

# Field Installation Guidelines for TECUMSEH

## Compressors and Condensing Units



*Tecumseh*

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### DISCLAIMER

Tecumseh Compressor Company has prepared this instruction manual to assist in the installation and replacement of compressors and condensing units. Please read the entire manual **BEFORE** beginning installation.

This manual is not designed to replace the training required for Professional Service Personnel. It is not intended to replace other information available from the refrigeration and air conditioning system manufacturers.

### 1) WARNINGS

- \* **DO NOT INSTALL**, service, repair, or troubleshoot an air conditioning or refrigeration system without proper certification and approval from authorities (Local, State, Federal).
- \* **YOU MUST** have the necessary knowledge, training and equipment.
- \* **DISCONNECT ELECTRICAL POWER** before removing the protective cover of any electrical terminal.
- \* **DO NOT RE-CONNECT** electrical power unless the protective covers of all electrical terminals are in place and securely fastened.
- \* **DO NOT OPERATE** condensing unit or connect electrical power, unless it is connected to ground.
- \* **DO NOT RESET A BREAKER** or replace a fuse without first checking for ground fault (short circuit to ground).
- \* **An open fuse** or tripped circuit breaker is a strong indication of a ground fault, also known as a short circuit to ground.
- \* **If a ground fault** does exist, keep the power off and find and repair. Use only a Mega Ohmmeter (“megger”) or a Hi-potential ground tester (“Hi-Pot”) to check for a ground fault. A conventional ohmmeter will not reliably detect an insulation breakdown causing the ground fault.

### 2) COMPRESSOR EXPLOSION HAZARD

- \* **Never expose system** to leak test pressures greater than 150 PSIG (10.5 kg/cm<sup>2</sup>).
- \* Never overcharge system with refrigerant. Overcharging with refrigerant may lead to excessive pressures and rupture of terminal block may occur. Always use proper charging techniques and limit charge amounts to those specified on the system equipment serial label or in the original equipment manufacturer’s service information.
- \* **Contact with refrigerant**, mixtures of refrigerant and oil, or other chemicals can cause a variety of injuries including burns and frostbite. For example, if refrigerant contacts skin or eyes it can cause severe frostbite. Also, in the event of a compressor motor failure, some refrigerant and oil mixtures can be acidic and cause chemical burns.
- \* **Oil and refrigerant** can spray from compressor electrical terminals and be ignited by electricity or other sources of ignition causing serious INJURY or DEATH.

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### 3) NEW INSTALLATION TIPS

- \* **Upon receipt** of your new TECUMSEH EQUIPMENT check for damage from shipping. Report any damage immediately to your local TECUMSEH dealer.
- \* **Check the name plate** for correct voltage, phase, frequency, and refrigerant for the intended use BEFORE installation.
- \* **Check compressor windings** for correct ohm's readings and short circuit to ground BEFORE installation. Keep the following in mind:
  - Power to unit must be off
  - Removing wires to expose terminals can lead to mis-wiring, replace correctly
  - Securely replace cover
- \* **Warning labels** are provided to inform and protect persons servicing TECUMSEH EQUIPMENT. Care must be taken not to damage or destroy labels during installation. Damaged or missing labels should be replaced with approved labels from your local TECUMSEH dealer.
- \* **TECUMSEH EQUIPMENT** is shipped with a holding charge of nitrogen or dry air. Remove the holding charge only after the equipment has been installed with connecting tubing and a new filter/dryer installed. Purge the holding charge thru a service port. **DO NOT leave the unit open to the atmosphere for an extended period of time**, to do so will contaminate the oil and cause excessive evacuation time, and could cause premature failure.
- \* **Locate the unit** so that the face of the unit is one width of the coil away from any obstruction, which would hinder airflow. The area of unit installation should have sufficient make-up air so that air into the unit does not exceed 110 degrees F (43C). To prevent excessive discharge pressure, which would shorten the service life of the unit. The condenser should be periodically cleaned of dirt and grease.
- \* **Water cooled units** require adequate amounts of water made available to insure that water leaving the condenser does not exceed 95 degrees F (35C), this will prevent mineral deposits and early condenser replacement. If water pressure is above 80 PSIG (5.6Kg/cm<sup>2</sup>) a pressure reducer MUST be installed ahead of the condenser inlet so that the water valve will work properly. Installations with water towers or evaporative coolers and closed loop systems should have bleed valves and sediment traps to prevent fouling the condenser with suspended particular matter.
- \* **Be sure to use clean**, dehydrated refrigeration tubing purchased with both ends sealed.
- \* **Cut, form and braze tubes** carefully to avoid getting dirt and/or filings into the lines. **When running suction and liquid lines, it is not recommended to drastically increase or decrease line sizes** from what attaches to the unit. To do so may decrease line velocities and hinder oil return. Line lengths in excess of 100 ft may require line size changes. Contact Tecumseh Technical Service for Engineering Recommendations. Whenever possible slope the suction line toward the unit.
- \* **Installation of a sight glass** and liquid line filter/dryer is strongly recommended.
- \* **When you open the system**, complete the operation as quickly as possible so it will not be exposed to the air longer than necessary.
- \* **Use Silfoss** or Silver Solder for all solder connections.
- \* **Use frostproof** flare nuts.
- \* **Once all connections have been made**, leak test with regulated nitrogen or other approved gas to a pressure not to exceed 150 PSIG (10.5 Kg/cm<sup>2</sup>). Repair any leaks and leak test again.

