trim" solenoid valve is unnecessary for variable-airvolume comfort-cooling applications, and

is only required for constant-volume applications when dehumidification is a concern.

- *Moisture-indicating sight glass:* Be sure to install one moisture-indicating sight glass in the main liquid line. The only value of the sight glass is its moisture indication ability. Use actual measurements of temperature and pressure—not the sight glass—to determine subcooling and whether the system is properly charged. The moisture indicator/sight glass must be sized to match the size of the liquid line at the thermal expansion valve.
- *Thermal expansion valve:* The expansion valve is the throttling device that meters the refrigerant into the evaporator coil. Metering too much refrigerant floods the compressor; metering too little elevates the compressor temperature. Choosing the correct size and type of expansion valve is critical to assure it will correctly meter refrigerant into the evaporator coil throughout the entire operating envelope of the system. *Correct refrigerant distribution into the coil requires an expansion valve for each distributor.*

NOTICE:

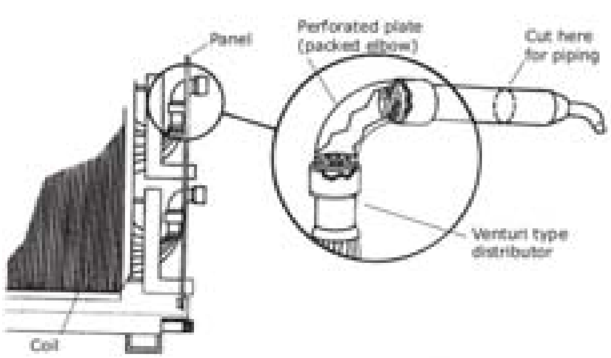
Valve Damage!

Disassemble the thermal expansion valve before completing the brazing connections. If necessary, wrap the valve in a cool, wet cloth while brazing. Failure to protect the valve from high temperatures could result in damage to internal components.

The thermal expansion valve must be selected for proper size and capacity. The size of the expansion valve should cover the full range of loadings. Check that the valve will successfully operate at the lightest load condition. For improved modulation, choose expansion valves with balanced port construction and external equalization.

Cut the process tube and cap assembly from the liquid connection as shown in Figure 16 and install the expansion valve directly to the liquid connections.

Figure 16. Type refrigerant coil with packed elbow



Suction Lines

Line sizing

Proper suction-line sizing is required to guarantee the oil returns to the compressor throughout the system's operating envelope. At the same time, the line must be sized so that the pressure drop does not excessively affect capacity or efficiency. To accomplish both objectives, it may be necessary to use two different line diameters: one for the horizontal run and for vertical drops, and another for the vertical lifts.

Routing

To prevent residual or condensed refrigerant from "free-flowing" toward the compressor, install the suction line so it slopes slightly—that is, by ¼ inch to 1 inch per 10 feet of run—toward the evaporator. When the application includes a suction riser, oil must be forced to travel the height of the riser. Riser traps and double risers are unnecessary in the suction line when the refrigerant coil is used with Trane condensing units.

Avoid putting refrigerant lines underground. Refrigerant condensation or installation debris inside the line, service access, and abrasion/corrosion can quickly impair reliability.

Insulation

Any heat that transfers from the surrounding air to the cooler suction lines increases the load on the condenser (reducing the system's air-conditioning capacity) and promotes condensate formation (adversely affecting indoor air quality). After operating the system and testing all fittings and joints to verify the system is leak-free, insulate the suction lines all the way to inner side panel to prevent heat gain and unwanted condensation.s

Components

Installing the suction line requires field installation of these components: a filter, access port, and a Frostat™ control when the refrigerant coil is used with Trane condensing units. Position them as close to the compressor as possible.

