



CONDENSING UNIT

ALL SERIES



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**NOMENCLATURE**

**O C S - 10 0 - 1 H 2 - 9**

- O = Outdoor Air-Cooled
- I = Indoor Air-Cooled
- W = Indoor Water-Cooled
- M = Indoor Sea Water-Cooled
- S = Indoor Remote Air-Cooled

**UNIT VOLTAGE:**

- 2 = 240/1/60
- 5 = 208-240/3/60
- 8 = 600/3/60
- 9 = 480/3/60

C = Condensing Unit

**REFRIGERANT:**

- 2 = R-22
- 3 = R-134a
- 4 = R-404A + R507

- S = Semi-Hermetic
- H = Hermetic
- Z = Scroll
- V = Screw

**APPLICATION:**

- H = High suction temperature
- M = Medium suction temperature
- L = Low suction temperature

Nominal Compressor HP-10

**COMPRESSOR:**

- 0 = Single Compressor
- 2 = Dual Compressor

- 1 = Copeland
- 2 = Carlyle
- 3 = Tecumseh
- 5 = Bitzer

## SAFETY CONSIDERATIONS

Installing, starting up, and servicing equipment can be hazardous due to system pressures, electrical components and equipment location (roofs, elevated structures, etc.). Only trained, qualified installers and service mechanics should install, start up, and service this equipment.

When working on the equipment, observe precautions in the literature and on the tags, stickers, and labels attached to the equipment.

Follow all safety codes. Wear safety glasses and work gloves. Keep quenching cloths and fire extinguisher nearby when brazing. Use care in handling, rigging, and setting bulky equipment.

### WARNING

Before installation, always check to be sure main power to systems is OFF. Electrical shock can cause personal injury or death.

## INTRODUCTION

These instructions describe installation, start-up, and service for refrigeration duty or cooled indoor (IC), outdoor (OC), remote condenser (SC) and water-cooled condensing unit (WC), with hermetic (H), semi-hermetic (S) or scroll (Z) compressor for high, medium or low temperature.

## HANDLING

**FORK LIFT** – The compressor side of the condenser unit is the heaviest side and should be facing the lift truck. Be sure the forks extend the entire length of the unit.

**CRANE** – The center of gravity must be identified before lifting the unit. Holes are provided to insert bars or hooks for lifting unit. To protect the casing, condenser coil, electrical box, piping and wiring, use spreader bars.

## INSTALLATION

### STEP 1 -

#### COMPLETE PRE-INSTALLATION CHECKS

Check unit for damage incurred during the shipment. File a claim immediately with transit if damage is found. Verify that the nameplate electrical requirements match the available power supply. Check the shipment for completeness.

### STEP 2 - LOCATION

#### OUTDOOR CONDENSING UNITS

These units are installed outside on a rooftop or on the ground. Be sure to check the load capacity of the roof before installing the unit on the rooftop.

When selecting the location be sure to provide enough space for adequate air circulation and avoid air recirculation. Locate the unit near the power supply and evaporator. Allow accessibility to the unit for maintenance. If more than one unit is installed or if installing a unit close to a wall, a spacing distance of 4 ft. is required. To avoid high condensing pressure, the condenser coil must face local prevailing winds or be protected from the wind.

Units should be attached to a steel frame (field supplied) on the roof. The frame must be straight and level for proper unit operation. The unit should be securely bolted to the frame.

#### INDOOR CONDENSING UNITS

Adequate supply of outside air must be available. Proper ventilation must be provided to vent room air exhaust outside to avoid heat build-up. For air-cooled unit (IC), experience has shown that 1000 to 1200 CFM and 2 to 2.5 ft<sup>2</sup> of lowered area per compressor HP provides good results. Room temperature should be maintained at a minimum of 70°F. Provide enough space for adequate air circulation and avoid air recirculation. Allow accessibility to the unit for maintenance. See Fig.1.

## STEP 3 – WIRING UNIT

### IMPORTANT

Wire connections may have come loose during transit. Check all screws for tightness prior to starting up the unit.

All system wiring must be in compliance with all applicable local and national codes.

Internal wiring of fan motors, optional controls and contactors have been completed at factory. Wiring connections terminate on a single terminal block in the control panel and are clearly labeled on the unit.

The unit must be grounded.

All units are wired for continuous pumpdown cycle. This prevents refrigeration migration from evaporator to the compressor. The liquid line solenoid and thermostat must be wired properly.

### STEP 4 – PIPING

All refrigerant system components must be installed in accordance with applicable local and national codes using proper engineering practices.

Use top quality refrigeration tubing that is internally free of dirt, humidity or other contaminants. Unsealed tubing should not be used. Long radius elbows are recommended.

Dry nitrogen must be swept through the lines while joints are brazed to avoid oxidation and carbon deposits.

All piping should be properly supported for proper operation. See Fig. 2 and 3.

### IMPORTANT

The use of a calibrated pressure gauge and regulator must always be used with nitrogen gas cylinders.

**STEP 5- SUCTION LINE**

The suction line must be sized to maintain proper line velocities with a practical line pressure drop, which is usually equal to 20°F. To ensure proper oil return, all horizontal lines must be sloped down toward the compressor with a pitch of 1/4 in. per 10 ft. The horizontal line can be increased one size in the case of a very long run.

In situations where it is necessary for the suction line to rise, an oil trap must be installed at the bottom of the riser. To ensure oil return through a riser in the suction line, a velocity of not less than 1000 ft. per minute is required. A trap should be provided for each additional 20 ft. of riser. See Fig. 4 and 5.

Suction line should not be exposed to heat or the sun. If it is necessary to run suction line outside of the building or through heated areas in the building, the line must be insulated. The suction line must be insulated in any situation where the line may sweat.

