General Installation Guidelines For Sectional Units

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Retain instructions with unit and maintain in a legible condition.
Please give model number and serial number when contacting factory for information and/or parts.

www.engineeredair.com

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Warning: ⚠ **Improper installation, adjustment, alteration, service or maintenance can cause property damage, injury or death. Read the installation, operating and maintenance instructions thoroughly before installing or servicing this equipment.**

YOU HAVE RESPONSIBILITIES TOO

This installation, operation and maintenance manual cannot cover every possibility, situation or eventuality. Regular service, cleaning and maintaining the equipment is necessary. If you are not capable of performing these tasks, hire a qualified service specialist. **Failure to perform these duties can cause property damage and/or harm to the building occupants and will void the manufacturers' warranty.**

INTRODUCTION

Engineered Air units are high quality products designed and manufactured to provide many years of trouble-free operation. We recommend that this manual be read thoroughly to ensure proper installation, efficient operation and proper maintenance of this equipment. The submittal record is considered to be part of the Installation, Operation and Maintenance Manual. Please report any omissions to the national service manager.

WARRANTY

LIMITED WARRANTY ENGINEERED AIR will furnish without charge, F.O.B. factory, freight collect, replacement parts for, or repairs to products covered herein which prove defective in material or workmanship under normal and proper use for a period of twelve (12) months from the initial start-up or eighteen (18) months from the date of shipment, whichever expires sooner, provided the customer gives ENGINEERED AIR written notice of such defects within such time periods and provided that inspection by ENGINEERED AIR establishes the validity of the claim and all pertinent invoices have been paid in full. The repairs or replacements will be made only when the complete product(s) or part(s) claimed to be defective are returned to ENGINEERED AIR or a depot designated by ENGINEERED AIR, transportation charges prepaid. Repairs or replacements as provided for by this paragraph shall constitute fulfillment of all ENGINEERED AIR's obligations with respect to this warranty. The refrigerant charge is not included in any part of this warranty. This warranty does not apply to any products or parts thereof that have been subject to accident, misuse or unauthorized alterations, or where ENGINEERED AIR's installation and service requirements have not been met.

The foregoing warranty is in lieu of all other warranties, express or implied. ENGINEERED AIR specifically disclaims any implied warranty of merchantability and/or fitness for purpose. Under no circumstances shall ENGINEERED AIR be liable to, nor be required to indemnify, Buyer or any third parties for any claims, losses, labour, expenses or damages (including special, indirect, incidental, or consequential damages) of any kind, resulting from the performance (or lack thereof) of this Agreement or the use of, or inability to use the goods sold hereunder, including, but not limited to, damages for delay, temporary heating/cooling costs, loss of goodwill, loss of profits or loss of use. Furthermore, the parties agree that the Buyer's sole remedy under this Agreement shall be limited to the limited warranty set forth in the preceding paragraph relating to the repair or replacement of any defective goods. Under no circumstances shall any claim or award against ENGINEERED AIR exceed the original contract price whether awarded through arbitration, litigation or otherwise.

ENGINEERED AIR Warranty is void if:

1. The unit is not installed in accordance with this manual.
2. The start-up and operation of the unit is not performed in accordance with this manual.
3. The unit is operated in an atmosphere containing corrosive substances.
4. The unit is allowed to operate during building construction.

RECEIVING

Refer to the back of the packing slip for receiving unit instructions.

On receipt of the unit, check for damage. Inspect protective covers for punctures or other signs that there may be internal damage.

INSTALLATION

Caution: ⚠ **All wiring, piping and fuel line installation must be completed by qualified persons in accordance with all federal, state, provincial and/or local codes.**

Warning: ⚠ **Assembly of split units requires bolting together the base frame of adjacent sections. This may require personnel to work under the unit during assembly. Injury or death can result from improper support or improper loading of the curb. Additional temporary support shall be provided by the installer for the safety of personnel.**

Warning: ⚠ **Always use all provided lifting lugs for each section whenever a section is being lifted to the roof or lifted completely from the ground.**

Note: Installation shall be in accordance with this manual and all other associated component and control Installation, Operation and Maintenance Manuals.

SECTIONAL UNIT GUIDELINES

If the unit is split and shipped in sections, the sections must be field assembled. All sections are pre-drilled for assembly. The hardware and gaskets are packed in one of the sections Access below the unit for bolting of the base frame must be provided. On outdoor units with an inlet hood connect the hood to the support flange and attach with appropriate fasteners. The gasket material provided for the split is open cell foam. Open cell foam is light and compresses easily.

Note: Only use the open cell foam gasket provided for sealing the split(s)

The procedure below describes the steps for installing sectional units on roof curbs. For equipment that is base mounted a similar procedure can be followed.

