LENNOX

INSTALLATION INSTRUCTIONS

HSXA12 Series Units

CONDENSING UNITS
504,540M
04/04
Supersedes 12/03

Technical Publications
Litho U.S.A.

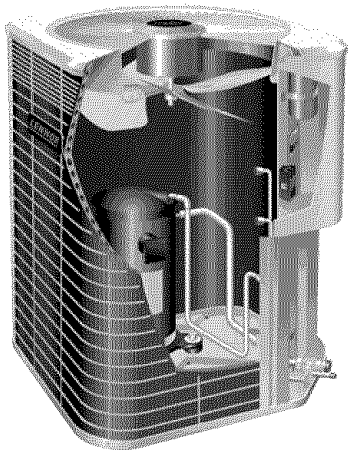


Table of Contents

RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE

HSXA12 Outdoor Unit

HSXA12 outdoor units use R410A which is an ozone friendly HFC refrigerant. This unit must be installed with a matching indoor coil and line set as outlined in the Lennox Engineering Handbook. HSXA12 outdoor units are designed for use in expansion valve (TXV) and fixed orifice systems. Refer to the Lennox Engineering Handbook for expansion valve kits which must be ordered separately. A filter dryer approved for use with R410A has been shipped with the unit. This component must be installed prior to operating the unit. Failure to install the provided filter dryer will void the warranty.

Shipping and Packing List

1 - Assembled HSXA12 outdoor unit
1 - Liquid line filter drier (approved for use with R410A systems)
1 - Fixed orifice refrigerant metering device

Check equipment for shipping damage. If you find any damage, immediately contact the last carrier.

⚠WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Installation and service must be performed by a qualified installer or service agency.

⚠IMPORTANT

This unit must be matched with an indoor coil as specified in Lennox' Engineering Handbook. Coils previously charged with R22 must be flushed.

General Information

These instructions are intended as a general guide and do not supersede national or local codes in any way. Consult authorities having jurisdiction before installation.

⚠WARNING

This product and/or the indoor unit it is matched with may contain fiberglass wool.

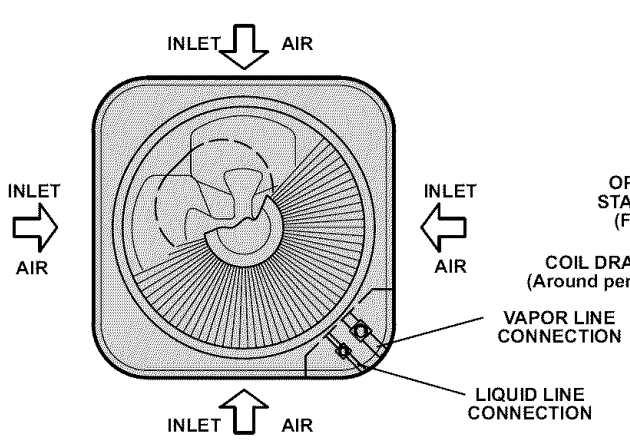
Disturbing the insulation during installation, maintenance, or repair will expose you to fiberglass wool dust. Breathing this may cause lung cancer. (Fiberglass wool is known to the State of California to cause cancer.)

Fiberglass wool may also cause respiratory, skin, and eye irritation.

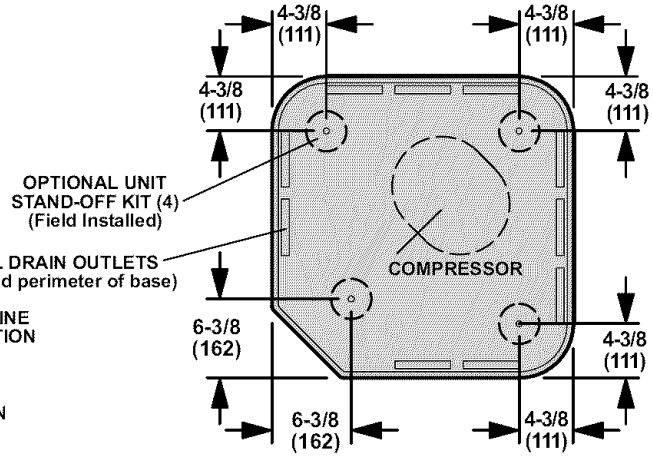
To reduce exposure to this substance or for further information, consult material safety data sheets available from address shown below, or contact your supervisor.

Lennox Industries Inc.
P.O. Box 799900
Dallas, TX 75379-9900

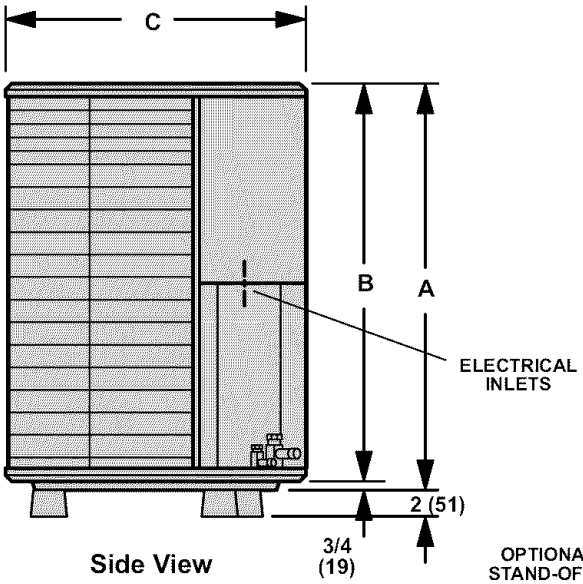
Unit Dimensions - inches (mm)



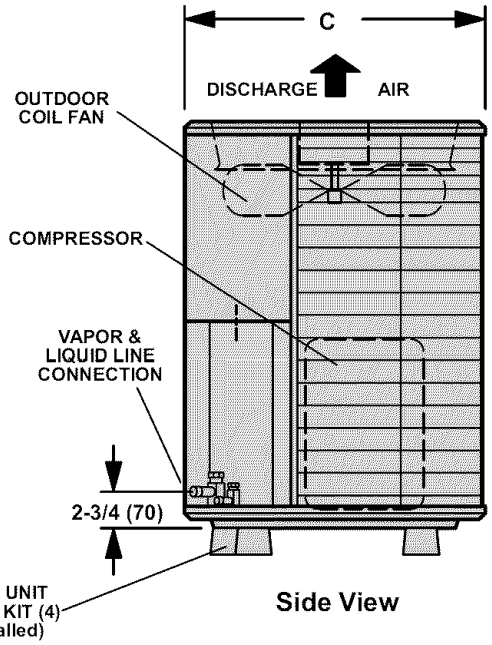
Top View



Top View Base Section



Side View



Side View

Model No.		A	B	C
HSXA12-018 HSXA12-024	in.	25	24-1/4	24-1/4
	mm	635	616	616
HSXA12-030 HSXA12-036 HSXA12-042 HSXA12-048	in.	33	32-1/4	24-1/4
	mm	838	819	616
HSXA12-060	in.	29	28-1/4	28-1/4
	mm	737	718	718

Setting the Unit

⚠CAUTION

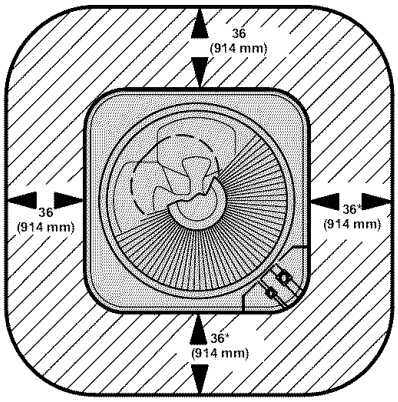
In order to avoid injury, take proper precaution when lifting heavy objects.

⚠CAUTION

Sharp sheet metal edges can cause injury. When installing the unit, avoid accidental contact with sharp edges.

Refer to unit dimensions for sizing mounting slab, platforms or supports. Refer to figure 1 for installation clearances.

Installation Clearances



**NOTE - A service clearance of 30" (762 mm) must be maintained on one of the sides adjacent to the control box. Clearance to one of the other three sides must be 36" (914 mm). Clearance to one of the remaining two sides may be 12" (304 mm) and the final side may be 6" (152 mm).*

NOTE - A clearance of 24" (610 mm) must be maintained between two units.

NOTE - 48" (1219 mm) clearance required on top of unit. Maximum soffit overhang is 36" (914 mm).

Figure 1

Slab Mounting

When installing a unit at grade level, the top of the slab should be high enough above the grade so that water from higher ground will not collect around the unit. See figure 2. Slab should have a slope tolerance away from the building of 2 degrees or 2 inches per 5 feet (51 mm per 1524 mm). Refer to roof mounting section for barrier construction if unit must face prevailing winter winds.

Slab Mounting At Ground Level

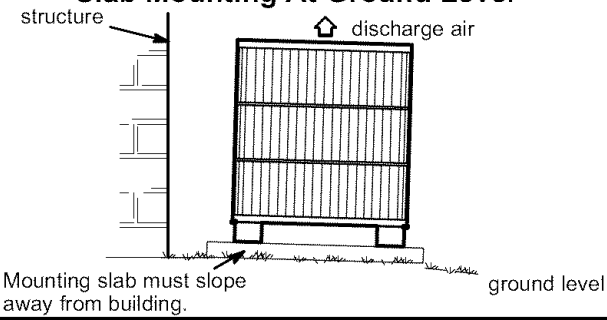


Figure 2

Roof Mounting

Install unit at a minimum of 4 inches above the surface of the roof. Care must be taken to ensure weight of unit is properly distributed over roof joists and rafters. Either redwood or steel supports are recommended.