Note: *: Placement of the Frostat control is illustrated in* *Figure 15, p. 15*

- *Filter:* The suction filter prevents contaminants, introduced during installation, from entering the compressor. For this reason, the suction filter should be the replaceable-core type, and a clean core should be installed after the system is cleaned up.
- *Access port:* The access port is used to determine suction pressure. This port is usually a Schraeder valve with a core.
- *Frostat™ coil frost protection:* The Frostat control is the preferred method for protecting evaporator coils from freezing when the refrigerant coil is used with Trane condensing units. It senses the suction-line

temperature and temporarily disables mechanical cooling if it detects frost conditions. The control is mechanically attached to the outside of the refrigerant line, near the evaporator, and wired to the unit control panel.

- *Ball shutoff valve:* Adding manual, ball-type shutoff valves upstream and downstream of the filter simplifies replacement of the filter core.

Refrigerant Charging

Evacuate and leak-test the entire refrigeration system after piping is complete. Charge the unit according to approximate weight requirements and operating pressures. Then measure superheat and subcooling after the system has been allowed time to stabilize and adjust the thermal expansion valve setting if necessary. Always allow the system to stabilize before taking pressure or temperature readings.

Installation Checklist

Use the following checklist to verify that all necessary installation procedures have been completed. Refer to specific sections of this manual for more detailed information.

[ ] Coil is installed with airflow in same direction as indicated on the coil nameplate or casing.

[ ] Suction connection of refrigerant coils is at the bottom of suction header.

[ ] If stacking more than three coils, stacking channels are properly installed. Bypass air is prevented by caulk or blockoffs.

[ ] Condensate drain pans and piping installed

[ ] Clean filters are installed upstream of the coil.

[ ] A liquid line filter-drier is installed upstream of the expansion valve.

[ ] A moisture indicator/sight glass is installed between the expansion valve and filter-drier.

[ ] A liquid line shutoff valve with access port is installed close to the condenser.

[ ] A schraeder valve is installed in the suction line close to the refrigerant coil outlet.

[ ] The thermal expansion valve, with external equalizer connections, is installed directly on the coil liquid connection. The liquid distributor must be in a true vertical position.

[ ] Piping system is evacuated, leak-tested and charged.

[ ] Superheat and subcooling measurements are taken. Thermal expansion valve is adjusted if necessary to obtain desired superheat.

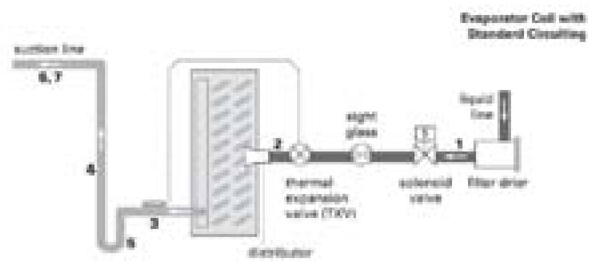
Coil identification

A nameplate is provided on the top channel near the piping connection end of the coil. The name plate contains the coils serial number and model number. Use these numbers whenever inquiring on coil information with a Trane representative.

Examples of Field-Installed Evaporator Piping

Single-Circuit Condensing Unit: Evaporator Coil with One Distributor

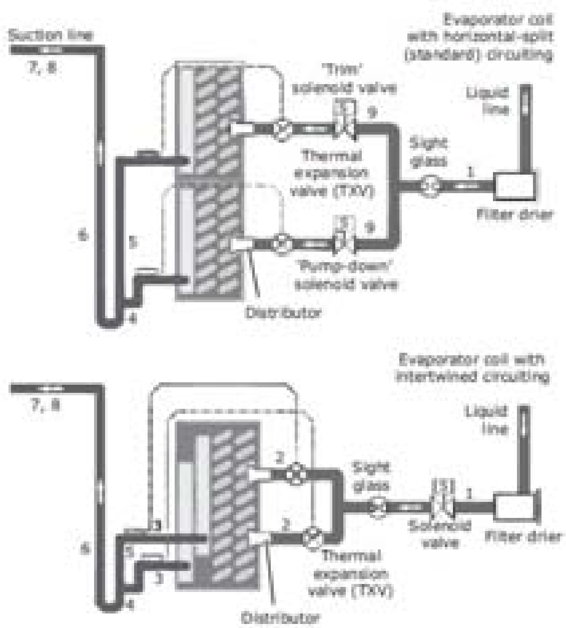
Figure 17. Single-circuit evaporator coil with one distributor