1. Each section of the unit must be able to slide along the roof curb during installation. Therefore, do not install the neoprene gasket between the base frame of the unit and the curb as this will increase the resistance when pulling the sections together. To water proof between the unit base and the curb, use caulking once the unit is in the proper position on the curb and the sections are fastened together. Alternatively, to help each section slide on the curb during assembly, caulking may be applied to the curb before a section is placed on the curb. Caution must be exercised to ensure the section is put into place before the caulking sets.

2. Always start with a section from one end of the unit and work towards the opposite end (Refer to mechanical schematic in the shop drawing package). Lift the first section (an end section) using **ALL** lifting points. Carefully place this first section on the designated end of the curb.

3. Once the first piece is set in place, remove any “removable” lifting lugs (if supplied) from the base channel (see Figure 1).

4. Carefully place the next section near the previously installed section on the curb using **ALL** provided lifting points. Place this section as close as possible to the previous section leaving enough room to work between the two sections.

5. Remove all “removable” lifting lugs (if supplied) from the base channel of this section (see Figure 1).

6. Apply open cell gasket on one side of unit split.

7. Move this section toward the first section, very carefully and gently, by simultaneously lifting lightly and sliding the section along the curb, using the provided lifting lugs. Care must be taken not to cause any bending across the width of the section. While some of the weight is removed, nuts and bolts are to be installed in pre-drilled and tapped holes along unit base channel width members to draw this

section to the first (see Figure 3). A “Come Along” or some other clamping device may be required to assist in pulling the two sections together.

8. Install bolts through all holes located along the split line of the perimeter for the two sections. Evenly tighten all nuts and bolts around the perimeter of the unit split. (see Figure 4)

9. Install caps (if supplied) along the roof and sides of the unit**.** (see Figure 4)

10. Repeat steps 4 to 9 for the remaining sections except for the last section (the end section).

11. Lift the last section to the top of the roof curb using all provided lifting lugs. This section will have to overhang the end of the curb temporarily while the removable lifting lugs are being removed. Once removed, join the last section as per step #7 above. Access under the unit to be either through the ceiling of the building from below or through unit floor hatches when provided (Figure 2). Once unit is joined, all floor hatches must be fastened and caulked with provided covers.