Electrical

In the U.S.A., wiring must conform with current local codes and the current National Electric Code (NEC). In Canada, wiring must conform with current local codes and the current Canadian Electrical Code (CEC).

Refer to the furnace or blower coil installation instructions for additional wiring application diagrams and refer to unit nameplate for minimum circuit ampacity and maximum overcurrent protection size.

⚠ WARNING

Unit must be grounded in accordance with national and local codes.
ELECTRIC SHOCK HAZARD.
Can cause injury or death.

1 - Install line voltage power supply to unit from a properly sized disconnect switch.

2 - Ground unit at unit disconnect switch or to an earth ground.

NOTE - To facilitate conduit, a hole is in the bottom of the control box. Connect conduit to the control box using a proper conduit fitting.

NOTE - Units are approved for use only with copper conductors.

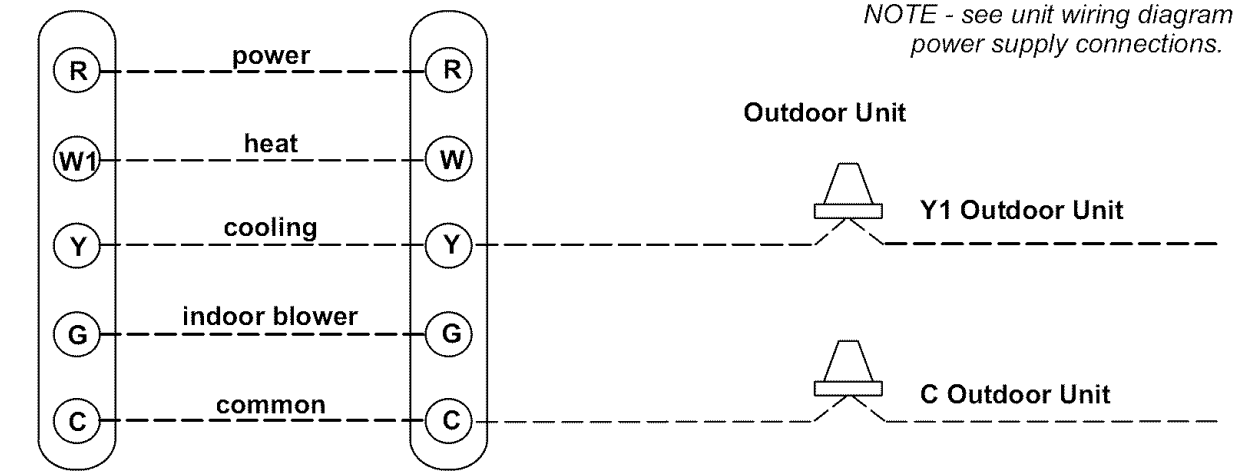
24V, Class II circuit connections are made in the low voltage junction box. Refer to figure 4 for field wiring diagram.

NOTE - A complete unit wiring diagram is located inside the unit control box cover.

3 - Install room thermostat (ordered separately) on an inside wall approximately in the center of the conditioned area and 5 feet (1.5 m) from the floor. It should not be installed on an outside wall or where it can be effected by sunlight, drafts or vibrations.

4 - Install low voltage wiring from outdoor to indoor unit and from thermostat to indoor unit. See figure 3.

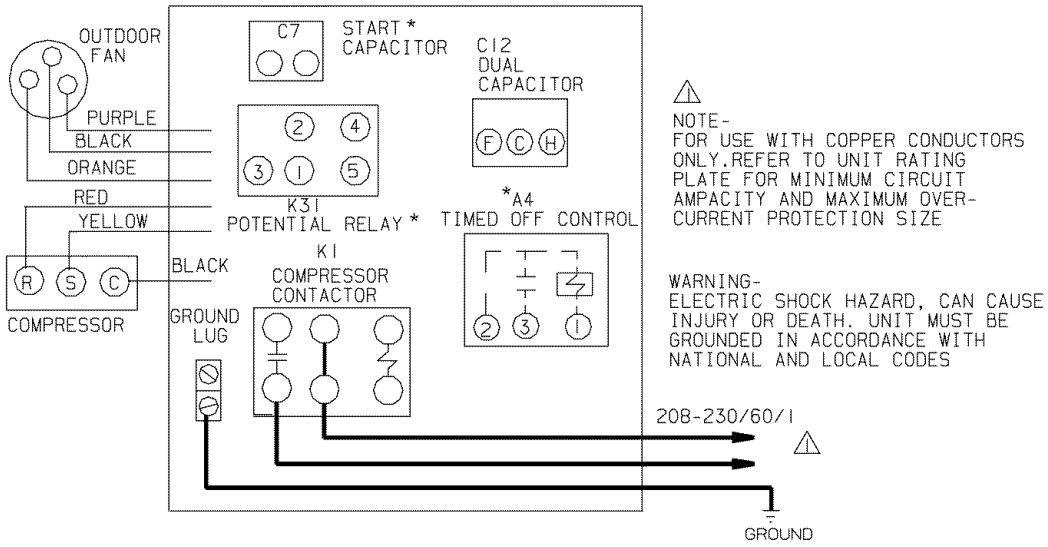
Thermostat Designations



NOTE - If the indoor unit is not equipped with blower relay. It must be field-provided and installed (P-8-3251 or equivalent).

Figure 3

Typical Field Wiring Diagram



*May be optional

Figure 4

Refrigerant Piping

If the HSXA12 unit is being installed with an indoor coil and line set, make the refrigerant connections as outlined in this section. If an existing line set and/or indoor coil is going to be used to complete the HSXA12 system, refer to this section, as well as the flushing section which follows.

Field refrigerant piping consists of liquid and vapor lines from the outdoor unit (sweat connections) to the indoor coil (flare or sweat connections). Use Lennox L15 (sweat, non-flare) series line sets as shown in table 1 or use field-fabricated refrigerant lines. Refer to Refrigerant Piping Guide (Corp. 9351-L9) for proper size, type, and application of field-fabricated lines. Valve sizes are also listed in table 1.

Refrigerant Line Connections

HSXA12 Matched with New Indoor Coil and Line Set

If the HSXA12 is being used with an existing indoor coil which was equipped with a liquid line which served as a metering device (RFCI), the liquid line must be replaced prior to the installation of the HSXA12 unit.

If refrigerant lines are routed through a wall, seal and isolate the opening so vibration is not transmitted to the building.

Table 1
Refrigerant Line Sets

Model	Valve Field Size Connections		Recommended Line Set		
	Liquid Line	Vapor Line	Liquid Line	Vapor Line	L15 Line Sets
-018	3/8 in. (10 mm)	5/8 in. (16 mm)	3/8 in. (10 mm)	5/8 in. (19 mm)	L15-26 15 ft. - 50 ft. (4.6 m - 15 m)
024 -030 -036	3/8 in. (10 mm)	3/4 in. (19 mm)	3/8 in. (10 mm)	3/4 in. (19 mm)	L15-41 15 ft. - 50 ft. (4.6 m - 15 m)
-042 -048	3/8 in. (10 mm)	7/8 in. (22 mm)	3/8 in. (10 mm)	7/8 in. (22 mm)	L15-65 15 ft. - 50 ft. (4.6 m - 15 m)
-060	3/8 in. (10 mm)	1-1/8 in. (29 mm)	3/8 in. (10 mm)	1-1/8 in. (29 mm)	Field Fabricated

NOTE - Units are designed for line sets of up to fifty feet (15 m). For applications longer than fifty feet, consult the Lennox Refrigerant Piping Guide (Corp. 9351-L9). Select line set diameters from table 1 to ensure that oil returns to the compressor.

Installing Refrigerant Line

During the installation of any heat pump or a/c system, it is important to properly isolate the refrigerant lines to prevent unnecessary vibration. Line set contact with the structure (wall, ceiling or floor) causes some objectionable noise when vibration is translated into sound. As a result, more energy or vibration can be expected. Closer attention to line set isolation must be observed.

Following are some points to consider when placing and installing a high-efficiency outdoor unit:

1- **Placement -** Be aware some localities are adopting sound ordinances based on how noisy the unit is from the adjacent property not at the original installation. Install the unit as far as possible from the property line. When possible, do not install the unit directly outside a window. Glass has a very high level of sound transmission.

2- **Line Set Isolation -** The following illustrations demonstrate procedures which ensure proper refrigerant line set isolation. Figure 5 shows how to install line sets on vertical runs. Figure 6 shows how to install line sets on horizontal runs. Figure 7 shows how to make a transition from horizontal to vertical. Finally, figure 8 shows how to place the outdoor unit and line set.

Refrigerant Line Sets
How To Install Vertical Runs
(new construction shown)

NOTE - Similar installation practices should be used if line set is to be installed on exterior of outside wall.