**STEP 6 – LIQUID LINE**

Excessive pressure drop in the liquid line must be avoided to keep a solid column of liquid at the thermostatic expansion valve (TXV). The liquid line solenoid valve should be installed in the liquid line just ahead of the TXV. Sweating of the liquid line may occur in warm ambient due to the sub-cooled condition of the liquid in winter operation.

**STEP 7 – LEAK TESTING AND EVACUATION**

Leak testing and evacuation must be done in accordance with local and national codes.

Pull and hold for 24 hours a 500 micron vacuum. If not, check for leaks and make sure that gauge hoses and all caps are not leaking.

Once all refrigerant connections are made, leak test all joints before charging the system with refrigerant. After leak testing, all moisture and non-condensable gas must be evacuated from the system. Attach high vacuum line pump and gauge on both high and low pressure sides of the system.

Be sure all valves such as compressor, hot gas, receiver, and liquid solenoid valves are open. Break the vacuum in the system with the refrigerant to be used. Always charge the refrigerant into the system through a new 16 cu. in. drier (field-supplied) in the charging manifold line.

**START-UP**

**CAUTION**

Units designed for HFC Refrigerant are supplied with polyolester (POE) oil. The oil needs to be added to the system before start-up. The required amount is listed on the unit.

This oil is very hygroscopic and care should be taken when using POE.

All oil must be used at once. Any remaining oil must be properly disposed of.

**PREPARE THE SYSTEM**

1. Add oil to system.
2. Open all refrigeration valves.
3. Connect the high side gauge to the refrigerant receiver outlet valve and the suction fitting on the compressor.
4. **Unit with scroll compressor must be checked for proper rotation.**

**REFRIGERANT**

Add liquid refrigerant to the high side until the system pressure equals the refrigerant cylinder pressure.

R-22 REFRIGERANT – Start the compressor and add refrigerant vapor through the suction connection of the compressor until the sight glass is clear. For outdoor units with flooding valve, restrict the condenser air flow to maintain 100° to 110° F condensing and add enough refrigerant to flood the condenser coil in low ambient.

R-404, R-507 (or blend) REFRIGERANT – Start the compressor and add liquid refrigerant through a calibrated restrictor in the suction connection of the compressor until the sight glass is clear. See Table 1 for winter charge.

**TABLE 1**  
ADDITIONAL REFRIGERANT CHARGE  
FOR WINTER OPERATION

| Model   | Lb.   | Kg   |
|---------|-------|------|
| 008     | 1.5   | 0.7  |
| 010     | 1.5   | 0.7  |
| 012     | 3.0   | 1.4  |
| 015     | 3.0   | 1.4  |
| 020     | 4.1   | 1.9  |
| 025     | 4.1   | 1.9  |
| 030     | 6.2   | 2.8  |
| 035     | 8.6   | 3.9  |
| 040     | 8.6   | 3.9  |
| 050     | 11.5  | 5.2  |
| 060     | 11.5  | 5.2  |
| 070     | 15.1  | 6.9  |
| 080     | 16.7  | 7.6  |
| 090     | 16.7  | 7.6  |
| 100     | 22.3  | 10.1 |
| 150     | 25.2  | 11.5 |
| 200     | 33.6  | 15.3 |
| 220     | 33.6  | 15.3 |
| 250     | 40.0  | 18.2 |
| 270     | 40.0  | 18.2 |
| 300     | 53.0  | 24.1 |
| 350     | 80.0  | 36.4 |
| 400     | 80.0  | 36.4 |
| 402/442 | 67.2  | 30.6 |
| 502/542 | 80.0  | 36.4 |
| 602     | 106.0 | 48.2 |
| 702/802 | 160.0 | 72.8 |

## SERVICE

System operating temperature, oil level, and system pressure should be checked and recorded periodically to ensure stable system operation. For troubleshooting on common condensing unit, refer to the troubleshooting chart.

### IMPORTANT

Disconnect all power before servicing.

## INSPECTION

After one day of operation, check any vibration in the unit.

### IMPORTANT

The compressor hold-down bolts should be checked periodically and re-tightened if necessary.

## CLEANING

It is recommended that the unit be checked periodically for dirt accumulation. Grease and dust should be removed from the fan, fan guards and drain pan.

Occasional cleaning of finned surfaces can be done by first dusting the fins then cleaning with a mild detergent and warm water spray.

The inner face of the coil may be cleaned by the access panel on the side of the units or by removing the fan guards.

### IMPORTANT

Do not use alkaline or acid solution as it will damage the coils. Remove the fan guard to clean the inner face of the fan coil.

## FAN MOTORS

Fan motors are permanently lubricated for service-free operation. The fan motor may cycle if the coil is blocked. If motor is inoperable, check the supply voltage at the motor leads.

## ADDING OIL

If oil is needed, allow the system to pump down. See Tables 3 and 4 to select proper oil.

1. Turn off all power to the unit.
2. Close the suction and discharge valves at the compressor.
3. Partially unscrew the filler hole pipe plug. Allow pressure to bleed before totally removing the plug. (The filler hole is located just above and to the left of the crankcase sight glass on most compressors).
4. Add manufacturer approved oil through the filler hole. Be sure oil has not been exposed to air or other contaminants.
5. Replace and tighten filler hole pipe plug.
6. Re-open the compressor suction and discharge valves.
7. Restart the unit.

## SEMI-HERMETIC COMPRESSOR

Oil level must be maintained at 1/2 or 3/4 full as indicated on the sight glass. If oil level is low, add manufacturer approved oil to the compressor. Do not overfill. Check oil level after 2 hours. Check oil level 2 days after the addition of oil.

