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Field Installation of Remote Condenser and Piping

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The installation of the remote condenser is a critical process in the installation of the equipment. To ensure longevity of the refrigeration system components, proper service practice must be followed.

This document is intended to provide guidance on specific procedures for installation and service of the refrigeration system on Desert Aire dehumidifiers. This is not an all encompassing document. It is assumed that the service technician is qualified to service refrigeration systems with the applicable refrigerant and holds the appropriate EPA certifications for stationary equipment. Refrigerants under high pressure are dangerous and improper handling and use can cause property damage, injury, or death.

Procedure for Installation of Remote Condensers

- Desert Aire dehumidifiers and remote condensers come equipped with connection sizes suitable for specific pipe routings. Many installations will require adapting to different field tube diameters depending on the distance between components. Use fittings and adapters as close as possible to the system components.
- **CAUTION: Most systems come equipped with copper caps installed at the connections. Relieve any pressure that may have built up by depressing the Schrader valve during removal of the cap or temporarily removing the Schrader core. Do not open the service valve at the connections until all piping and evacuation is complete.**
- Use dehydrated tube where possible.
 - Use Type K per ASTM B 88 or ASTM B 819 or Type ACR per ASTM B 280 copper tubing or for all tubes 1 1/8" and smaller.
 - Tubes 1 3/8" and larger shall use Type K per ASTM B 88 or ASTM B 819.
- All tubes should be kept clean and dry before and during installation.
 - Cap sections of tube that are not actively being installed to prevent infiltration of moisture and contaminants.

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- Ensure that copper chips are not introduced into the system during fabrication of tubing.
 - Use tubing cutter rather than saw when cutting tubes to length.
- Use only bronze alloys to join tube.
 - The selection of filler metals is highly dependent on the tube fit, clearance, and operator preference for flow. When flux is to be used, care should be taken to ensure that the flux is not introduced to the inside of the tube. It is recommended that phosphorous bearing alloys be considered for copper to copper connections due to their self-fluxing on copper to copper joints. Refer to alloy manufacturer's guidelines for details on compatibility.
- Flow nitrogen into tubing to prevent the formation of copper oxides.
 - Copper oxides form rapidly when copper is heated to temperatures required by the brazing process and exposed to oxygen in the air. Copper oxides flake easily on the inside of the tubing and dislodge easily when the system is filled with refrigerant and oil. The particulate can move throughout the system and cause contamination on valves and other critical components. System filters may become fouled.
 - Flowing nitrogen into the system and ensuring that the inside of the tube is significantly free from oxygen while brazing ensures that oxides do not form. As the last joints of a system are made, additional thought must be made on the location where the nitrogen can escape. Schrader valves are available on the unit and remote condenser. These valves can be opened to allow for nitrogen to flow without generating pressure behind the braze joint that is being created.
- If remote condenser piping is pressure tested before evacuation, use a maximum of 80 PSI pressure for R-22 or R-407C systems and 150 PSI for R-410A systems to ensure that none of the gas used for testing is forced into the other system sections.
- Carefully inspect pump and related equipment before connecting to system. Ensuring gaskets are in good condition and pump is capable of low vacuum can save time. Connect pump(s) to as many locations as possible ensuring

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all locations are well sealed. If a field charge will be required, connecting a refrigerant tank to the system with a good valve is recommended. Any hose connections requiring purging of non-condensable can be done at this point.

- Evacuate the line and remote condenser to 400 microns measured at a point on the system furthest away from the pump.
 - Note that a gauge installed on the pump or in close proximity will give a lower reading while the unit is being evacuated.
 - A deep vacuum gauge should be used to evaluate the pressure. Compound manifold gauges do not allow for enough accuracy at the pressures required.
 - The system should be able to hold a vacuum under 500 microns for more than 10 minutes.
 - If pressure continuously rises at a rapid rate there is likely a system leak. Review all piping connections and correct before continuing evacuation.
 - Pressure rising above 500 microns and tending to stabilize at a higher pressure indicates the system has moisture above specifications. Continue evacuation until 500 microns or lower can be held for a minimum of 10 minutes.
- If field charge of refrigerant and oil is required, it can be fed into evacuated condenser at this time.
 - To account for the length of piping for remote condensers and the oil traps that occur in the piping, additional oil should be added when additional refrigerant is specified for charging in the field. Note that the factory has already added oil charge for the refrigerant charge in the unit.
 - Oil added to the system should be from new, sealed containers. New systems with R-410A or R-407C should use only the following oils:
 - Copeland® Ultra 32-3MAF,
 - Lubrizol Emkarate RL 32-3MAF
 - Parker Emkarate RL 32-3MAF
 - Nu Calgon 4314-66 (RL 32-3MAF)
 - Hatcol 22 CC
 - Copeland® Ultra 22 CC

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- Mobil Arctic 22 CC
- Oil should not be exposed to atmosphere for more than 5 minutes. Due to the highly hygroscopic nature of POE oils, water is absorbed at high rates and will only be removed by the filter dryer in the system. The dryer located inside the unit is sufficient for removal of the moisture introduced during this initial remote condenser connection and oil charging if proper procedures are followed.
- For ease of installation, it is preferable to install oil while a section of the piping is under vacuum. Charge into the high side of the system. The following equation can be used to determine the initial oil charge to be added.

Specified field refrigerant charge, lbs. x 0.352 = Field oil charge, oz.

Oil can also be introduced into the compressor sump or slowly into the suction line while the compressor is running.

- Every lineset is different and those with larger traps or improperly sloped piping may require more oil. The compressor oil sightglass must be checked after 24 hours of operation to ensure sufficient oil. This does not apply to units without a compressor oil sight glass.
- The remote condenser is the preferred location for field charging as it is furthest from the compressor in these systems and presents the least risk for introduction of liquid refrigerant into the compressor sump.
- Charge should be weighed into the system using a scale. Field charge is located on label attached to unit near the remote condenser connections. Many Desert Aire dehumidifiers are custom products with special features and due to continuous improvements, the I&O manual may differ from the label. Where there is a conflict between the standard charge indicated in I&O and the label, the label field charge should be used.
- In cases where the full field charge cannot be added at the condenser, the charge can be added to the low side of the system only when compressors are energized. See last step for details.

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- Service valves connecting remote condenser and unit can be opened after any field charge is added.
- If the system is being started for the first time, the refrigeration and fans system should be temporarily disabled by removing primary fuses or breaking the 24 volt circuit. An easy method is to open the knife switches on the control voltage terminal block before powering unit. This will energize crankcase heaters to ensure that any refrigerant that may have migrated to the compressor sump is forced out. Crankcase heater should be energized for 24 hours before refrigeration system is allowed to operate.
- If any remaining field charge needs to be added to the system, the compressors should be energized and the charge should be slowly metered into the suction line as far as possible upstream of the compressor. If the unit is equipped with an accumulator, the charge needs to be added to the port upstream of this location. The bulkhead fittings on the side of the unit should not be used for charge addition. Monitor superheat at the compressor suction inlet using the bulkhead fitting and a temperature sensor on the suction line near the compressor. Superheat should not drop below 10 degrees during the process of adding charge.