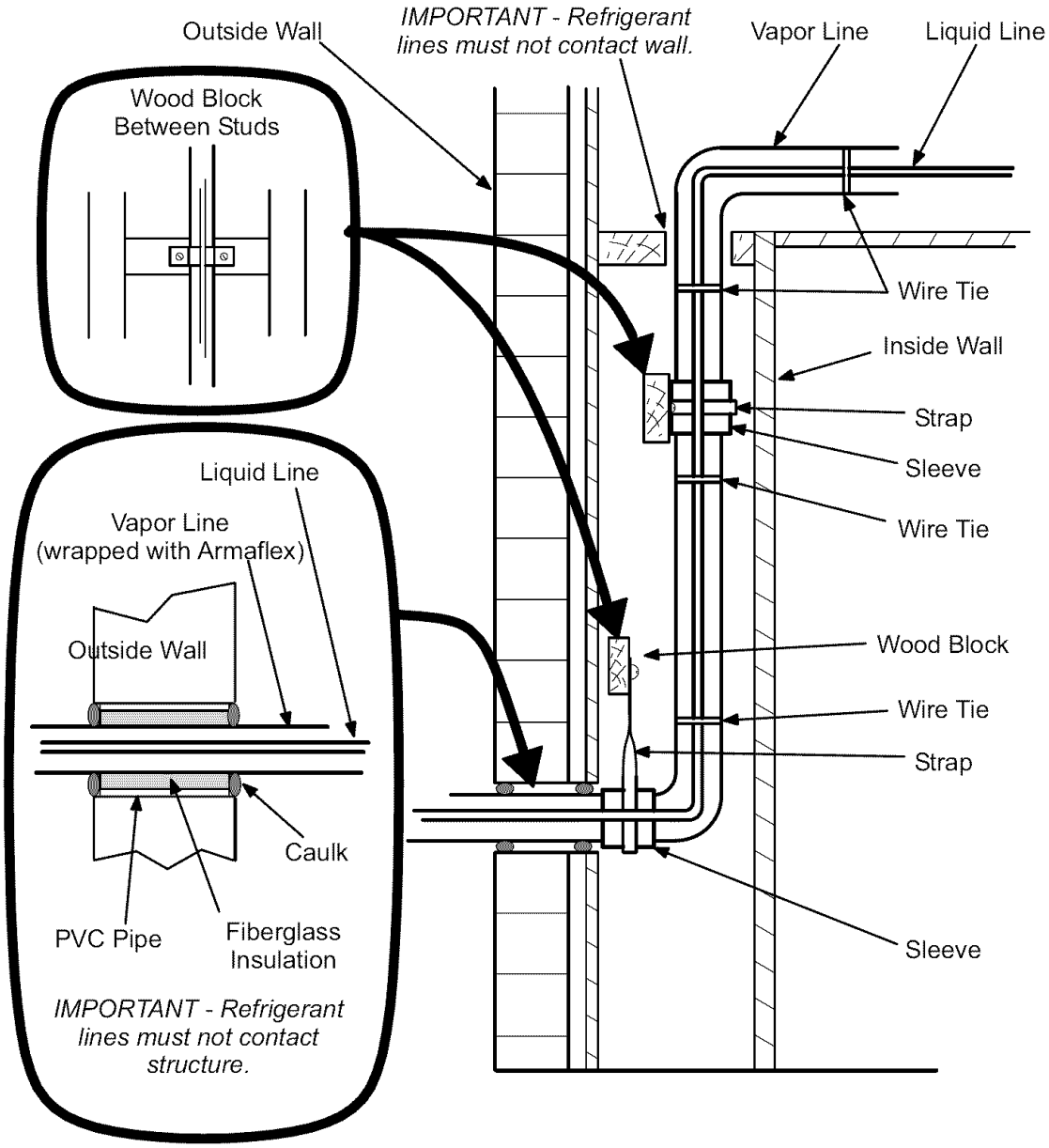


Figure 5

Refrigerant Line Sets:
Installing Horizontal Runs

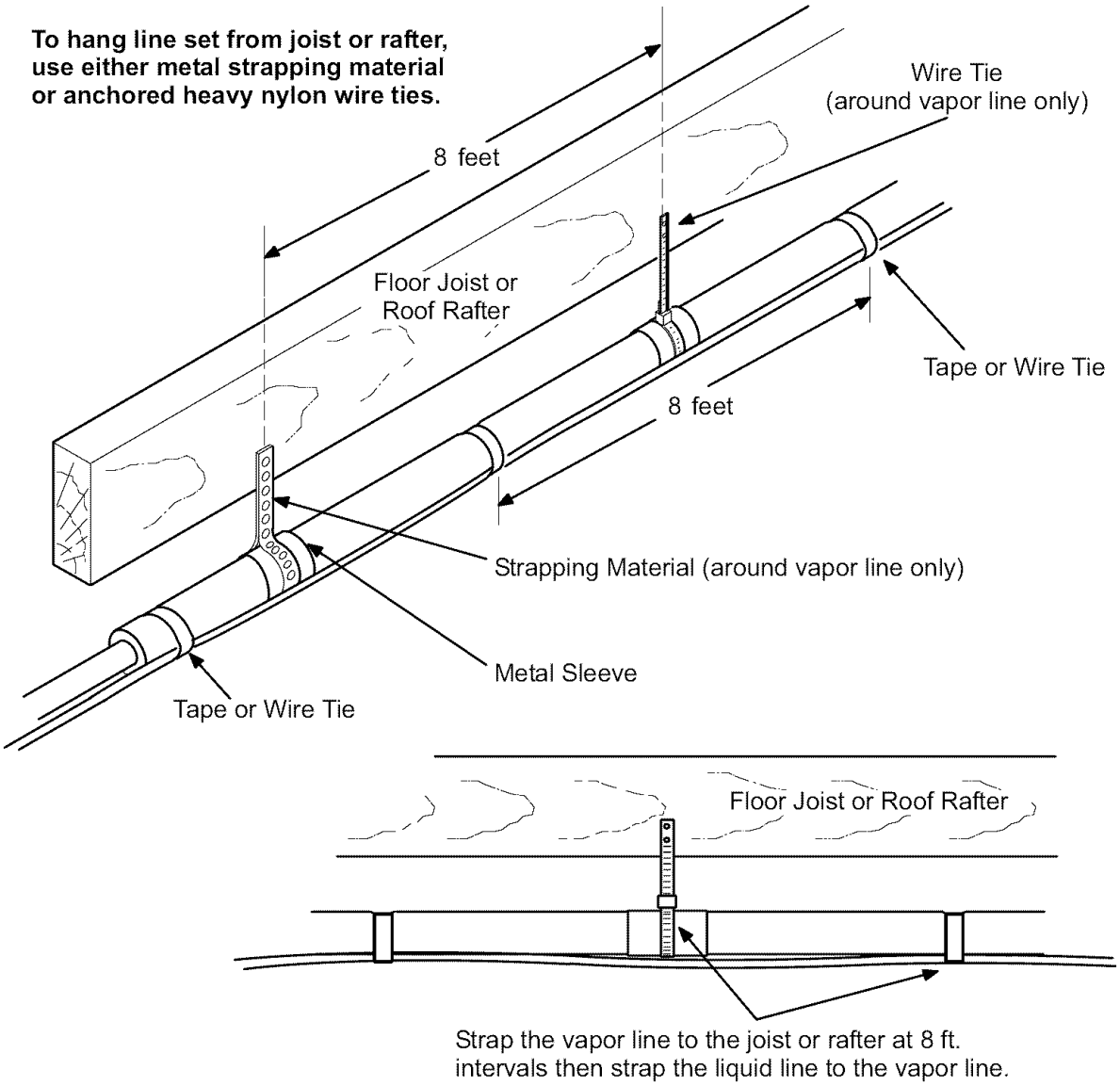


Figure 6

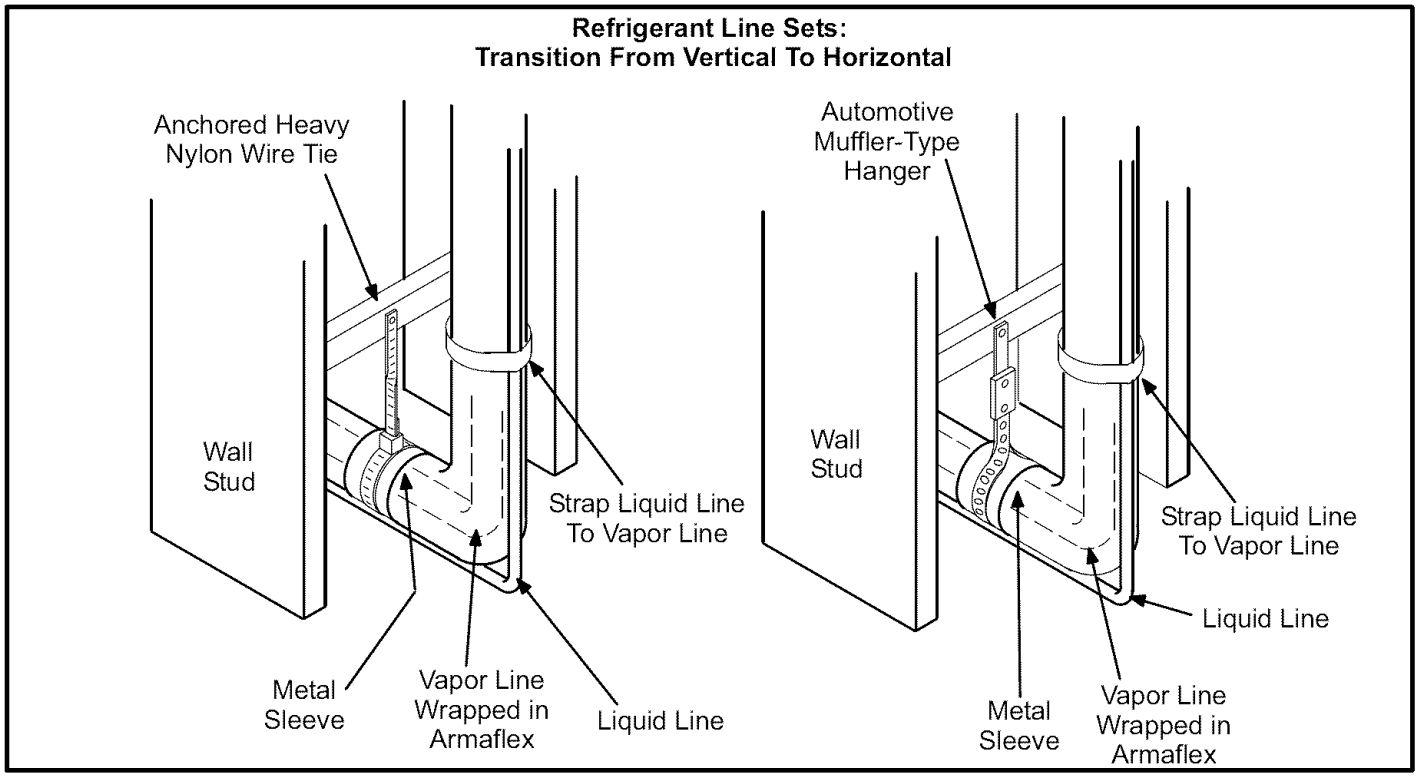


Figure 7

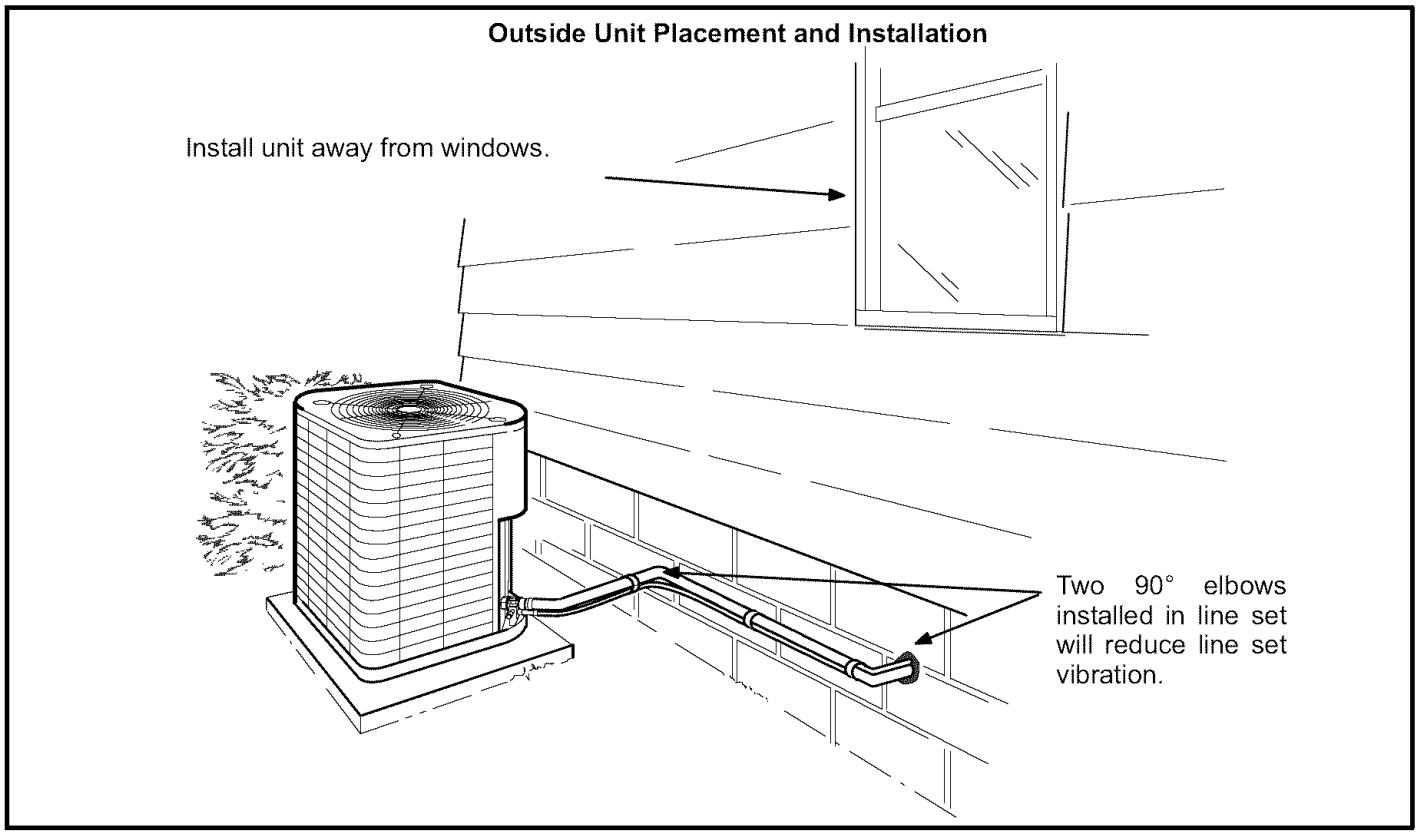


Figure 8

⚠WARNING

Polyol ester (POE) oils used with R410A refrigerant absorb moisture very quickly. It is very important that the refrigerant system be kept closed as much as possible. DO NOT remove line set caps or service valve stub caps until you are ready to make connections.

Brazing Connection Procedure

1 - Cut ends of the refrigerant lines square (free from nicks or dents). Debur the ends. The pipe must remain round, do not pinch end of the line.

2 - Before making line set connections, use dry nitrogen to purge the refrigerant piping. This will help to prevent oxidation and the introduction of moisture into the system.

3 - Use silver alloy brazing rods (5 or 6 percent minimum silver alloy for copper-to-copper brazing or 45 percent silver alloy for copper-to-brass or copper-to-steel brazing) which are rated for use with R410A refrigerant. Wrap a wet cloth around the valve body and the copper tube stub. Remove light maroon washers from service valves and shield light maroon stickers in order to protect them during brazing. Braze the line set to the service valve.

4 - Wrap a wet cloth around the valve body and copper tube stub to protect it from heat damage during brazing. Wrap another wet cloth underneath the valve body to protect the base paint.

Quench the joints with a wet cloth to prevent possible heat damage to the valve core and opening port.

NOTE - The tube end must stay bottomed in the fitting during final assembly to ensure proper seating, sealing and rigidity.

5 - Install the provided **fixed orifice (or thermal expansion valve which is sold separately and approved for use with R410A refrigerant)** in the liquid line at the indoor coil.

6 - Install the provided filter drier (approved for use with R410A refrigerant) in the liquid line as close as possible to the expansion device. **Do not leave the filter drier uncapped for more than 10 to 15 minutes prior to brazing, evacuation, and leak testing.**