Excessive oil quantity in a system may lead to liquid slugging and compressor damage.

A well-balanced unit should not require any additional oil after a week of operation.

If any system requires more oil after one week of operation, the unit must be inspected to find the location of the trapped oil.

TABLE 2

REFRIGERATION OILS, COPELAND COMPRESSOR

| Refrigeration Oils |                                   | R-12               | R-22,<br>R-502 | R-401A, R-401B<br>R-402A, R-408A<br>R-409A | R-134a, R-404A<br>R-507, R-407C<br>R-410a |
|--------------------|-----------------------------------|--------------------|----------------|--|---|
| POE's              | Copeland Ultra 22CC               | Not acceptable     | AA             | AA   | PL  |
|                    | Copeland 3MA                      |                    | AA             | AA   | PL*                                       |
|                    | Mobil EAL ARCTIC 22 CC            |                    | AA             | AA   | PL  |
|                    | ICI (Virginia KMP)                |                    | AA             | AA   | PL  |
|                    | Emkarate RL 32CF                  |                    |                |  |   |
| MINERAL OILS       | Witco Suniso 3GS                  | PL                 | PL             | PL & M                                     | NOT acceptable                            |
|                    | Texaco Capella WF32               | PL                 | PL             | PL & M                                     |   |
|                    | Calumet RO15 (Witco)              | PL                 | PL             | PL & M                                     |   |
|                    | Perenco Sontex 200-LT<br>Shritene | BR and SCROLL ONLY |                |  |   |
|                    | Witco LP-200                      | PL                 | PL             |  |   |
| AB                 | Copeland Ultra 200                | AA                 | AA             | PL & M                                     |   |
|                    | Shreve Zerol 200TD                | AA                 | AA             | PL & M                                     |   |
|                    | Soltex AB200A                     | AA                 | AA             | PL & M                                     |   |
| AB MO MIX          | Shell 22-12                       | AA                 | AA             | PL   |   |
|                    | Witco R-195-0                     | AA                 | AA             | PL   |   |

LEGEND: PL: Preferred lubricant choice

AA: Acceptable Alternative

M: Mixture of Mineral oil and Alkyl Benzene (AB) with minimum 50% AB

\*: ZP Scroll A/C applications

TABLE 3

REFRIGERATION OILS, CARLYLE COMPRESSOR

| Refrigeration Oils |                             | R-12, R-500<br>R-502, R-22 | R-134a, R-404A<br>R-507, R-407C |
|--------------------|-----------------------------|----------------------------|---------------------------------|
| POE's              | Castrol E68                 | Not acceptable             | Recommended                     |
|                    | ICI Emkerarate RL68H        |                            |                                 |
|                    | CPI CP-2916S                |                            |                                 |
|                    | CPI Solest 68               |                            |                                 |
|                    | BP marine Enersyn MP-S68    |                            |                                 |
| MINERAL OILS       | Mineral Witco Sunisco 3GS   |                            |                                 |
| AB                 | Shrieve Chemical Zerol 150  | Recommended                | Not acceptable                  |
|                    | Texaco Capella WFI-32-150   |                            |                                 |
|                    | IGI Petroleum Ind Cryol-150 |                            |                                 |

**TABLE 4**

**REFRIGERATION OILS, BITZER COMPRESSOR**

|              | Lubricant Type                      | (H) CFC<br>R-22 | Interim Blends<br>R-401A, R-401B, R-402A, R-408A,<br>R-409A, (MP-39, MP-66, HP-80,<br>FX-10, FX-56) | HFC's<br>R-134A, R-404A,<br>R-507,R-407C |
|--------------|-------------------------------------|-----------------|---|--|
| POLYOLESTER  | ICI (Virgina KMP)<br>Emkarate RL32S | A*              | A*  | P  |
|              | Mobil EAL Arctic 32                 | A*              | A*  | P  |
|              | Castrol Icematic SW 32              | A*              | A*  | P  |
| MINERAL OILS | Sunisco 3GS                         | A               | A   | Not acceptable                           |
|              | Sunisco 4Gs                         | A               | A   |  |
|              | Capella Oil WF 32                   | A               | A   |  |
|              | Capella OIL WF 68                   | A               | A   |  |
|              | Esso Zerice R68                     | A               | A   |  |
| ALKYLBENZENE | Zerol 150                           | P               | P   | Not acceptable                           |
|              | Zerol 300                           | P               | P   |  |
|              | Icematic 2284                       | P               | P   |  |
|              | Esso Zerice S46                     | P               | P   |  |
|              | Esso Zerice S68                     | P               | P   |  |
| AB/MO MIX    | Shell Clavus SD 2212                | P               | P   | Not acceptable                           |
|              | Esso Zerice R46                     | A               | A   |  |