1. Pitch the liquid line slightly—1 inch/10 feet—so that the refrigerant drains toward the evaporator.
2. Provide one expansion valve per distributor.
3. Slightly pitch the outlet line from the suction header toward the suction riser—that is, 1 inch/10 feet in the direction of flow. Use the tube diameter that matches the suction-header connection.
4. For vertical riser, use the tube diameter recommended by the condensing unit manufacturer. Assure the top of the riser is higher than the evaporator coil.
5. Arrange the suction line so the refrigerant gas leaving the coil flows downward, past the lowest suction-header outlet, before turning upward.
6. Pitch the suction line slightly—1 inch/10 feet—so the refrigerant drains toward the evaporator.
7. Insulate the suction line.

Single-Circuit Condensing Unit: Evaporator Coil with Two Distributors

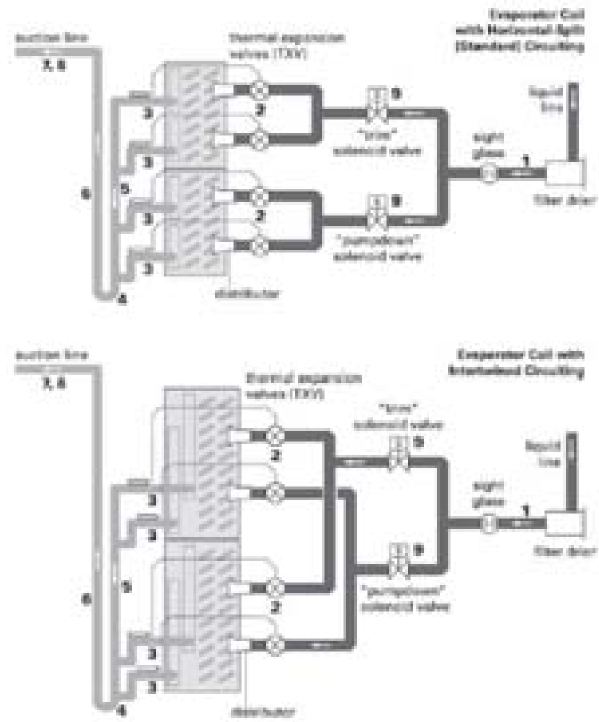
Figure 18. Single-circuit evaporator coil with two distributors



1. Pitch the liquid line slightly—1 inch/10 feet—so that the refrigerant drains toward the evaporator.
2. Provide one expansion valve per distributor.
3. Slightly pitch the outlet line from the suction header toward the suction riser—that is, 1 inch/10 feet in the direction of flow. Use the tube diameter that matches the suction-header connection.
4. Arrange the suction line so the refrigerant gas leaving the coil flows downward, past the lowest suction-header outlet, before turning upward. Use a double-elbow configuration to isolate the thermal expansion valve bulb from other suction headers.
5. For horizontal tubing, use the tube diameter recommended by the condensing unit manufacturer.
6. For vertical riser, use the tube diameter recommended by the condensing unit manufacturer. Assure the top of the riser is higher than the evaporator coil.
7. Pitch the suction line slightly—1 inch/10 feet—so the refrigerant drains toward the evaporator.
8. Insulate the suction line.
9. Only use a "trim" solenoid valve for constant-volume, humidity-sensitive applications. For all other applications, install a single solenoid valve (the "pumpdown" solenoid valve) between the liquid-line filter drier and the sight glass.