Polyol ester oils used in this system absorb moisture quickly. Failure to install the filter drier will void the warranty.

Flushing Existing Line Set & Indoor Coil

⚠WARNING

Danger of fire. Bleeding the refrigerant charge from only the high side may result in the low side shell and suction tubing being pressurized. Application of a brazing torch while pressurized may result in ignition of the refrigerant and oil mixture - check the high and low pressures before unbrazing.

⚠IMPORTANT

If this unit is being matched with an approved line set or indoor coil which was previously charged with mineral oil, or if it is being matched with a coil which was manufactured before January of 1999, the coil and line set must be flushed prior to installation. Take care to empty all existing traps. Polyol ester (POE) oils are used in Lennox units charged with R410A refrigerant. Residual mineral oil can act as an insulator, preventing proper heat transfer. It can also clog the expansion device, and reduce the system performance and capacity.
Failure to properly flush the system per the instructions below will void the warranty.

⚠CAUTION

This procedure should not be performed on systems which contain contaminants (Example: compressor burn out).

Required Equipment

You will need the following equipment in order to flush the existing line set and indoor coil: two clean R22 recovery bottles, an oilless recovery machine that has a pump down feature, and two sets of gauges (one for use with R22 and one for use with the R410A).

Flushing Procedure

1 - Remove existing R22 refrigerant using the appropriate procedure below.
If the existing outdoor unit is not equipped with shut-off valves, or if the unit is not operational AND you plan to use the existing R22 refrigerant to flush the system - Disconnect all power to the existing outdoor unit. Connect to the existing unit, a

clean recovery cylinder and the recovery machine according to the instructions provided with the recovery machine. Remove all R22 refrigerant from the existing system. Refer to gauges after shutdown to confirm that the entire system is completely void of refrigerant. Disconnect the liquid and vapor lines from the existing outdoor unit.