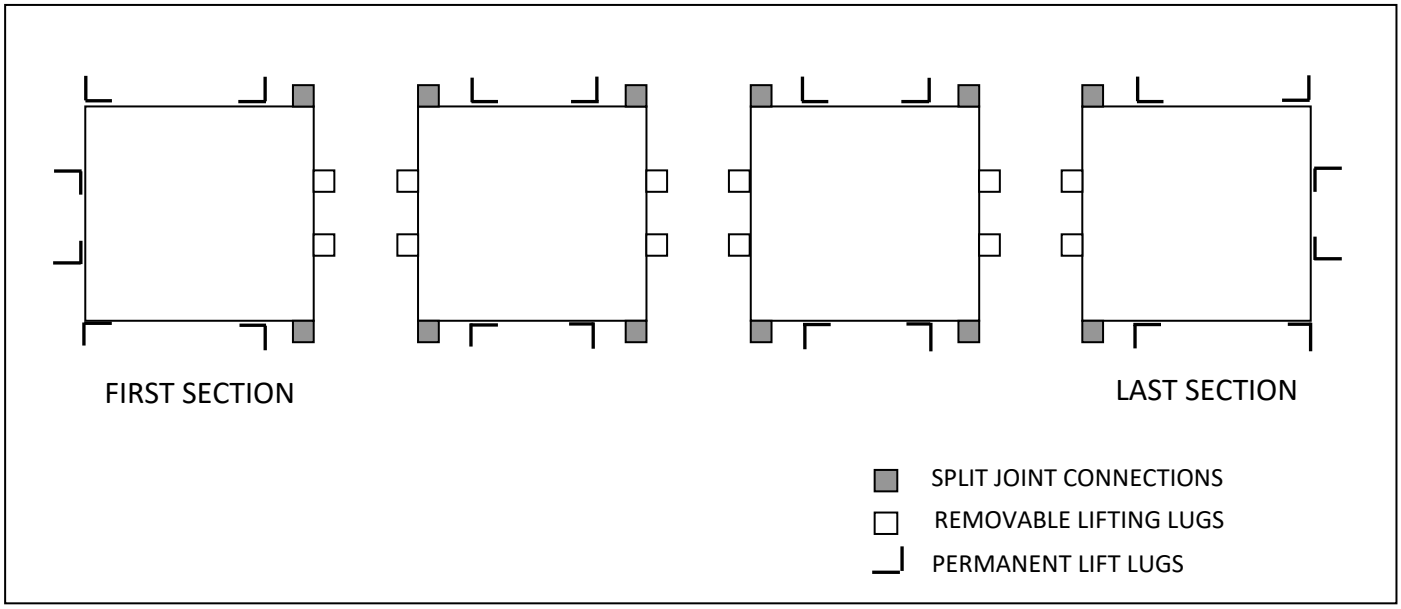

FIGURE 1

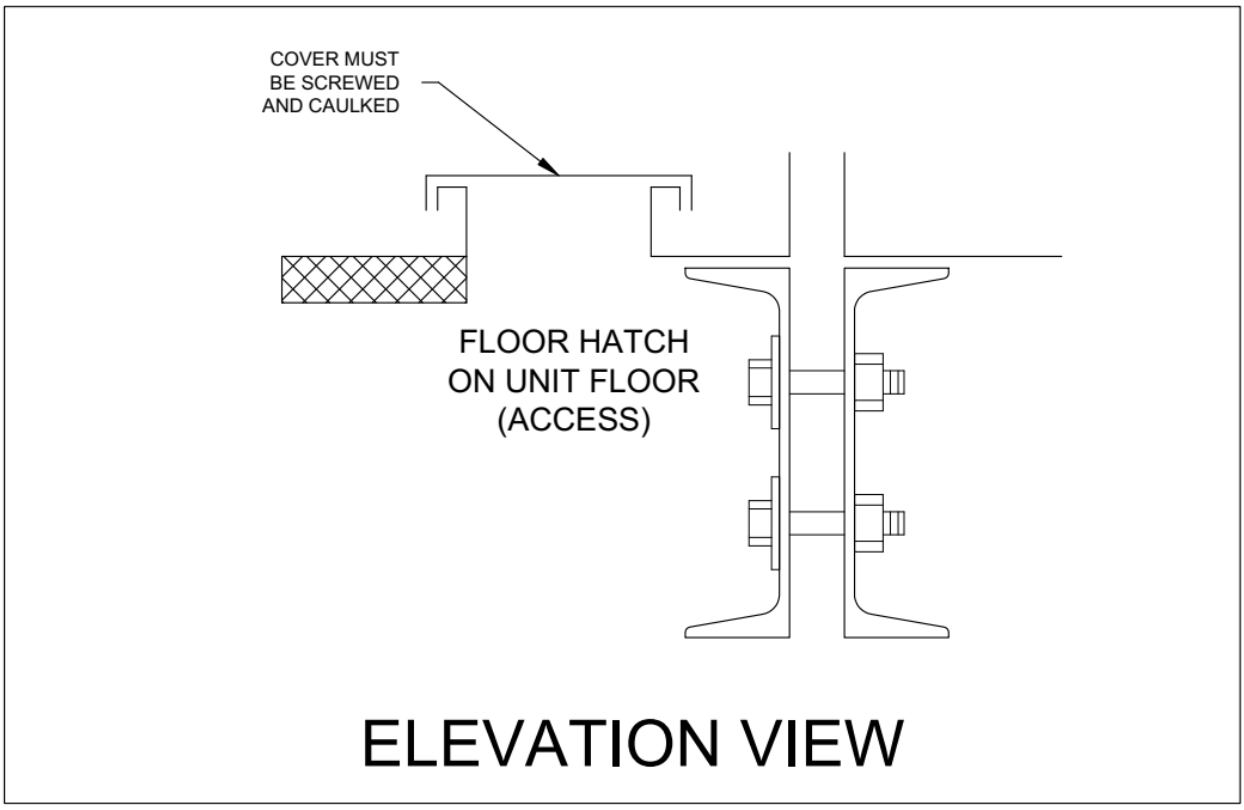

FIGURE 2

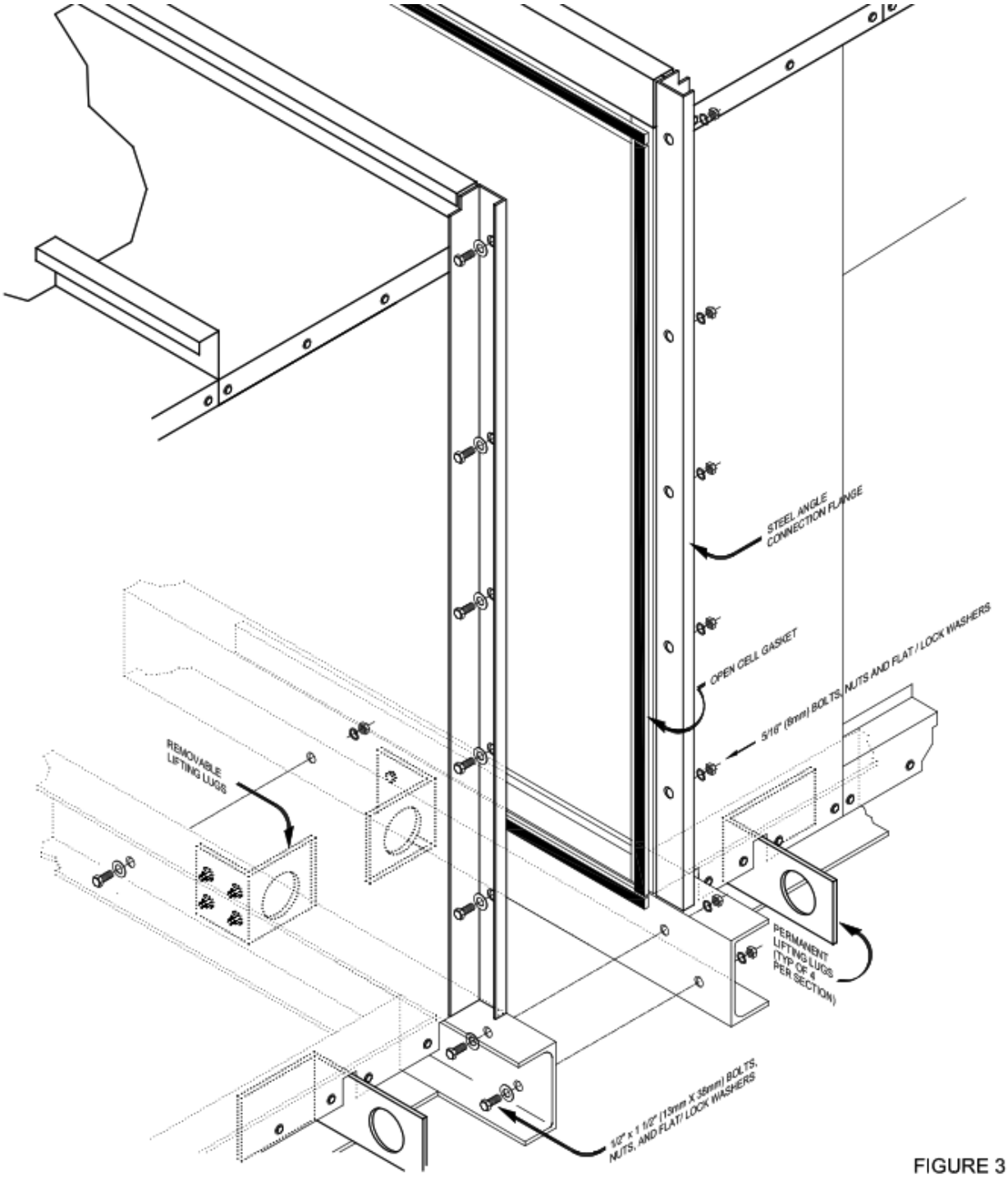

FIGURE 3

UNIT SPLIT - PREPARATION DETAIL PRIOR TO FINAL ASSEMBLY

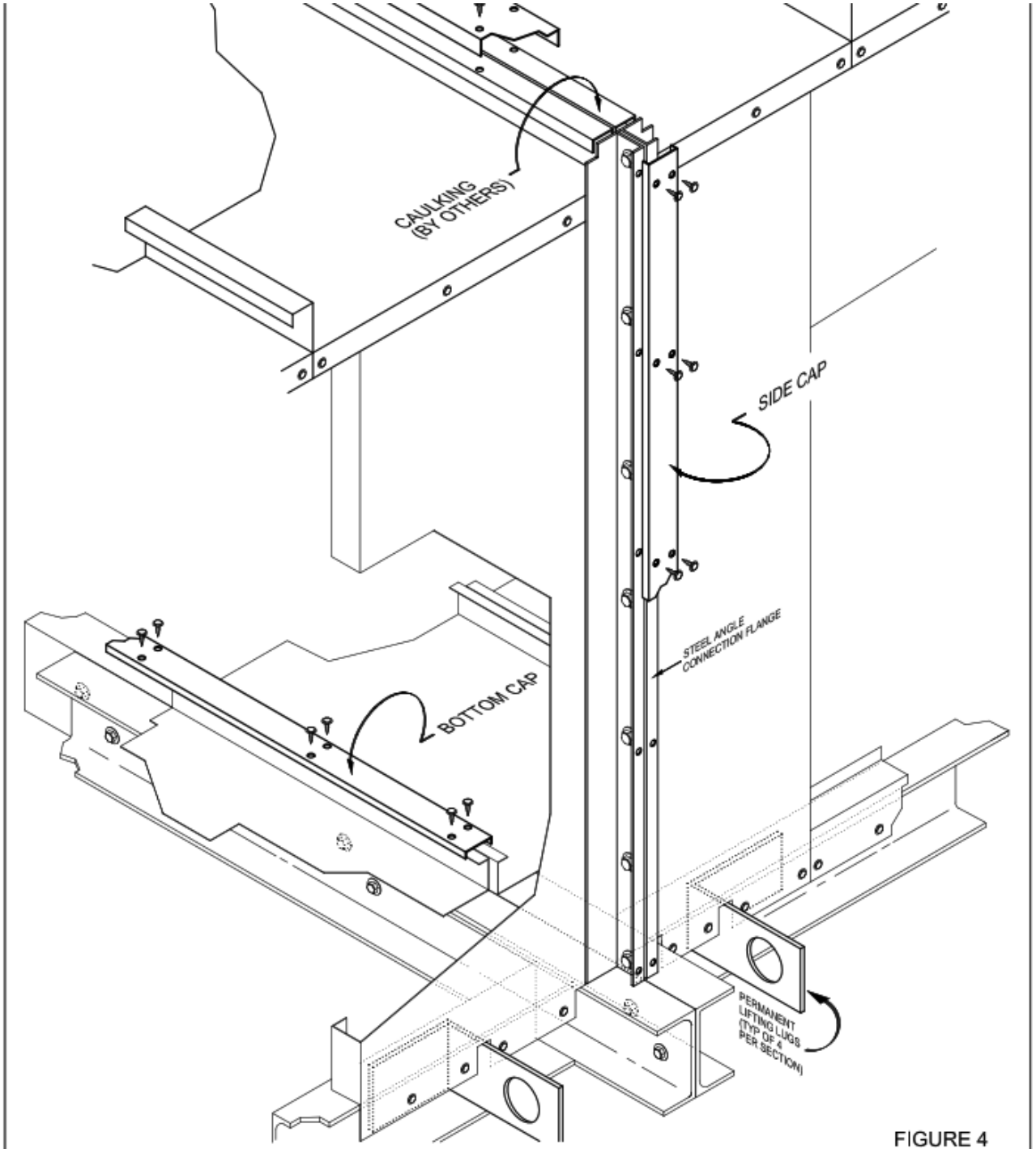

FIGURE 4

UNIT SPLIT - FINAL ASSEMBLY AND WEATHER SEALING DETAIL

SECTIONAL UNITS WITH MEMBRANE ROOF

1. Overlap roof membrane from the two sections (see figure 5). Seam overlaps should be a minimum of 6" wide. Clean all membrane surfaces that will be welded and allow to dry. There should be no adhesives present within overlap areas.

2. Loosen the membrane holder by removing screws so the side membrane over the roof extension can be fitted under the membrane holder. Replace the screws and tighten down membrane holder and trim membrane from below the holder.

3. Insert the nozzle of the hand welder into the seam at a 45° angle to the edge of the membrane. Once the proper welding temperature has been reached and the membrane begins to "flow," place the hand roller perpendicular to the nozzle and press down lightly. The welder and the roller are then moved together in a simultaneous steady continuous motion (do not "start and stop") along the seam. Be sure not to allow the liquid membrane to "bleed out" from between the two layers. Smoke during the welding procedure is a good sign that the welding is proceeding correctly. The installer should consider contacting a qualified roofing contractor to join the membrane.