Single-Circuit Condensing Unit: Evaporator Coil with Four Distributors

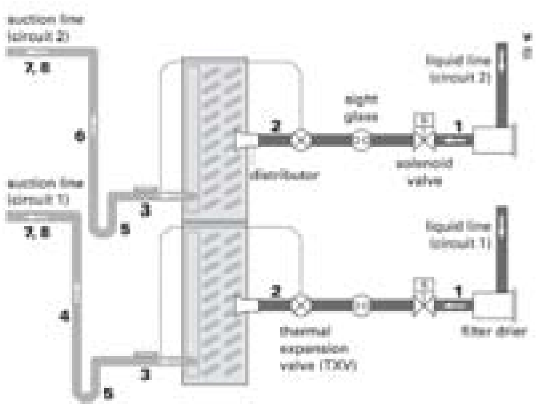
Figure 19. Single-circuit condensing unit: evaporator coil with four distributors



Follow steps 1-9 as in "Single-Circuit Condensing Unit: Evaporator Coil with Two Distributors," p. 18.

Dual-Circuit Condensing Unit: Evaporator Coil with Two Distributors

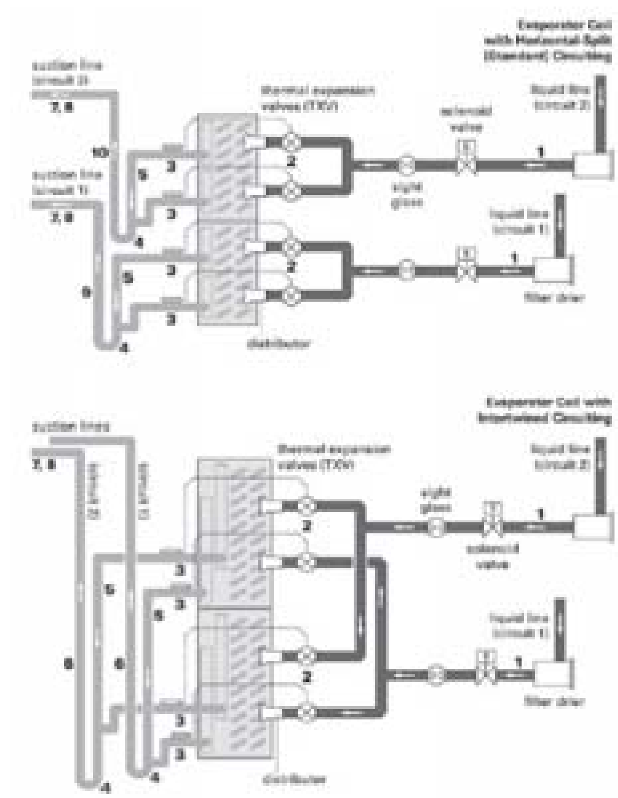
Figure 20. Dual-circuit evaporator coil with two distributors



1. Pitch the liquid line slightly—1 inch/10 feet—so that the refrigerant drains toward the evaporator.
2. Provide one expansion valve per distributor.
3. Slightly pitch the outlet line from the suction header toward the suction riser—that is, 1 inch/10 feet in the direction of flow. Use the tube diameter that matches the suction-header connection.
4. The top of the Circuit 1 suction riser must be higher than the bottom evaporator coil. Use the tube diameter recommended by the condensing unit manufacturer for the riser.
5. Arrange the suction line so the refrigerant gas leaving the coil flows downward, past the lowest suction-header outlet, before turning upward.
6. The top of the Circuit 2 suction riser must be higher than the top evaporator coil. Use the tube diameter recommended by the condensing unit manufacturer for the riser.
7. Pitch the suction line slightly—1 inch/10 feet—so the refrigerant drains toward the evaporator.
8. Insulate the suction line.