If the existing outdoor unit is equipped with manual shut-off valves AND you plan to use NEW R22 refrigerant to flush the system - Start the existing R22 system in the cooling mode and close the liquid line valve. Pump all of the existing R22 refrigerant back into the outdoor unit. (It may be necessary to bypass the low pressure switches to ensure complete refrigerant evacuation.) When the low side system pressures reach 0 psig, close the vapor line valve. Disconnect all power to the existing outdoor unit. Refer to gauges after shutdown to confirm that the valves are not allowing refrigerant to flow back into the low side of the system. Disconnect the liquid and vapor lines from the existing outdoor unit.

2 - Remove the existing outdoor unit. Set the new R410A unit and follow the brazing connection procedure which begins on the previous page to make line set connections. **DO NOT install the provided fixed orifice yet.**
Make low voltage and line voltage connections to the new outdoor unit. **DO NOT turn on power to the unit or open the outdoor unit service valves at this time.**

3 - Remove the existing refrigerant flow control orifice or thermal expansion valve before continuing with flushing procedures. The existing devices are not approved for use with R410A refrigerant and may prevent proper flushing. Use a field-provided fitting to reconnect the lines.

⚠IMPORTANT

The line set and indoor coil must be flushed with at least the same amount of clean refrigerant that previously charged the system. Check the charge in the flushing cylinder before proceeding.

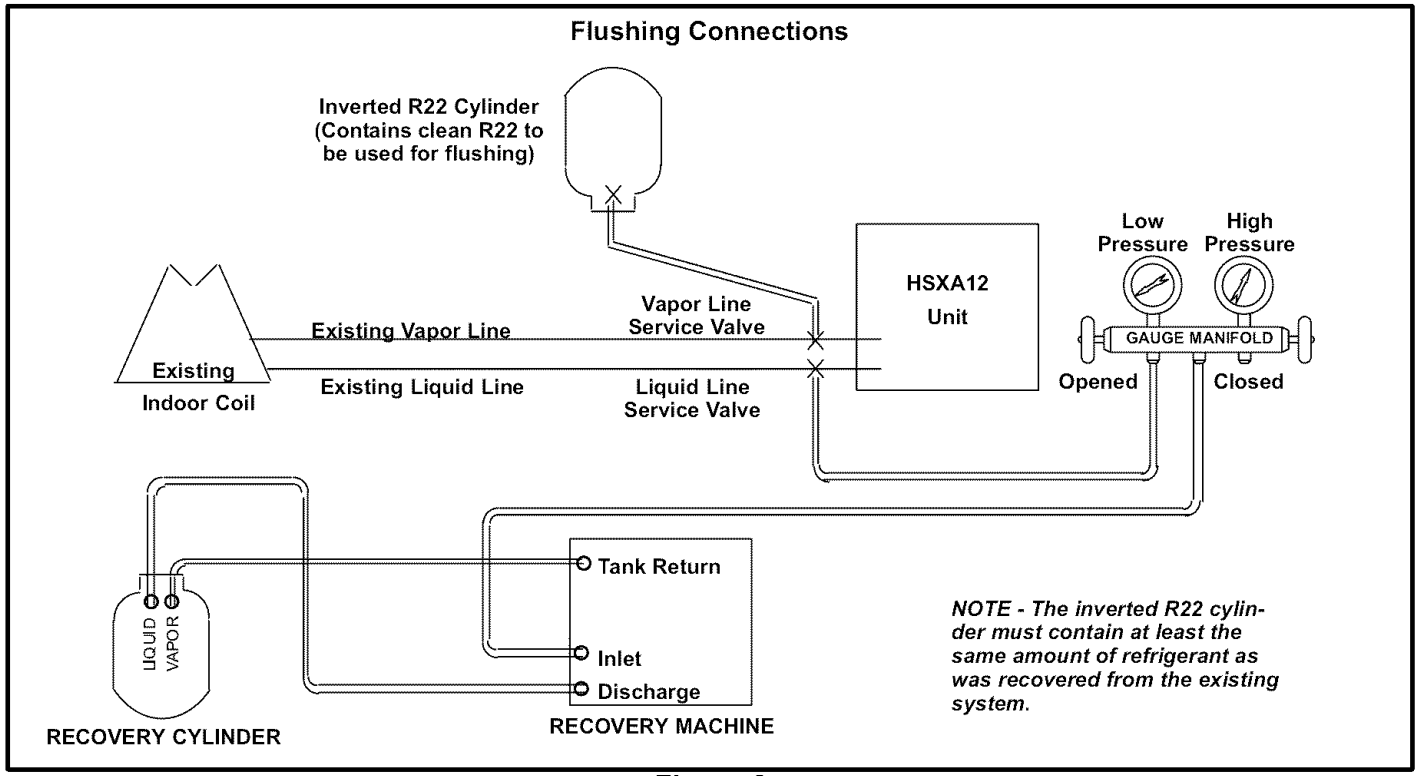


Figure 9

4 - Remove the pressure tap valve cores from the HSXA12 unit's service valves. Connect an R22 cylinder with clean refrigerant to the vapor service valve. Connect the R22 gauge set to the liquid line valve and connect a recovery machine with an empty recovery tank to the gauge set.

5 - Set the recovery machine for liquid recovery and start the recovery machine. Open the gauge set valves to allow the recovery machine to pull a vacuum on the existing system line set and indoor coil.

6 - Invert the cylinder of clean R22 and open its valve to allow liquid refrigerant to flow into the system through the vapor line valve. Allow the refrigerant to pass from the cylinder and through the line set and the indoor coil before it enters the recovery machine.

7 - After all of the liquid refrigerant has been recovered, switch the recovery machine to vapor recovery so that all of the R22 vapor is recovered. Allow the recovery machine to pull a vacuum on the system.

NOTE - A single system flush should remove all of the mineral oil from the existing refrigerant lines and indoor coil. A second flushing may be done (using clean refrigerant) if insufficient amounts of mineral oil were removed during the first flush. ***Each time the system is flushed, you must allow the recovery machine to pull a vacuum on the system at the end of the procedure.***

8 - Close the valve on the inverted R22 drum and the gauge set valves. Pump the remaining refrigerant out of the recovery machine and turn the machine off.

9 - Use nitrogen to break the vacuum on the refrigerant lines and indoor coil before removing the recovery machine, gauges and R22 refrigerant drum. Reinstall pressure tap valve cores into HSXA12 service valves.

10 - Install the provided **fixed orifice** in the liquid line at the indoor coil.

Refrigerant Metering Device

HSXA12 units are applicable to either fixed orifice or an expansion valve system. See the indoor coil installation instructions and the Lennox Engineering Handbook for approved TXV and fixed orifice match-ups and application information. Table 1 lists the unit liquid and vapor line sizes and corresponding line sets.

Fixed Orifice Systems

HSXA12 units are shipped with a fixed orifice refrigerant metering device. Replace the existing indoor unit fixed orifice with the orifice supplied with the outdoor unit. Place the supplied fixed orifice sticker on the indoor cabinet after installation. See table 2 for the fixed orifice size for each unit. In nonstandard applications, the provided fixed orifice may not be appropriately sized. Refer to the Engineering Handbook for specific orifice information.

Table 2
Fixed Orifice Drill Sizes

Unit	Fixed Orifice Part #	Drill Size
HSXA12-018	29M88	.05
HSXA12-024	42J43	.063
HSXA12-030	42J43	.063
HSXA12-036	42J47	.071
HSXA12-042	42J51	.078
HSXA12-048	29M93	.081
HSXA12-060	42J57	.090

Install the fixed orifice as shown in figure 10. Do not twist the cap tubes when loosening the seal nut from the orifice housing. Use a wrench to back up the distributor.

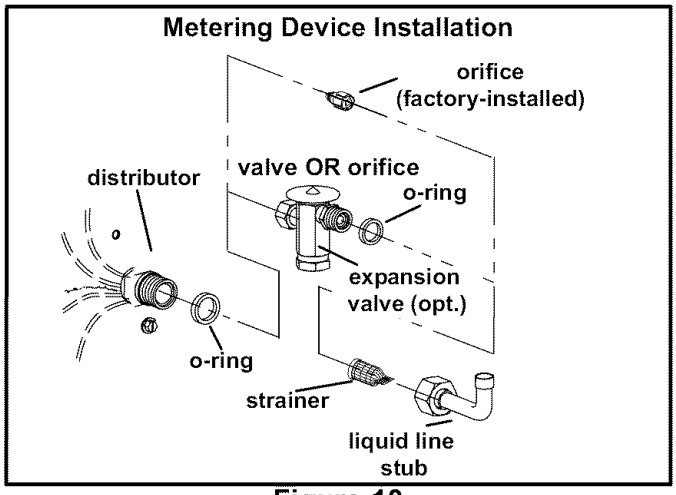


Figure 10

Expansion Valve Systems

Expansion valves equipped with Chatleff type fittings are available from Lennox. Refer to the Engineering Handbook for expansion valves for use with specific match-ups.

If you install an expansion valve with an indoor coil that includes a fixed orifice, remove the orifice before the expansion valve is installed.

⚠ IMPORTANT

Failure to remove a fixed orifice when installing an expansion valve to the indoor coil will result in improper operation and damage to the system.