4. Check all welded seams for continuity, any gaps or un-welded areas must be re-welded to ensure water proof seal

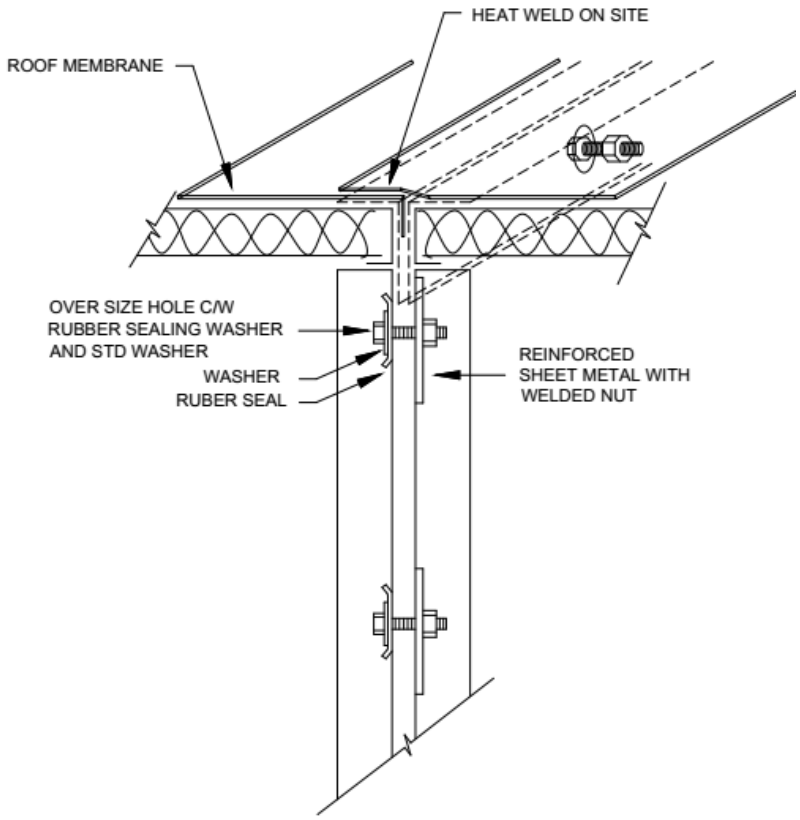

FIGURE 5

SECTIONAL UNIT WIRING

All split wiring must be completed by a qualified electrician prior to starting the equipment. Different methods are used to reconnect the wiring are outlined in the following sections. All loose wiring must be securely fastened to the equipment casing upon completion.

POWER WIRE

Power (Three Phase) wiring is generally not broken or spliced, and will extend from the device back to the contactor or terminal block inside the electrical panel(s). The wire will be tagged to identify which panel it extends to and will be numbered to the corresponding connection.

The location of the equipment split line may result in the wire being disconnected at the device it is feeding. The wire bundle will be tagged and identified. Confirm correct rotation of 3 phase devices after the wiring connections has been completed.

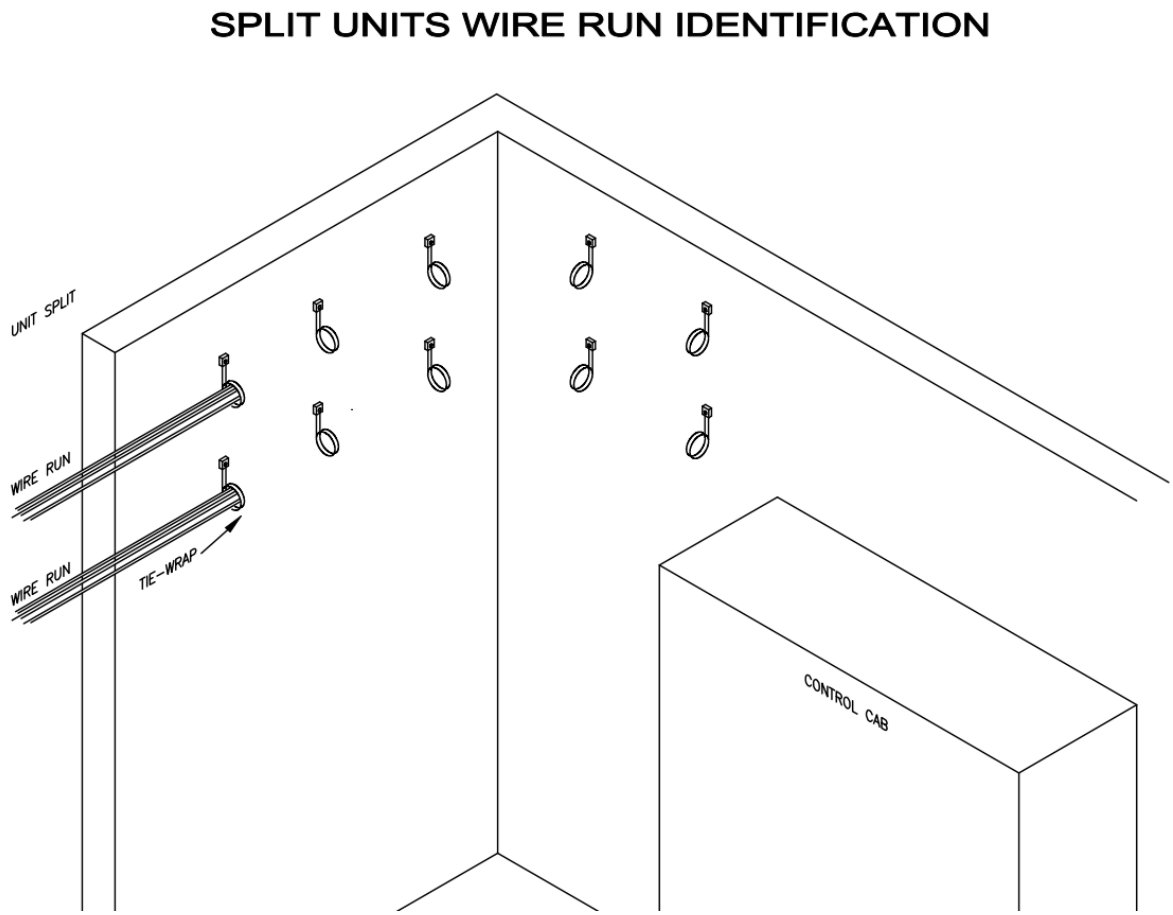

FIGURE 6

CONTROL WIRE

Control wiring is typically broken near the split line, to be reconnected at either an enclosed terminal block, junction box or extended to a nearby control panel. Each wire or wire bundle will be tagged and numbered to indicate the location it is sent to.