Dual-Circuit Condensing Unit: Evaporator Coil with Four Distributors

Figure 21. Dual-circuit evaporator coil with four distributors

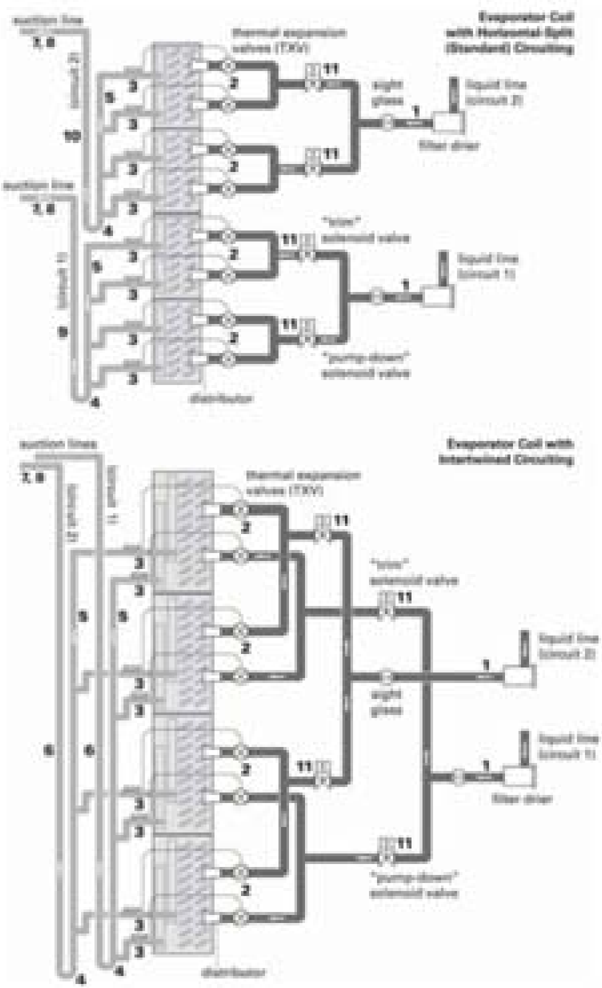


Follow steps 1-3 as in "Dual-Circuit Condensing Unit: Evaporator Coil with Two Distributors," p. 19.

4. Arrange the suction line so the refrigerant gas leaving the coil flows downward, past the lowest suction-header outlet, before turning upward. Use a double-elbow configuration to isolate the thermal expansion valve bulb from other suction headers.
5. For horizontal tubing, use the tube diameter recommended by the condensing unit manufacturer.
6. For vertical riser, use the tube diameter recommended by the condensing unit manufacturer. Assure the top of the riser is higher than the evaporator coil.
7. The top of the Circuit 1 suction riser must be higher than the bottom evaporator coil.
8. The top of the Circuit 2 suction riser must be higher than the top evaporator coil.
9. Pitch the suction line slightly—1 inch/10 feet—so the refrigerant drains toward the evaporator.
10. Insulate the suction line.

Dual-Circuit Condensing Unit: Evaporator Coil with Eight Distributors

Figure 22. Dual-circuit evaporator coil with eight distributors



Follow steps 1-10 as in "Dual-Circuit Condensing Unit: Evaporator Coil with Four Distributors," p. 19.

11. Only use a "trim" solenoid valve for constant-volume, humidity-sensitive applications. For all other applications, install a single solenoid valve (the "pumpdown" solenoid valve) between the liquid-line filter drier and the sight glass.

Maintenance

⚠WARNING

Hazardous Chemicals!

Failure to follow all safety instructions below could result in death or serious injury. Coil cleaning agents can be either acidic or highly alkaline and can burn severely if contact with skin occurs. Handle chemical carefully and avoid contact with skin. ALWAYS wear Personal Protective Equipment (PPE) including goggles or face shield, chemical resistant gloves, boots, apron or suit as required. For personal safety refer to the cleaning agent manufacturer's Materials Safety Data Sheet and follow all recommended safe handling practices.

Coil Cleaning

NOTICE:

Coil Damage!

Do not clean the coil with hot water or steam. The use of hot water or steam as a refrigerant coil cleaning agent will cause high pressures inside the coil tubing and subsequent damage to the coil.

NOTICE:

Equipment Damage!

Do not use acidic chemical coil cleaner. Do not use alkaline chemical coil cleaners that, after mixing, have a ph value greater than 8.5, without also using an aluminum corrosion inhibitor in the cleaning solution. Failure to follow these guidelines or the manufacturer's instructions for use of cleaning chemicals could result in damage to the unit.