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- \* **When system is leak free**, connect a vacuum pump capable of at least 500 microns vacuum to both sides of the system. Evacuate to at least 500 microns for a minimum of 30 - 45 min. Vacuum levels should be measured with an electronic gauge. **Do not use the compressor as a vacuum pump or assist in any vacuum, and do not apply power to any unit under vacuum.** To do so can cause damage to the unit and/or personal injury.
- \* **Break vacuum with dry nitrogen**, reducing vacuum to 0 PSIG, repeat evacuation twice. **HOLD** vacuum to 500 microns for a minimum of 15 min each time. After isolating vacuum from the system, break vacuum using **appropriate refrigerant** to a pressure of 20 PSIG (1.4kg/cm<sup>2</sup>).
- \* **Do not operate the compressor without a charge in the system.** Operating the compressor without a charge in the system can damage the hermetic terminals. To avoid serious injury or death from terminal venting with ignition, **DO NOT** energize the compressor unless the protective cover is securely fastened.
- \* **CAUTION!!!** Only use refrigerant indicated on serial label when charging the system. Using a different refrigerant can lead to excessive system pressure and/or an explosion. Use of a refrigerant other than the serial label refrigerant will void the warranty.
- \* **When charging** refrigerant into the system, only vapor should be allowed to reach the compressor. Single part refrigerants (R-22, R-134a) and azeotrope (R-502, R-507) should be charged in the vapor state. Blended or multi-part refrigerants (R-404A, R-401a, MP-39) should always be added as a liquid to prevent altering the composition. This should be done in a two-step process:
  - 1) Add initial charge to a receiver or liquid line service port prior to initial startup.
  - 2) Add any additional refrigerants in a liquid state **thru a restrictor**, such as a capillary tube, to prevent liquid from entering the compressor.
- \* **Removal of refrigerant** (for charge adjustment) should also be done in a liquid state at a liquid service port, again to prevent altering the refrigerant composition.
- \* **Charge TECUMSEH equipment** to the recommended superheat and subcooling.

Recommended superheat at compressor;

|                     |             |
|---------------------|-------------|
| Low Temp Cap Tube   | = 3 – 6° F  |
| Low Temp Exp. Valve | = < 5° F    |
| Med Temp            | = 5 – 8° F  |
| High Temp Refrig.   | = 8 – 12° F |
| Air Conditioning    | = 20° F     |

Recommended subcooling at liquid line = 15° F
- \* For Scroll Compressors and Condensing Units Installers should check the oil level in the compressor sight glass to ensure adequate running level is maintained. Proper running level is ¼ to ½ of the sight glass. Check the level when the system is operation in a stable running condition. If needed, correct by following the proper power disconnection, evacuation, charging, and start-up procedures. Add or remove oil after the system refrigerant charge has been removed and the system is at ambient temperature. A service port is provided in the compressor bottom housing for drawing or adding oil. Contact Tecumseh Technical Services 1-800-211-3427 if assistance is needed.

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### 4) COMPRESSOR REPLACEMENT TIPS -

- \* Failure to properly remove the compressor can result in serious injury or death from electrocution, fire, or sudden release of refrigerant and oil. To prevent these, follow these precautions when removing a compressor from a system:
- \* **Disconnect all electrical power** supplies to the system, making sure all power legs are open. (note: The system may have more than one power supply.)
- \* **Be sure all refrigerant** is recovered before removing the compressor. Attempting to remove the compressor before removing all refrigerant from the system can cause a sudden release of refrigerant and oil. Among other things, this can cause a variety of injuries including burns and frostbite, a fire, and expose the service person to toxic gas.
- \* **Use a tubing cutter** to remove the compressor. A torch can cause even trace amounts of refrigerant to decompose and release toxic fumes, and can cause a fire.
- \* **Proper system flushing**, purging, and pressure testing is essential for the service life of the compressor and/or equipment. Failure to properly flush, purge, and pressure test the system for leaks can result in serious injury and death from explosion, fire, or contact with acid-saturated refrigerant or oil mists.
- \* **Use flushing products** according to the manufacturer's instructions.
- \* **DO NOT Use Air, Oxygen or Acetylene** when purging or pressure testing any refrigeration or air conditioning system.  
**Oxygen** can explode on contact with oil.  
**Acetylene** can decompose and explode when exposed to pressures greater than approximately 15 PSIG (1.0 kg/cm<sup>2</sup>).
- \* **Combining an oxidizing gas**, such as oxygen or air, with an HCFC or HFC refrigerant under pressure can result in a fire or explosion.
- \* **Use only Regulated Dry Nitrogen or Dry Nitrogen** with trace amounts of the serial label refrigerant to purge and/or leak test the system to a pressure not to exceed 150 PSIG (10.5 Kg/cm<sup>2</sup>). When field testing a system for leaks, 150 PSIG (10.5 Kg/cm<sup>2</sup>) is adequate pressure. Nitrogen cylinders contain pressures in excess of 2000 PSIG at 70° F. Pressures much lower than 2000 PSIG, compressors can explode and cause serious injury or death. To avoid over pressurizing the system, always use a pressure regulating valve on the nitrogen cylinder discharge. The pressure regulator must be able to reduce the pressure down to 1 or 2 PSIG and maintain this pressure.

Please consult your Tecumseh "Service Handbook" or call Technical Services At 1-800-211-3427 should you require further information.