**LEGEND:** P = Preferred

A = Acceptable Alternative

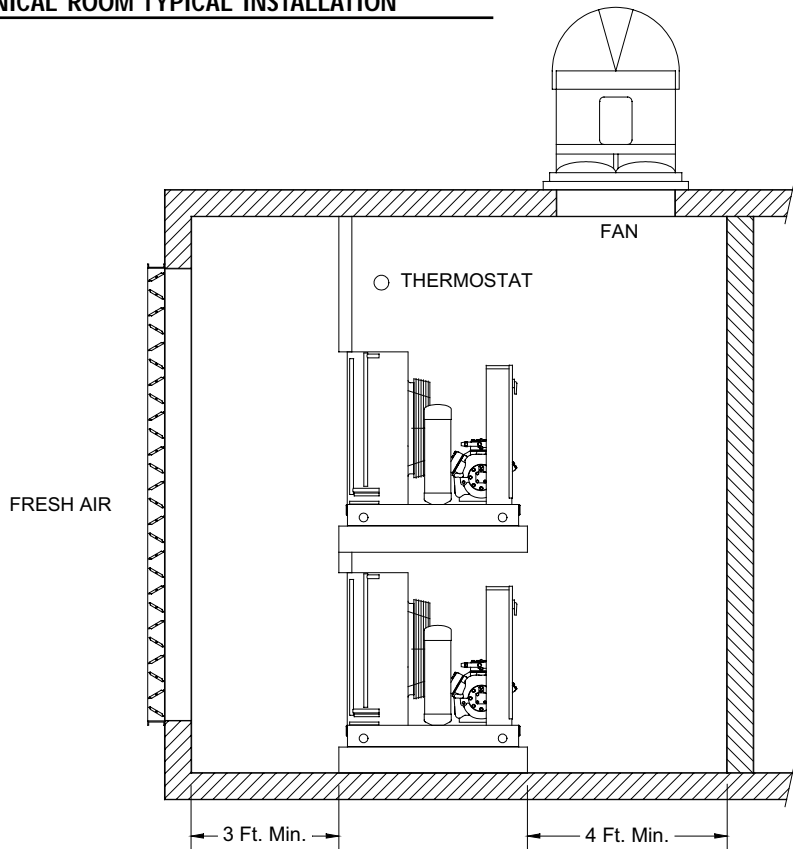
\* = When operating (H) CFC with ester oils the quality of refrigerant dissolved in the oil is more than doubled as compared with conventional lubricants. Special care should be taken. Refer to Bitzer Technical Bulletin KT-510-2, section 5 for additional information.



## TROUBLESHOOTING CHART

| PROBLEM                                  | POSSIBLE CAUSES  | POSSIBLE CORRECTIVE STEPS  |
|--|--|--|
| Compressor will not run                  | <ol style="list-style-type: none"> <li>1. Main switch open.</li> <li>2. Fuse Blown.</li> <li>3. Thermal overloads tripped.</li> <li>4. Defective contactor or coil.</li> <li>5. System shut down by safety devices.</li> <li>6. No cooling required.</li> <li>7. Liquid line solenoid will not open.</li> <li>8. Motor electrical trouble.</li> <li>9. Loose wiring.</li> </ol>                                  | <ol style="list-style-type: none"> <li>1. Close switch.</li> <li>2. Check electrical circuits and motor winding for shorts or grounds. Investigate for possible overloading. Replace fuse after fault is corrected.</li> <li>3. Overloads are automatically reset. Check unit closely when unit comes back on line.</li> <li>4. Repair or replace defective parts.</li> <li>5. Determine type and cause of shutdown and correct it before resetting safety switch.</li> <li>6. None. Wait until unit calls for cooling.</li> <li>7. Repair or replace coil.</li> <li>8. Check motor for open windings, short circuit or burnout.</li> <li>9. Check all wire junctions. Tighten all terminal screws.</li> </ol> |
| Compressor noisy or vibrating            | <ol style="list-style-type: none"> <li>1. Flooding of refrigerant into crankcase.</li> <li>2. Improper piping support on suction or liquid line.</li> <li>3. Worn compressor.</li> <li>4. Scroll compressor rotation reversed.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Check setting of expansion valves.</li> <li>2. Relocate, add or remove hangers.</li> <li>3. Replace.</li> <li>4. Rewire for phase change.</li> </ol>   |
| High discharge pressure                  | <ol style="list-style-type: none"> <li>1. Noncondensables in system.</li> <li>2. System overcharges with refrigerant.</li> <li>3. Discharge shutoff valve partially closed.</li> <li>4. Fan not running.</li> <li>5. Head pressure control setting.</li> <li>6. Dirty condenser coil.</li> </ol>   | <ol style="list-style-type: none"> <li>1. Remove the noncondensables.</li> <li>2. Remove excess refrigerant.</li> <li>3. Open valve.</li> <li>4. Check electrical circuit.</li> <li>5. Adjust control setting.</li> <li>6. Clean condenser coil.</li> </ol>  |
| Low discharge pressure                   | <ol style="list-style-type: none"> <li>1. Faulty condenser temperature regulation.</li> <li>2. Suction shutoff valve partially closed.</li> <li>3. Insufficient refrigerant in system.</li> <li>4. Low suction pressure.</li> <li>5. Variable head pressure valve.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Check condenser control operation.</li> <li>2. Open valve.</li> <li>3. Check for leaks. Repair and add charge.</li> <li>4. See corrective steps for low suction pressure.</li> <li>5. Check valve setting.</li> </ol>  |
| High suction pressure                    | <ol style="list-style-type: none"> <li>1. Excessive load.</li> <li>2. Expansion valve overfeeding.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Reduce load or add additional equipment.</li> <li>2. Check remote bulb. Regulate superheat.</li> </ol>   |
| Low suction pressure                     | <ol style="list-style-type: none"> <li>1. Lack of refrigerant.</li> <li>2. Evaporator dirty or iced.</li> <li>3. Clogged suction line or compressor suction gas strainers.</li> <li>4. Clogged liquid line filter drier.</li> <li>5. Expansion valve malfunctioning.</li> <li>6. Condensing temperature too low.</li> </ol>  | <ol style="list-style-type: none"> <li>1. Check for leaks. Repair leak and add charge.</li> <li>2. Clean evaporator.</li> <li>3. Replace cartridge(s).</li> <li>4. Clean strainers.</li> <li>5. Check and reset for proper superheat.</li> <li>6. Check means for regulating condensing temperature.</li> </ol>  |
| Low or no oil pressure                   | <ol style="list-style-type: none"> <li>1. Clogged suction oil strainer.</li> <li>2. Excessive liquid in crankcase.</li> <li>3. Low oil pressure safety switch defective.</li> <li>4. Worn oil pump.</li> <li>5. Oil pump reversing gear stuck in wrong position.</li> <li>6. Worn bearings.</li> <li>7. Low oil level.</li> <li>8. Loose fitting on oil lines.</li> <li>9. Pump housing gasket leaks.</li> </ol> | <ol style="list-style-type: none"> <li>1. Clean.</li> <li>2. Check crankcase heater. Reset expansion valve for higher superheat. Check liquid line solenoid valve operation.</li> <li>3. Replace oil pressure safety switch.</li> <li>4. Replace oil pump.</li> <li>5. Reverse direction of compressor rotation.</li> <li>6. Replace compressor.</li> <li>7. Add oil.</li> <li>8. Check and tighten system.</li> <li>9. Replace gasket.</li> </ol>   |
| Compressor loses oil                     | <ol style="list-style-type: none"> <li>1. Lack of refrigerant.</li> <li>2. Excessive compression ring blowby.</li> <li>3. Refrigerant flood-back.</li> <li>4. Improper piping or traps.</li> </ol>   | <ol style="list-style-type: none"> <li>1. Check for leaks and repair. Add refrigerant.</li> <li>2. Replace compressor.</li> <li>3. Maintain proper superheat at compressor.</li> <li>4. Correct piping.</li> </ol>   |
| Compressor thermal protector switch open | <ol style="list-style-type: none"> <li>1. Operating beyond design conditions.</li> <li>2. Discharge valve partially shut.</li> <li>3. Blown valve plate gasket.</li> <li>4. Dirty condenser coil.</li> <li>5. Overcharged system.</li> </ol>   | <ol style="list-style-type: none"> <li>1. Add facilities so that conditions are within allowable limits.</li> <li>2. Open valve.</li> <li>3. Replace gasket.</li> <li>4. Clean coil.</li> <li>5. Reduce charge.</li> </ol>   |