Manifold Gauge Set

Manifold gauge sets used with systems charged with R410A refrigerant must be capable of handling the higher system operating pressures. The gauges should be rated for use with pressures of 0 - 800 on the high side and a low side of 30" vacuum to 250 psi with dampened speed to 500 psi. Gauge hoses must be rated for use at up to 800 psi of pressure with a 4000 psi burst rating.

Service Valves

The liquid line and vapor line service valves (figures 11 and 12) and gauge ports are used for leak testing, evacuating, charging and checking charge. See table 3 for torque requirements.

Each valve is equipped with a service port which has a factory-installed Schrader valve. A service port cap protects the Schrader valve from contamination and serves as the primary leak seal.

Table 3
Torque Requirements

Part	Recommended Torque	
Service valve cap	8 ft.- lb.	11 NM
Sheet metal screws	16 in.- lb.	2 NM
Machine screws #10	28 in.- lb.	3 NM
Compressor bolts	90 in.- lb.	10 NM
Gauge port seal cap	8 ft.- lb.	11 NM

To Access Schrader Port:

1 - Remove service port cap with an adjustable wrench.
2 - Connect gauge to the service port.
3 - When testing is completed, replace service port cap. Tighten finger tight, then tighten an additional 1/6 turn.

To Open Service Valve:

1 - Remove stem cap with an adjustable wrench.
2 - Use a service wrench with a hex-head extension to back the stem out counterclockwise as far as it will go.
NOTE - Use a 3/16" hex head extension for liquid line sizes or a 5/16" extension for vapor line sizes.
3 - Replace the stem cap. Tighten finger tight, then tighten an additional 1/6 turn.

To Close Service Valve:

1 - Remove the stem cap with an adjustable wrench.
2 - Use a service wrench with a hex-head extension to turn the stem clockwise to seat the valve. Tighten it firmly.
NOTE - Use a 3/16" hex head extension for liquid line sizes or a 5/16" extension for vapor line sizes.
3 - Replace the stem cap. Tighten finger tight, then tighten an additional 1/6 turn.

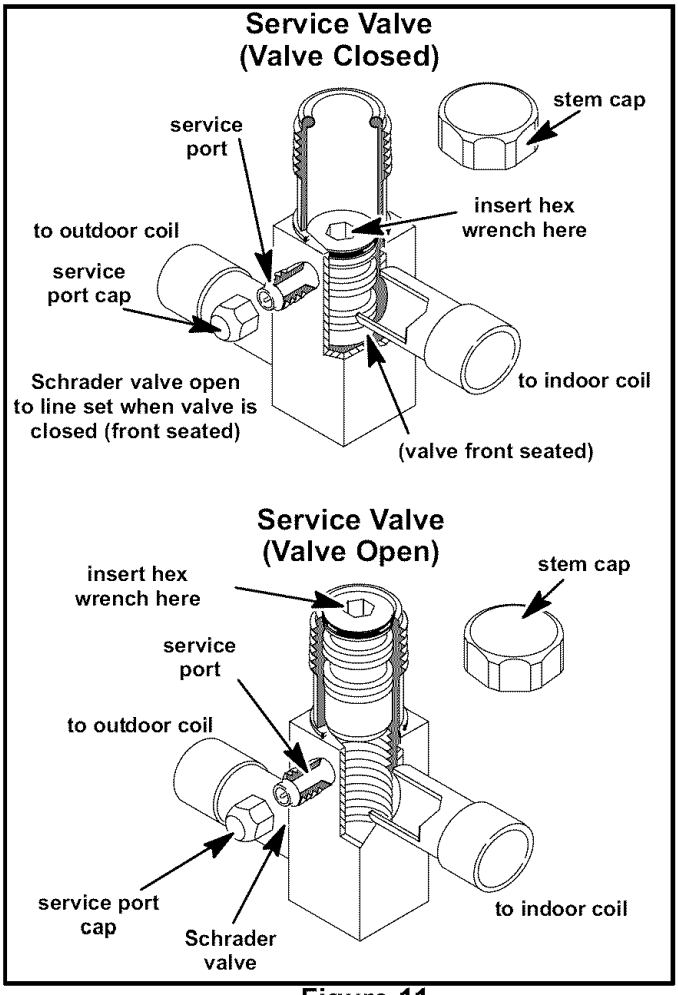


Figure 11

Vapor Line (Ball Type) Service Valve

Vapor line service valves function the same way as the other valves; the difference is in the construction. These valves are not rebuildable. If a valve has failed, you must replace it. A ball valve is illustrated in figure 12.

The ball valve is equipped with a service port with a factory-installed Schrader valve. A service port cap protects the Schrader valve from contamination and assures a leak-free seal.

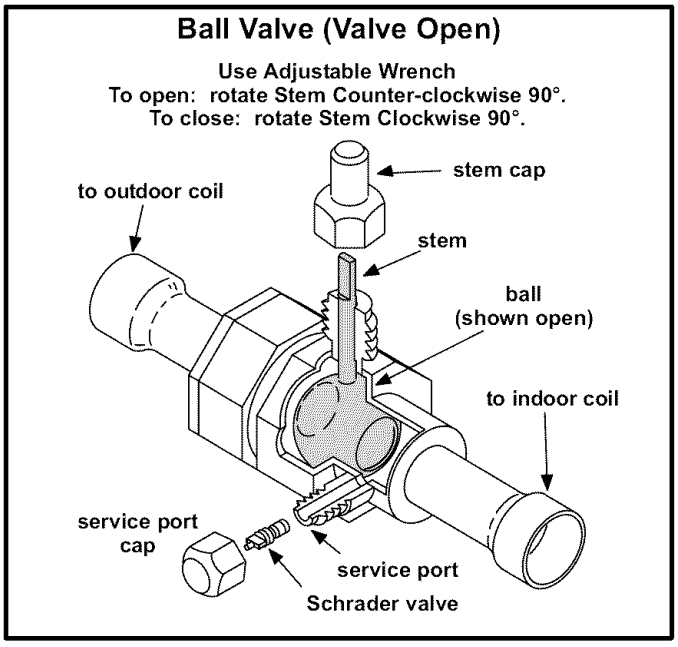


Figure 12

Leak Testing

After the line set has been connected to the indoor and outdoor units, check the line set connections and indoor unit for leaks.

⚠ WARNING

Refrigerant can be harmful if it is inhaled. Refrigerant must be used and recovered responsibly.

Failure to follow this warning may result in personal injury or death.

⚠ WARNING

Danger of explosion: Can cause equipment damage, injury or death. Never use oxygen to pressurize a refrigeration or air conditioning system. Oxygen will explode on contact with oil and could cause personal injury.

⚠ WARNING

Danger of explosion: Can cause equipment damage, injury or death. When using a high pressure gas such as dry nitrogen to pressurize a refrigeration or air conditioning system, use a regulator that can control the pressure down to 1 or 2 psig (6.9 to 13.8 kPa).

Using an Electronic Leak Detector

1 - Connect a cylinder of R410A to the center port of the manifold gauge set.

2 - With both manifold valves closed, connect the cylinder of R410A refrigerant. Open the valve on the R410A cylinder (vapor only).

3 - Open the high pressure side of the manifold to allow R410A into the line set and indoor unit. Weigh in a trace amount of R410A. *[A trace amount is a maximum of 2 ounces (57 g) refrigerant or 3 pounds (31 kPa) pressure].* Close the valve on the R410A cylinder and the valve on the high pressure side of the manifold gauge set. Disconnect R410A cylinder.

4 - Connect a cylinder of nitrogen with a pressure regulating valve to the center port of the manifold gauge set.

5 - Connect the manifold gauge set high pressure hose to the vapor valve service port. *(Normally, the high pressure hose is connected to the liquid line port; however, connecting it to the vapor port better protects the manifold gauge set from high pressure damage.)*

6 - Adjust nitrogen pressure to 150 psig (1034 kPa). Open the valve on the high side of the manifold gauge set in order to pressurize the line set and the indoor unit.

7 - After a few minutes, open a refrigerant port to ensure the refrigerant you added is adequate to be detected. (Amounts of refrigerant will vary with line lengths.) Check all joints for leaks. Purge nitrogen and R410A mixture. Correct any leaks and recheck.

⚠ IMPORTANT

Leak detector must be capable of sensing HFC refrigerant.

Evacuation

Evacuating the system of noncondensables is critical for proper operation of the unit. Noncondensables are defined as any gas that will not condense under temperatures and pressures present during operation of an air conditioning system. Noncondensables and water vapor combine with refrigerant to produce substances that corrode copper piping and compressor parts.

⚠ IMPORTANT

Use a thermocouple or thermistor electronic vacuum gauge that is calibrated in microns. Use an instrument that reads from 50 microns to at least 10,000 microns.

1 - Connect manifold gauge set to the service valve ports as follows:

- low pressure gauge to *vapor* line service valve
- high pressure gauge to *liquid* line service valve

2 - Connect micron gauge.

3 - Connect the vacuum pump (with vacuum gauge) to the center port of the manifold gauge set.

4 - Open both manifold valves and start the vacuum pump.

5 - Evacuate the line set and indoor unit to an **absolute pressure** of 23,000 microns (29.01 inches of mercury). During the early stages of evacuation, it is desirable to close the manifold gauge valve at least once to determine if there is a rapid rise in **absolute pressure**. A rapid rise in pressure indicates a relatively large leak. If this occurs, repeat the leak testing procedure.