Keep coils clean to maintain maximum performance. For operation at its highest efficiency, clean the coil often during periods of high cooling demand or when dirty conditions prevail. A routine cleaning schedule is recommended to prevent dirt build-up in the coil fins, where it may not be visible.

Remove large debris from the coils and straighten fins before cleaning.

Clean refrigerant coil fin surfaces with cold water and detergent or with one of the commercially available chemical coil cleaners. Rinse coils thoroughly after cleaning.

Type K coils have removable headers for cleaning. A small nylon or fiber brush may be used to clean the tubes. After cleaning tubes flush with water. Replace rubber sealing gasket with new gasket when removing any header and be sure it seats properly when replacing the header. If necessary, pull turbulators, clean tubes, and replace with new turbulators.

When the header covers are replaced, washers are recommended under bolt heads and bolts should be evenly tightened to 50 ft.-lbs. torque.

Coils should be kept clean to maintain maximum performance. If fins become dirty, clean with steam and detergent, hot water spray and detergent, or one of the commercially available chemical coil cleaners.

Fin Straightening

Coil fins may have been bent during shipping or servicing, and must be straightened to maintain maximum heat transfer. Reduction of the effective coil surface correspondingly reduces coil capacity. Always check in appearance after any handling of the coil and after any servicing is done near the coils.

Fin rakes are sized according to number of fins per inch of the coil. For relatively small bends that require only minor repair, other tools may be used to evenly space the fins. Be careful not to damage the coils.

Rinse coils thoroughly after cleaning.

Winterization Procedures

General Guidelines

Water coil winterization procedures consist primarily of draining water from the coil before the heating season and adding antifreeze to prevent freezing of any water left standing in the coil.

NOTICE:

Coil Damage!

Inactive water coils exposed to freezing and sub-freezing temperatures must be winterized annually to prevent "coil freeze" damage.

Individual coil type and attitude (pitched toward drain header) will determine how completely each coil can be drained for shutdown during inoperative period. If draining is questionable because of dirt or scale deposits. Blow coil out with compressed air and fill the coil with antifreeze before the heating season begins.

Type D and DD coils

Where coils are installed level or pitched toward the drain header, remove the vent and drain plugs at the ends of each header and allow the water to drain from the coil. If the coils have been pitched away from header, it will be necessary to drain and blow the coils out as completely as possible with compressed air. The coil should then be filled and drained several times with full strength ethylene glycol so that it will mix thoroughly with the water retained in the coil. Drain the coil as completely as possible.

Type K coils

Remove the header covers. If tubes are fouled, cleaning can be done with nylon or wire brush. To ensure that no water will remain in the coil, do not replace the header covers until the coils are put back into service.

Note: *Type K coils are not cleanable by mechanical means when spring wire turbulators are used.*

When the coils are put back into service, new gaskets must be used. It is also recommended that when header covers are replaced, washers be used under bolt heads and bolts be evenly tightened to 50 ft.-lbs. torque.

All Coils Types except WL and UW—Leveled

If these coils have been installed perfectly level, remove the vent and drain plugs at the lower ends of each header and allow the water to drain from the coil.

If coil level is questionable, blow coil out with compressed air to ensure proper drainage.

Type UW and WL Coils—Leveled and/or Pitched — All except WL, UL, D and DD

NOTICE:

Equipment Damage!

Use care in removing header plugs from P2, P4 and P8 coils. Overtorquing may result in twisted tubes.

Remove the vent and drain plugs and blow the coils out as completely as possible with compressed air. The coils should then be filled and drained several times with full strength ethylene glycol so that it will mix thoroughly with the water retained in the coil. Drain the coil out as completely as possible.

Notes

Trane optimizes the performance of homes and buildings around the world. A business of Ingersoll Rand, the leader in creating and sustaining safe, comfortable and energy efficient environments, Trane offers a broad portfolio of advanced controls and HVAC systems, comprehensive building services, and parts. For more information, visit www.Trane.com.

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