**FIG 1: MECHANICAL ROOM TYPICAL INSTALLATION**



**FIG. 2: PIPE SUPPORT EXAMPLE**

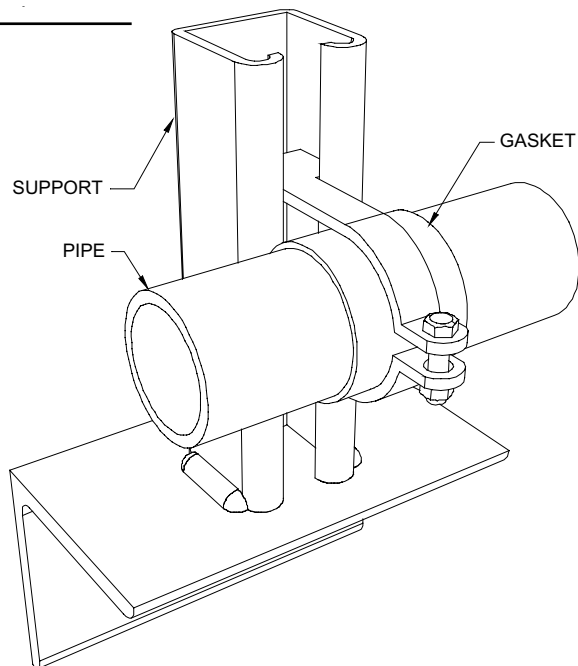


FIG 3: SUPPORTING CONDENSING UNIT AND COMPRESSOR TO WALL