*NOTE - The term **absolute pressure** means the total actual pressure within a given volume or system, above the absolute zero of pressure. Absolute pressure in a vacuum is equal to atmospheric pressure minus vacuum pressure.*

6 - When the absolute pressure reaches 23,000 microns (29.01 inches of mercury), close the manifold gauge valves, turn off the vacuum pump and disconnect the manifold gauge center port hose from vacuum pump. Attach the manifold center port hose to a nitrogen cylinder with pressure regulator set to 150 psig (1034 kPa) and purge the hose. Open the manifold gauge valves to break the vacuum in the line set and indoor unit. Close the manifold gauge valves.

⚠WARNING

Danger of Equipment Damage.
Avoid deep vacuum operation. Do not use compressors to evacuate a system.
Extremely low vacuums can cause internal arcing and compressor failure.
Damage caused by deep vacuum operation will void warranty.

7 - Shut off the nitrogen cylinder and remove the manifold gauge hose from the cylinder. Open the manifold gauge valves to release the nitrogen from the line set and indoor unit.

8 - Reconnect the manifold gauge to the vacuum pump, turn the pump on, and continue to evacuate the line set and indoor unit until the absolute pressure does not rise above 500 microns (29.9 inches of mercury) within a 20-minute period after shutting off the vacuum pump and closing the manifold gauge valves.

9 - When the absolute pressure requirement above has been met, disconnect the manifold hose from the vacuum pump and connect it to an upright cylinder of R410A refrigerant. Open the manifold gauge valves to break the vacuum from 1 to 2 psig positive pressure in the line set and indoor unit. Close manifold gauge valves and shut off the R410A cylinder and remove the manifold gauge set.

Start-Up

⚠IMPORTANT

If unit is equipped with a crankcase heater, it should be energized 24 hours before unit start-up to prevent compressor damage as a result of slugging.

1 - Rotate fan to check for frozen bearings or binding.

2 - Inspect all factory- and field-installed wiring for loose connections.

3 - After evacuation is complete, open the liquid line and vapor line service valves to release the refrigerant charge (contained in outdoor unit) into the system.

4 - Replace the stem caps and secure finger tight, then tighten an additional one-sixth (1/6) of a turn.

5 - Check voltage supply at the disconnect switch. The voltage must be within the range listed on the unit's nameplate. If not, do not start the equipment until you have consulted the power company and the voltage condition has been corrected.

6 - Set the thermostat for a cooling demand. Turn on power to the indoor blower and close the outdoor unit disconnect switch to start the unit.

7 - Recheck voltage while the unit is running. Power must be within range shown on the nameplate.

Charging

This system is charged with R410A refrigerant which operates at much higher pressures than R22. The provided liquid line filter drier is approved for use with R410A. Do not replace it with components designed for use with R22. This unit is NOT approved for use with coils which use capillary tubes as a refrigerant metering device.

Factory Charge

Units are factory charged with the amount of R410A refrigerant indicated on the unit rating plate. This charge is based on a matching indoor coil and outdoor coil with 15 ft. (4.6 m) line set. For varying lengths of line set, refer to table 4 for refrigerant charge adjustment.

Table 4

Liquid Line Set Diameter	Oz. per 5 ft. (grams per 1.5 m) adjust from 15 ft. (4.6 m) line set*
3/8 in. (10 mm)	3 ounces per 5 feet (85g per 1.5 m)

**If line length is greater than 15 ft. (4.6 m), add this amount. If line length is less than 15 ft. (4.6 m), subtract this amount.*

⚠IMPORTANT

Mineral oils are not compatible with R410A. If oil must be added, it must be a polyol ester oil.

The compressor is charged with sufficient polyol ester oil for line set lengths up to 50 feet (15.2 m). If oil must be added to the compressor in the field, Copeland has approved Mobil EAL™ Arctic 22CC and ICI EMKARATE™ RL32CF.

Units Delivered Void of Charge

If the system is void of refrigerant, clean the system using the procedure described below.

1 - Use nitrogen to pressurize the system and check for leaks. Repair leaks, if possible.

2 - Evacuate the system to remove as much of the moisture as possible.

3 - Use nitrogen to break the vacuum and install the provided filter drier in the system.

4 - Evacuate the system again. Then, weigh the appropriate amount of R410A refrigerant (listed on unit nameplate) into the system.

5 - Monitor the system to determine the amount of moisture remaining in the oil. Use test kit 10N46 to verify that the moisture content is within the kit's dry color range. It may be necessary to replace the filter drier several times to achieve the required dryness level. **If system dryness is not verified, the compressor will fail in the future.**

Checking Charge

The outdoor unit should be charged during warm weather. However, applications arise in which charging must occur in the colder months. *The method of charging is determined by the unit's* ***refrigerant metering device*** *and the* ***outdoor ambient temperature****.*

Measure the liquid line temperature and the outdoor ambient temperature as outlined below:

1 - Connect the manifold gauge set to the service valves:
- low pressure gauge to *vapor* valve service port
- high pressure gauge to *liquid* valve service port

Close manifold gauge set valves. Connect the center manifold hose to an upright cylinder of R410A .

2 - Set the room thermostat to call for heat. This will create the necessary load for properly charging the system in the cooling cycle.

3 - Use a digital thermometer to record the outdoor ambient temperature.

4 - When the heating demand has been satisfied, switch the thermostat to cooling mode with a set point of 68°F (20°C). When pressures have stabilized, use a digital thermometer to record the liquid line temperature.

5 - The outdoor temperature will determine which charging method to use. Proceed with the appropriate charging procedure.

Weighing in the Charge Fixed Orifice or TXV Systems – Outdoor Temp. < 65°F (18°C)

If the system is void of refrigerant, or if the outdoor ambient temperature is cool, the refrigerant charge should be weighed into the unit. Do this after any leaks have been repaired.

1 - Recover the refrigerant from the unit.

2 - Conduct a leak check, then evacuate as previously outlined.

3 - Weigh in the unit nameplate charge.

If weighing facilities are not available or if you are charging the unit during warm weather, follow one of the other procedures outlined below.

Charging Using the Subcooling Method Fixed Orifice Systems Outdoor Temp. ≥ 65°F (18°C))

If you charge a fixed orifice system when the outdoor ambient is 65°F (18°C) or above, use the subcooling method to charge the unit.

1 - With the manifold gauge hose still on the liquid service port and the unit operating stably, use a digital thermometer to record the liquid line temperature.

2 - At the same time, record the liquid line pressure reading.

3 - Use a temperature/pressure chart for R410A to determine the saturation temperature for the liquid line pressure reading. See table 5.

4 - Subtract the liquid line temperature from the saturation temperature (according to the chart) to determine subcooling. **(Saturation temperature - Liquid line temperature = Subcooling)**

5 - Compare the subcooling value with those in table 6. If subcooling is greater than shown, recover some refrigerant. If subcooling is less than shown, add some refrigerant.

Table 5
R410A Temperature/Pressure Chart

Temperature °F	Pressure Psig	Temperature °F	Pressure Psig	Temperature °F	Pressure Psig	Temperature °F	Pressure Psig
32	100.8	63	178.5	94	290.8	125	445.9
33	102.9	64	181.6	95	295.1	126	451.8
34	105.0	65	184.3	96	299.4	127	457.6
35	107.1	66	187.7	97	303.8	128	463.5
36	109.2	67	190.9	98	308.2	129	469.5
37	111.4	68	194.1	99	312.7	130	475.6
38	113.6	69	197.3	100	317.2	131	481.6
39	115.8	70	200.6	101	321.8	132	487.8
40	118.0	71	203.9	102	326.4	133	494.0
41	120.3	72	207.2	103	331.0	134	500.2
42	122.6	73	210.6	104	335.7	135	506.5
43	125.0	74	214.0	105	340.5	136	512.9
44	127.3	75	217.4	106	345.3	137	519.3
45	129.7	76	220.9	107	350.1	138	525.8
46	132.2	77	224.4	108	355.0	139	532.4
47	134.6	78	228.0	109	360.0	140	539.0
48	137.1	79	231.6	110	365.0	141	545.6
49	139.6	80	235.3	111	370.0	142	552.3
50	142.2	81	239.0	112	375.1	143	559.1
51	144.8	82	242.7	113	380.2	144	565.9
52	147.4	83	246.5	114	385.4	145	572.8
53	150.1	84	250.3	115	390.7	146	579.8
54	152.8	85	254.1	116	396.0	147	586.8
55	155.5	86	258.0	117	401.3	148	593.8
56	158.2	87	262.0	118	406.7	149	601.0
57	161.0	88	266.0	119	412.2	150	608.1
58	163.9	89	270.0	120	417.7	151	615.4
59	166.7	90	274.1	121	423.2	152	622.7
60	169.6	91	278.2	122	428.8	153	630.1
61	172.6	92	282.3	123	434.5	154	637.5
62	195.5	93	286.5	124	440.2	155	645.0