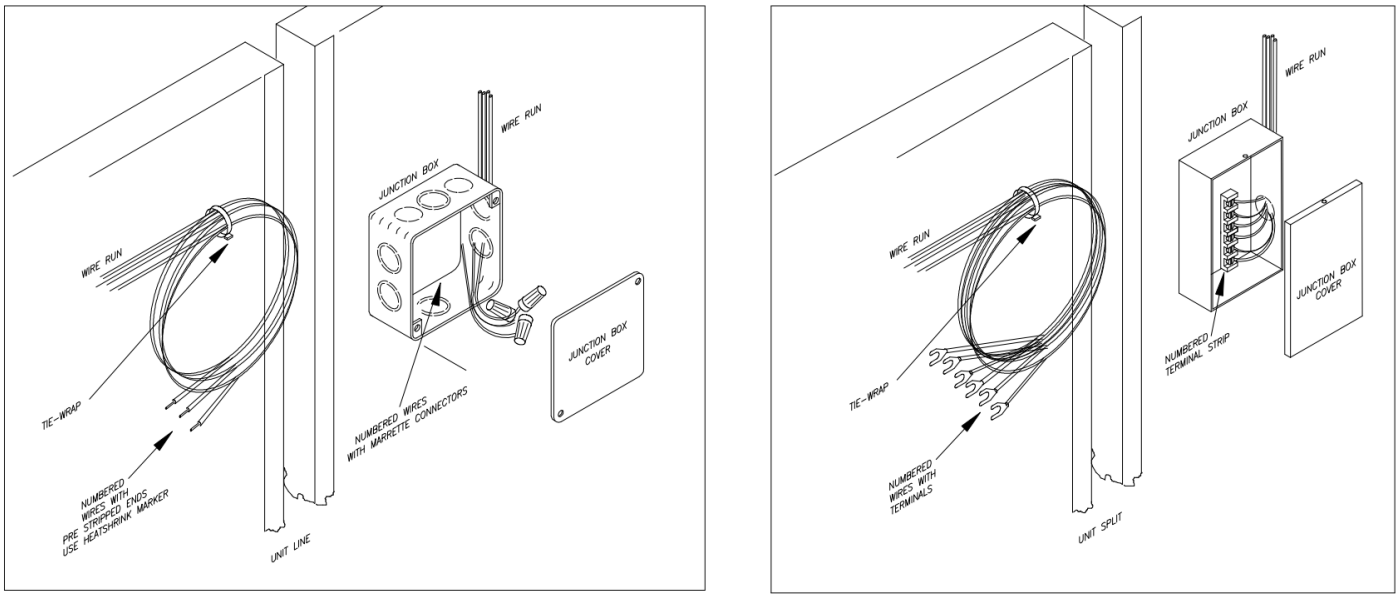

FIGURE 7

Sensor wire shield

The drain wire from the shield must be grounded at one end only. A ground connection point will be available for connection at the point of termination.

SPLIT REFRIGERATION PIPING

To complete the installation, an air-conditioning mechanic experienced and qualified in system piping is required. The contractor is responsible for installation of the refrigeration specialties and refrigerant piping for this equipment. The following information is intended to provide general information and guidelines for the successful installation of this equipment.

For detailed information about installation practices consult ASHRAE handbooks, ANSI/ASME Codes, ANSI/ASHRAE Safety Code for Mechanical Refrigeration, CAN/CSA B52 Mechanical Refrigeration Code and any local authorities having jurisdiction.

NOTE:	**A qualified refrigeration contractor experienced in refrigerant piping must complete the installation. The installation must be completed using industry-accepted methods and materials.**

TUBING

Use Nitrogenized ACR grade, 'Type L' or 'Type K' copper tubing only. All refrigerant tubing shall be clean and dry.

The tubing shall be nitrogen purged during the brazing process. This prevents harmful copper oxides from forming in the tubing.

WARNING: 	**Nitrogen cylinders shall be equipped with a high-pressure regulator and flow meter. Do not connect high-pressure cylinders to the refrigerant circuit without a regulator. Failure to do so may result in property damage, injury or death.**

Refrigerant tubing must be cut with a tube cutter and the ends deburred before installation. Never use a hacksaw or abrasive cutter to cut refrigeration tubing. Long radius elbows should be used to reduce pressure drop.

Copper to copper connections should be made with SILFOS, or similar silver bearing low temperature brazing material.

Copper to brass or copper to steel joints should be made with 45% silver solder and the appropriate flux. Flux must be cleaned from tubing after installation.