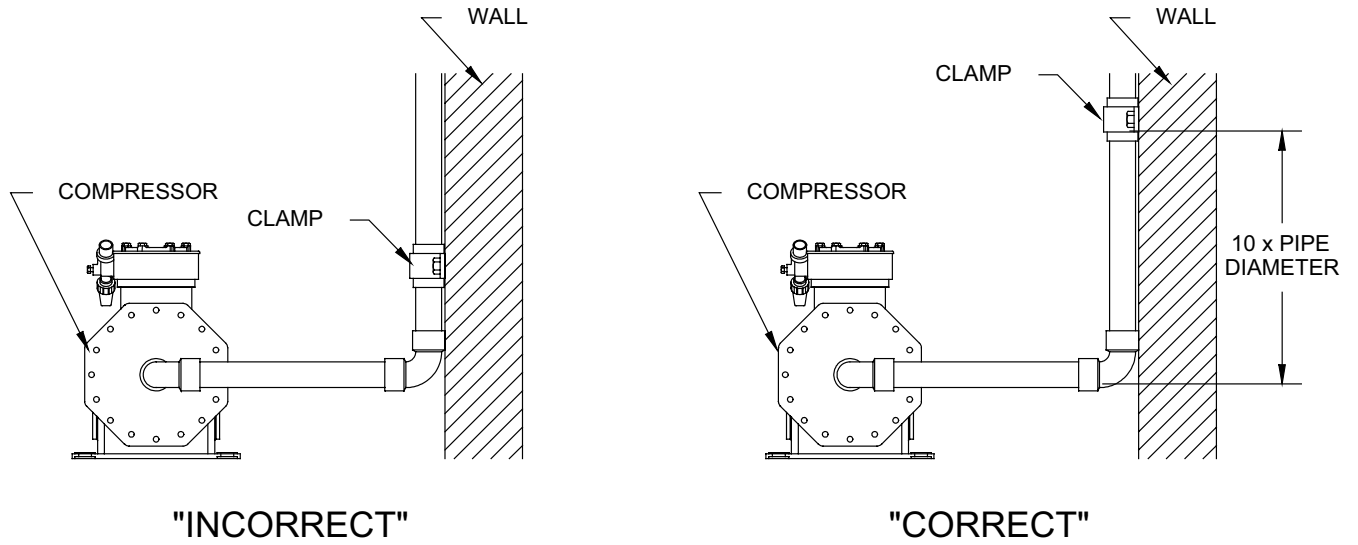


FIG 4: SUCTION P-TRAPS

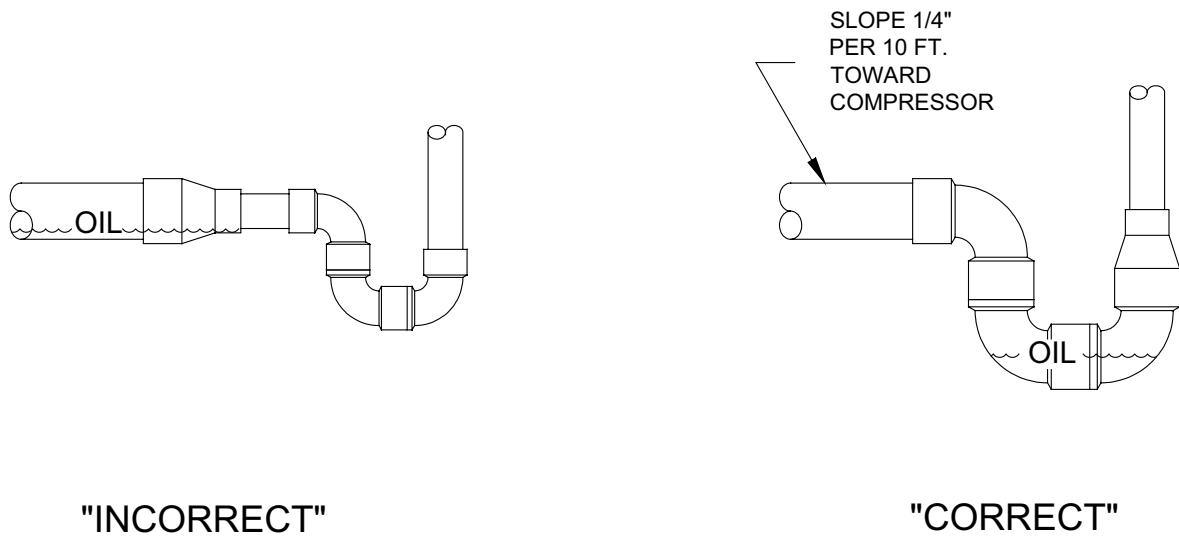
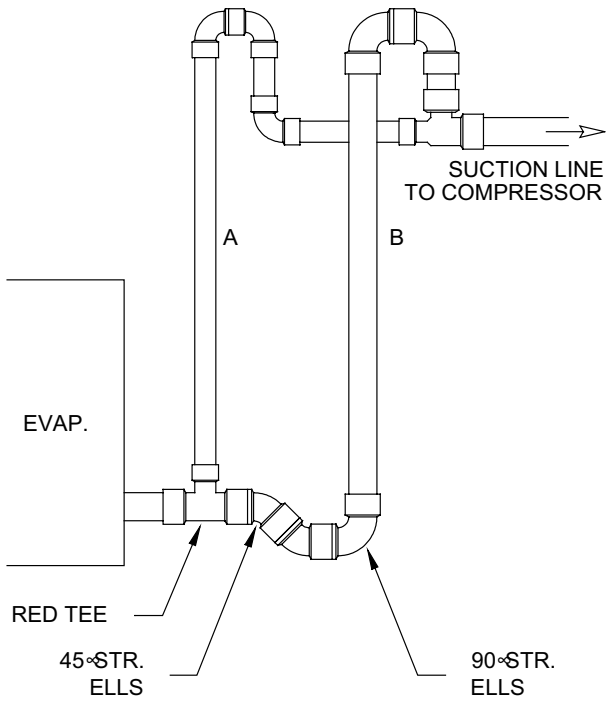
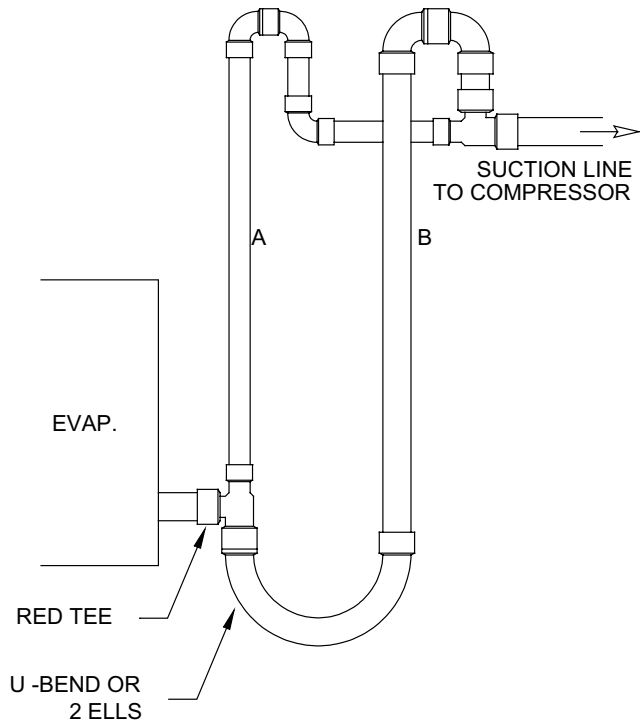