Table 6
Subcooling Values for Fixed Orifice Systems

Outdoor Temp. °F (°C)	Liquid Subcooling [± 1°F (.6°C)]						
	-018	-024	-030	-036	-042	-048	-060
65 (18)	13 (7.2)	13 (7.2)	16 (8.9)	12 (6.7)	11 (6.4)	14 (7.8)	13 (7.2)
70 (21)	12 (6.7)	11 (6.1)	15 (8.3)	11 (6.1)	10 (5.6)	13 (7.2)	12 (6.7)
75 (24)	11 (6.1)	10 (5.6)	14 (7.8)	10 (5.6)	9 (5)	12 (6.7)	11 (6.1)
80 (27)	9 (5)	9 (5)	13 (7.2)	9 (5)	8 (4.5)	11 (6.1)	10 (5.6)
85 (29)	8 (4.5)	7 (3.9)	12 (6.7)	8 (4.5)	7 (3.9)	10 (5.6)	10 (5.6)
90 (32)	6 (3.3)	6 (3.3)	10 (5.6)	7 (3.9)	6 (3.3)	9 (5)	9 (5)
95 (35)	5 (2.8)	5 (2.8)	9 (5)	6 (3.3)	6 (3.3)	8 (4.5)	8 (4.5)
100 (38)	5 (2.8)	4 (2.2)	8 (4.5)	5 (2.8)	5 (2.8)	7 (3.9)	7 (3.9)
105 (41)	4 (2.2)	4 (2.2)	7 (3.9)	4 (2.2)	4 (2.2)	7 (3.9)	6 (3.3)
110 (43)	3 (1.7)	3 (1.7)	6 (3.3)	4 (2.2)	3 (1.7)	6 (3.3)	6 (3.3)
115 (45)	2 (1.1)	3 (1.7)	5 (2.8)	3 (1.7)	3 (1.7)	6 (3.3)	5 (2.8)

Approach Method and Normal Operating Pressures TXV Systems – Outdoor Temp. ≥ 65°F (18°C)

The following procedure is intended as a general guide and is for use on expansion valve systems only. For best results, indoor temperature should be 70°F (21°C) to 80°F (26°C). Monitor system pressures while charging.

1 - Record outdoor ambient temperature using a digital thermometer.

2 - Attach high pressure gauge set and operate unit for several minutes to allow system pressures to stabilize.

3 - Compare stabilized pressures with those provided in table 8, "Normal Operating Pressures." Minor variations in these pressures may be expected due to differences in installations. Significant differences could mean that the system is not properly charged or that a problem exists with some component in the system. Pressures higher than those listed indicate that the system is overcharged. Pressures lower than those listed indicate that the system is undercharged. Verify adjusted charge using the approach method.

Approach Method

4 - Use the same digital thermometer you used to check the outdoor ambient temperature to check the liquid line temperature.

5 - The difference between the ambient and liquid temperatures should match values given in table 7. If the values don't agree with the those in table 7, add refrigerant to lower the approach temperature, or recover refrigerant from the system to increase the approach temperature.

Be aware of the R410A refrigerant cylinder. It will be rose-colored. Refrigerant should be added through the vapor valve in the liquid state. **Some R410A cylinders are equipped with a dip tube which allows you to draw liquid refrigerant from the bottom of the cylinder without turning the cylinder upside-down. The cylinder will be marked if it is equipped with a dip tube.**

Table 7
HSXA12 Approach Values

Model No.	Approach Temperature Liquid Line - Outdoor Ambient °F (°C)
-018	10 (5.6)
-024	12 (6.7)
-030	13 (7.2)
-036	12 (6.7)
-042	11 (6.1)
-048	13 (7.2)
-060	14 (7.8)

⚠ IMPORTANT

Use table 8 to perform maintenance checks. Table 8 is not a procedure for charging the system. Minor variations in these pressures may be due to differences in installations. Significant deviations could mean that the system is not properly charged or that a problem exists with some component in the system.

Table 8
Normal Operating Pressures In psig (liquid +/- 10 and vapor +/- 5 PSIG)*

Mode	Out. Coil Entering Air Temp. °F (°C)	-018		-024		-030		-036		-042		-048		-060	
		LIQ	SUC	LIQ	SUC	LIQ	SUC	LIQ	SUC	LIQ	SUC	LIQ	SUC	LIQ	SUC
fixed orifice	65 (18.3)	238	123	261	131	261	128	268	130	254	121	270	124	280	121
	75 (23.9)	275	131	300	135	300	133	308	134	296	128	311	130	332	126
	85 (29.4)	317	136	343	139	343	138	351	138	340	133	356	134	379	130
	95 (35.0)	362	141	391	143	387	141	398	142	389	138	404	139	427	135
	105 (40.6)	410	144	441	147	434	145	447	146	440	142	456	143	479	140
TXV	65 (18.3)	234	133	256	134	256	137	264	135	256	124	269	131	262	121
	75 (23.9)	270	135	298	137	296	139	305	138	296	127	312	133	304	127
	85 (29.4)	312	137	344	140	339	141	349	139	341	133	357	135	349	132
	95 (35.0)	361	138	394	142	384	144	396	140	389	136	406	137	397	136
	105 (40.6)	409	141	448	143	432	146	446	143	440	140	460	140	449	140

**These are typical pressures only. Indoor indoor match up, indoor air quality, and indoor load will cause the pressures to vary.*

System Operation

The outdoor unit and indoor blower cycle on demand from the room thermostat. When the thermostat blower switch is in the **ON** position, the indoor blower operates continuously.

Compressor Time Delay (TD1)

A compressor time delay is used to prevent compressor short cycling and to prevent the compressor from running backwards. When there is demand for a cooling cycle, the control delays compressor operation for about 5 minutes (± 2 minutes). Do not bypass the control.

High Pressure Switch

HSXA12 units are equipped with a high pressure switch that is located in the liquid line of the compressor. The switch (SPST, manual reset, normally closed) removes power from the compressor when discharge pressure rises above factory setting at 640 ± 10 psi.

Low Pressure Switch

HSXA12 units are also equipped with a low pressure switch that is located in the vapor line of the compressor. The switch (SPST, auto-reset, normally closed) removes power from the compressor when vapor line pressure drops below factory setting at 40 ± 5 psi.

Filter Drier

A filter drier is shipped with each HSXA12 unit. The filter drier must be field installed in the liquid line between the liquid line service valve and the expansion valve. **This filter drier must be installed to ensure a clean, moisture-free system. Failure to install the filter drier will void the warranty.** A replacement filter drier is available as from Lennox.

Maintenance

⚠WARNING

Electric shock hazard. Can cause injury or death. Before attempting to perform any service or maintenance, turn the electrical power to unit OFF at disconnect switch(es). Unit may have multiple power supplies.

Maintenance and service must be performed by a qualified installer or service agency. At the beginning of each cooling season, the system should be checked as follows:

1 - Clean and inspect the outdoor coil. The coil may be flushed with a water hose. Ensure the power is turned off before you clean the coil.

2 - Outdoor fan motor is prelubricated and sealed. No further lubrication is needed.

3 - Visually inspect connecting lines and coils for evidence of oil leaks.

4 - Check wiring for loose connections.

5 - Check for correct voltage at unit (unit operating).

6 - Check amp-draw outdoor fan motor.
Unit nameplate _____ Actual _____ .
NOTE - If owner complains of insufficient cooling, the unit should be gauged and refrigerant charge checked. Refer to section on refrigerant charging in this instruction.

Indoor Coil

1 - Clean coil, if necessary.

2 - Check connecting lines and coils for evidence of oil leaks.

3 - Check condensate line and clean, if necessary.

Indoor Unit

1 - Clean or change filters.

2 - Adjust blower speed for cooling. Measure the pressure drop over the coil to determine the correct blower CFM. Refer to the unit information service manual for pressure drop tables and procedure.

3 - *Belt Drive Blowers* - Check belt for wear and proper tension.

4 - Check all wiring for loose connections

5 - Check for correct voltage at unit (blower operating).

6 - Check amp-draw on blower motor
Unit nameplate_____ Actual _____.

Optional Accessories

Refer to the Engineering Handbook for optional accessories that may apply to this unit. The following may or may not apply:

- Loss of Charge Kit
- High Pressure Switch Kit
- Compressor Monitor
- Compressor Crankcase Heater
- Hail Guards
- Mounting Bases
- Timed Off Control
- Stand-off Kit
- Sound Cover
- Low Ambient Kit

HSXA12 Check Points

Start-up and Performance Check List

Job Name _____ Job No. _____ Date _____

Job Location _____ City _____ State _____

Installer _____ City _____ State _____

Unit Model No. _____ Serial No. _____ Service Technician _____

Nameplate Voltage _____

Rated Load Ampacity _____ Compressor _____ Outdoor Fan _____

Maximum Fuse or Circuit Breaker _____

Electrical Connections Tight? ☐ Indoor Filter Clean? ☐ Supply Voltage (Unit Off) _____

Indoor Blower RPM _____ S.P. Drop Over Indoor (Dry) _____ Outdoor Coil Entering Air Temp. _____

Discharge Pressure _____ Vapor Pressure _____ Refrigerant Charge Checked? ☐

Refrigerant Lines: Leak Checked? ☐ Properly Insulated? ☐ Outdoor Fan Checked? ☐

Service Valves Fully Opened? ☐ Service Valve Caps Tight? ☐

Thermostat

Voltage With Compressor Operating _____ Calibrated? ☐ Properly Set? ☐ Level? ☐