WARNING: 	**Soft solders (50/50, 95/5, etc.) are not suitable for use with air conditioning systems.**

All accessories shall be properly protected from heat during installation. Refer to the installation guidelines supplied with the components.

Piping shall be properly supported and allowances shall be made for thermal expansion or contraction of tubing.

LEAK CHECKING

After installation, all joints, both factory and field installed, shall be pressure checked and leak tested using approved industry methods. Ensure all service valves and manual valves are open.

WARNING:

Test pressures must not exceed the maximum pressure ratings specified on the unit rating plate.

WARNING:

Oxygen must NEVER be used to pressurize a system.

If leaks are located, remove pressure and repair leaks. Recheck as necessary. If brazing is necessary to repair leaks, a dry nitrogen purge through tubing while brazing is required to prevent the formation of copper oxides.

EVACUATION AND DEHYDRATION

The system must be evacuated prior to charging. Proper evacuation will remove non-condensable gasses and water vapor from the system. Water vapor in the system will combine with the oil and refrigerant to form acids and other undesirable by-products. Non-condensable gasses such as air or nitrogen will increase the head pressure and operating temperature and degrade system performance.

Sketch a piping schematic showing all valves and components. Check the diagram to ensure that all portions of the system will be evacuated. Add additional hoses or service fittings as required.

NOTE: **A high vacuum cannot be pulled through a solenoid valve whether or not is energized. A high vacuum cannot be pulled through a check valve regardless of direction of flow.**

Evacuation Procedure:

1. Remove leak-testing gasses from the system. If refrigerant was used to leak test, the refrigerant shall be recovered.
2. Connect a high vacuum pump to the system. Use the shortest and largest diameter hose available.
3. Use as many connections as the system will allow.
4. If evacuating through ‘Schrader valves’, remove the Schrader valve core before evacuation.
5. Open all service valves.
6. Use a micron gauge to measure the vacuum.

NOTE: **A standard refrigeration gauge with “inches of mercury” is not suitable to measure the high vacuums. A high vacuum gauge capable of measuring Microns is required.**

7. Triple evacuation or high evacuation methods are both acceptable.
8. Evacuate the system to an ultimate vacuum of 500 microns (0.5mm of mercury).
9. Check unit rating-plate for correct refrigerant type. Break the vacuum with virgin refrigerant from a sealed container.
10. Pressurize the system to a slight positive pressure, (one or two psig). Replace all Schraeder valve cores. Do not allow air into the system.
11. Reinstall gauges; proceed to the start-up section of the associated component and control Installation, Operation and Maintenance Manual and the following section for startup and charging instructions.

CAUTION: **NEVER use system compressors to evacuate a system. Operating a compressor while the system is under a high vacuum may cause internal arcing of the windings and compressor failure. Compressor damage caused by high vacuum operation is not covered by system warranty**.

Charging Procedure

System charge will depend on the length and orientation of the installed system. Ideally charging should be done in warm weather. If the ambient temperature is less than design, restrict the airflow across the condenser to increase head pressure to 130°F (55°C) saturated discharge temperature for charging.

1. Check that all manual shut-off valves in the refrigeration circuit are in the normal operating position.

2. Weigh in an initial charge of approximately 75% of the estimated charge.

3. Check to ensure evaporator section has proper airflow. Check static pressure drop and compare with design static. Check inlet air temperature to evaporator. Ensure that there is sufficient load to operate the air conditioning.

4. Check the supply voltage and ensure that is within 10% of design voltage on unit rating plate.

5. Check control voltage at refrigerant solenoid valves and ensure that it is within 10% of rated voltage.

Caution: **Screw and Scroll compressors MUST be checked for proper rotation at startup. Permanent damage can occur if rotation is not correct.**

6. Set controls to call for cooling.

7. Close the system service switch.

8. With the saturated discharge temperature approximately equal to 130°F (55°C), this step may require blocking condenser airflow to increase head pressure. Charge system slowly until the sight glass is clear. DO NOT OVERCHARGE.

9. Check evaporator superheat.
Attach an accurate temperature sensor tightly to the suction line at the TX bulb. Measure the suction pressure; subtract the saturated temperature from the temperature measured at the TX bulb. This is the suction superheat. Superheat should be between 16°F to 20°F (9° to 11°C) when the system is operating at full load with a clear sight-glass.

10. Set up the hot gas bypass valve (optional). Using a pressure-temperature chart find the refrigerant pressure that corresponds to a temperature of 34°F (1°C). Create a low load condition on the evaporator by restricting the airflow across the evaporator. Adjust the hot gas bypass regulator so that it will start to open at the pressure corresponding to 34°F (1°C). If the hot gas system is equipped with a desuperheating TX valve, measure the superheat at the compressor and ensure the valve is working.

11. Check the settings of the Condenser Fan Cycling Controls (CFC's), adjust as required.