FIG 5: DOUBLE SUCTION RISER CONSTRUCTION



METHOD "A"



METHOD "B"

## REFRIGERATION SYSTEM START-UP CHECK LIST

### 1. PRELIMINARY INFORMATION

|                                  |                   |
|----------------------------------|-------------------|
| UNIT COOLER MODEL No.: _____     | SERIAL No.: _____ |
| UNIT COOLER MODEL No.: _____     | SERIAL No.: _____ |
| CONDENSING UNIT MODEL No.: _____ | SERIAL No.: _____ |
| COMPRESSOR MODEL No.: _____      | SERIAL No.: _____ |
| COMPRESSOR MODEL No.: _____      | SERIAL No.: _____ |
| DATE: _____                      | TECHNICIAN: _____ |

### 2. PRE-START-UP (Check each item when completed)

|  |  |
|--|--|
| <p>_____ CHECK ALL ELECTRICAL CONNECTIONS AND TERMINALS FOR TIGHTNESS</p> <p>_____ VERIFY REFRIGERANT CHARGE USING CHARGING CHART LABEL ON CONDENSING UNIT</p> <p>_____ CHECK REFRIGERANT AND OIL LEVEL IN SYSTEM</p> <p>_____ VERIFY THAT ALL DEFROST CONTROLS ARE FUNCTIONING PROPERLY</p> | <p>_____ CHECK ALL FAN MOTORS AND MOTOR MOUNTS FOR TIGHTNESS</p> <p>_____ CHECK DRAIN LINES AND DRAIN PAN FOR PROPER DRAINAGE</p> <p>_____ CHECK DRAIN LINE HEATER FOR PROPER OPERATION</p> <p>_____ CHECK ALL FLARE CONNECTIONS FOR TIGHTNESS</p> |
|--|--|

### 3. START-UP

#### ELECTRICAL

|                    |               |               |               |
|--------------------|---------------|---------------|---------------|
| COMPRESSOR VOLTAGE | L1 - L2 _____ | L2 - L3 _____ | L3 - L1 _____ |
| COMPRESSOR AMPS    | L1 _____      | L2 _____      | L3 _____      |
| COMPRESSOR         | VOLTS _____   | PHASE _____   | HERTZ _____   |
| UNIT COOLER        | VOLTS _____   | PHASE _____   | HERTZ _____   |

#### TEMPERATURES

|                                   | START-UP | AFTER 24 HOURS OF OPERATION |
|-----------------------------------|----------|-----------------------------|
| AMBIENT TEMPERATURE               | _____ F  | _____ F                     |
| DESIGN BOX TEMPERATURE            | _____ F  | _____ F                     |
| OPERATING BOX TEMPERATURE         | _____ F  | _____ F                     |
| OPERATING BOX TEMPERATURE         | _____ F  | _____ F                     |
| SUPERHEAT AT COMPRESSOR           | _____ F  | _____ F                     |
| SUCTION LINE TEMP. AT UNIT COOLER | _____ F  | _____ F                     |
| SUPERHEAT AT UNIT COOLER          | _____ F  | _____ F                     |

#### PRESSURES (in cooling mode)

|                                  |                          |
|----------------------------------|--------------------------|
| REFRIGERANT SUCTION _____ PSIG   | TEMP AT COMPRESSOR _____ |
| REFRIGERANT DISCHARGE _____ PSIG | TEMP AT COMPRESSOR _____ |
| EVACUATION: NUMBER TIMES _____   | FINAL MICRON _____       |

UNIT COOLER DRAIN LINE TRAPPED OUTSIDE OF BOX:      YES      OR      NO

### 4. CONTROLS

THERMOSTAT SETTING      \_\_\_\_\_ F      \_\_\_\_\_ F

DEFROST SETTING      \_\_\_\_\_ /DAY      \_\_\_\_\_ MINUTES FAIL-SAFE

   \_\_\_\_\_ /DAY      \_\_\_\_\_ MINUTES FAIL-SAFE

### 5. FIELD INSTALLED EXPANSION VALVE

MANUFACTURER \_\_\_\_\_

MODEL \_\_\_\_\_

# INSTALLATION, OPERATION & MAINTENANCE INSTRUCTIONS

## REPLACEMENT PARTS

### CONDENSING UNITS OCH, ICH, OCS, ICS, SCS, WCS, OCZ

| MOTOR                    |          |          |          |
|--------------------------|----------|----------|----------|
| MODEL                    | 008-017  | 020-220  | 250-802  |
| SUFFIX-2<br>240/1/60     | RMT 0021 | RMT 0022 | N/A      |
| SUFFIX-5<br>208-240/3/60 |          |          | RMT 0041 |
| SUFFIX-9<br>480/3/60     | N/A      | RMT 0023 | RMT 0042 |
| SUFFIX-8<br>600/3/60     |          | RMT 0033 |          |

| FAN MOTOR CAPACITOR      |          |          |
|--------------------------|----------|----------|
| MODEL                    | 008-017  | 020-220  |
| SUFFIX-2<br>240/1/60     | REC 0003 | REC 0004 |
| SUFFIX-5<br>208-240/3/60 |          |          |
| SUFFIX-9<br>480/3/60     | N/A      | REC 0003 |
| SUFFIX-8<br>600/3/60     |          |          |

| MOTOR MOUNT   |               |
|---------------|---------------|
| MODEL 008-220 | MODEL 250-802 |
| RGR 0140      | RGR 0180      |

| CONTROL TRANSFORMER |         |          |          |
|---------------------|---------|----------|----------|
| COMPRESSOR          |         | SUFFIX-8 | SUFFIX-9 |
| SINGLE              | TWIN    |          |          |
| 020-220             | 302-802 | RET 0207 | RET 0208 |
| 250-400             |         | RET 0211 | RET 0210 |
|                     |         | RET 0218 | RET 0219 |

| FAN BLADE     |               |
|---------------|---------------|
| MODEL 008-220 | MODEL 250-802 |
| RFN 0040      | RFN 0050      |

| FAN GUARD     |               |
|---------------|---------------|
| MODEL 008-220 | MODEL 250-802 |
| RGR 0100      | RGR 0120      |

### HEATER

| CRANKCASE           |                    | RECEIVER   |            | OIL SEPARATOR |
|---------------------|--------------------|------------|------------|---------------|
| COPELAND COMPRESSOR | CARLYLE COMPRESSOR | 008 to 220 | 250 to 802 | ALL MODELS    |
| 2 D                 | 06 D               | REH 0300   | REH 0301   | REH 0300      |
| 3 D                 | 06 E               |            |            |               |
| 4 D                 | 06 CC              |            |            |               |
| 6 D                 |                    | RCP 3046   |            |               |
| 6 D DEEP SUMP       | RCP 3014           |            |            |               |
| ZR 18/ZR 42         | RCP 3039           |            |            |               |
| ZR 46/ZR 72         | RCP 3038           |            |            |               |
| ZR 84/ZR 125        | RCP 3045           |            |            |               |
| K                   | RCP 3015           |            |            |               |
| E                   |                    |            |            |               |
| L                   | RCP 3002           |            |            |               |
| N                   |                    |            |            |               |
| C                   | RCP 3043           |            |            |               |
| R                   | RCP 3042           |            |            |               |

REPLACEMENT PARTS

CONDENSING UNITS OCH, ICH, OCS, ICS, SCS, WCS, OCZ

PRESSURE CONTROL

| HIGH PRESSURE | LOW PRESSURE | FAN CYCLING | DUAL PRESSURE | UNLOADER CONTROL |
|---------------|--------------|-------------|---------------|------------------|
| REP 0052      | REP 0053     | REP 0050    | REP 0205      | REP 0051         |

OIL FAILURE CONTROL

| MECHANICAL |          | ELECTRONIC |          | JOHNSON  |
|------------|----------|------------|----------|----------|
| COPELAND   | CARLYLE  | COPELAND   | CARLYLE  |          |
| REP 0022   | REP 0023 | REP 0053   | RCP 4084 | REP 0107 |

OIL CONTROL

| RATING | COMPRESSOR CONTACTOR | DISCONNECT SWITCH |          |
|--------|----------------------|-------------------|----------|
|        |                      | NON FUSED         | FUSED    |
| 25 A   | RER 0232             | -                 | -        |
| 30 A   | RER 0233             | REM 2060          | REM 2041 |
| 40 A   | RER 0234             | -                 | -        |
| 50 A   | RER 0235             | -                 | -        |
| 60 A   | RER 0236             | REM 2064          | REM 2042 |
| 75 A   | RER 0237             | -                 | -        |
| 90 A   | RER 0238             | -                 | -        |
| 100 A  | -                    | REM 2066          | REM 2043 |
| 200 A  | -                    | REM 2029          | REM 2044 |
| 400 A  | -                    | REM 2030          | REM 2045 |

DEFROST TIMER

| AIR      | GAS      | ELECTRIC |
|----------|----------|----------|
| REM 2032 | REM 2031 | REM 2031 |

HEAD COOLING FAN

| COPELAND   | CARLYLE    |            |
|------------|------------|------------|
| ALL MODELS | 030 TO 150 | 200 TO 802 |
| RCP 4001   | RCP 4005   | RCP 4004   |

CONTACTOR AUXILIARY CONTACT

ALL MODELS

RER 0250

Note: Must be the same make and model as contactor.

## WARRANTIES

RefPlus Inc. warrants the labeled (Serial No.) new RefPlus Inc. equipment and all parts thereof, to be free from defects in workmanship and material at the time of purchase. Applies to original purchaser only (nontransferable).

Under this warranty RefPlus Inc. shall be limited to repairing or exchanging any parts, without charge FOB factory or nearest authorized parts wholesalers, which may prove defective to the satisfaction of RefPlus Inc. within one year from date of start up, not to exceed

eighteen (18) months from date of shipment from the factory.

The warranties to repair or replace above recited, are the only warranties, express, implied, or statutory, made by RefPlus Inc. No express or implied warranties as to merchantability or fitness for a particular purpose or use. RefPlus Inc. neither assumes, nor authorizes any person to assume for it, any other obligation or liability in connection with the sale of said equipment or any part thereof.

## REFPLUS INC. SHALL NOT BE LIABLE:

- 1 - For any repairs or replacement by buyer without the written consent of RefPlus Inc., or when the equipment is installed or operated in a manner contrary to the instructions covering installation and service which accompanied such equipment.
- 2- For any damages, delays, or losses, direct or consequential, caused by defects, nor for damages caused by short or reduced supply of materials, fire, flood, strikes, acts of God, or circumstances beyond its control.
- 3- When the failure or defect of any part or parts is incidental to ordinary wear, accident, abuse or misuse; or when the serial number of the equipment has been removed, defaced, altered, or tampered with.
- 4- When this equipment is operated on low or improper voltages.
- 5- When this equipment is moved to a different location other than the original installation.
- 6- For payment of any removal or installation charges of parts or units.

## EXCLUSIONS

**THIS WARRANTY SHALL NOT APPLY TO LOSS OF FOOD OR REFRIGERANT DUE TO FAILURE FOR ANY REASON.**

RefPlus Inc. reserves the right to make any changes in the design or specifications of any product at any time without notice.



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