



APPLICATION GUIDELINES FOR CF REFRIGERATION COMPRESSORS AND CONDENSING UNITS

New hermetic compressors and condensing units have been developed utilizing R-404A/507 refrigerants suitable for Low Temperature applications. It must be noted, however, that under low evaporating temperature conditions, the operating envelope for these models will be restricted especially in comparison to semi-hermetic compressors typically used in similar applications. The operating envelope and restrictions are shown in **Figure 1**.

For a given saturated suction temperature, the maximum condensing temperature, the maximum return gas temperature, and the maximum discharge line temperature as outlined in **Figure 1 must not be exceeded!** Operation beyond these limits will cause high compression ratios and/or excessive internal compressor temperatures resulting in overheating connecting rod wear and premature compressor failure.

If the system design is such that operation within these guidelines cannot be guaranteed, then the following additional controls must be added:

1. Discharge Line Thermostat: Located 6 inches from the compressor and Set to cut-out the compressor at 225°F maximum
2. Low Pressure Control: Set to cut-out at 7 psig minimum.

Superheat Requirements

In order to ensure that liquid refrigerant does not return to compressor during the running cycle, attention must be given to maintaining proper superheat at the compressor suction inlet. Copeland recommends a minimum of 20°F superheat, measured on the suction line 6 inches from the suction inlet, to prevent refrigerant floodback.

Another method to determine if liquid is coming back to the compressor is to accurately measure the differ-

ence in temperature between the compressor lower shell opposite the suction inlet and the suction line. If this delta can be kept at a minimum of 50°F, no liquid will be present in the crankcase.

Suction Accumulator Requirements

Through our development testing we have found the combination of HFC refrigerants and polyol ester oil develop very high cylinder pressures during flooded start conditions. As a result of this testing, we have set the **maximum charge limit to be 6 lbs.**

Any system that exceeds the charge limit will require a suction accumulator and/or pumpdown cycle. The purpose of these precautions is to prevent damage to the compressor due to continuous floodback and/or flooded start conditions. An accumulator is an effective measure against floodback and provides some protection against flooded starts; however, the pumpdown cycle is the most positive means of preventing flooded start conditions.

Crankcase Heater Requirements

Crankcase heaters are recommended on all outdoor applications or indoor applications if expected to operate in ambients below 40°F, or **any system with an accumulator.**

Lubricants

HFC refrigerants such as R-404A and R-507 require polyol ester lubricants to provide proper miscibility and lubricity. Copeland has approved only the following lubricants at this time:

- Copeland Ultra 22CC
- Mobile EAL Arctic 22CC
- ICI Emkarate RL32CF
- Thermal Zone 22CC

Should a system require the addition of lubricant for any reason, only the lubricants specified above should be used.

Practical Considerations

The application restrictions imposed on these models will require careful system design. Some considerations for the designer are:

1. Units operating at low evaporator temperatures will be susceptible to overheating with dirty condensers and/or restricted air flow. Large condensers (with low TD's) should be designed into systems using these compressors and proper condenser coil maintenance is required and regular cleaning practices should be followed.
2. Minimum suction line pressure drops will be important to maintain Saturated Suction Temperature limits at the compressor.
3. Traditional superheat settings at the Thermal Expansion Valves may be too high to maintain the return gas temperature limits specified.
4. Suction lines should be well insulated.
5. Suction line to liquid heat exchangers may not be desirable if return gas temperatures specified are to be maintained.

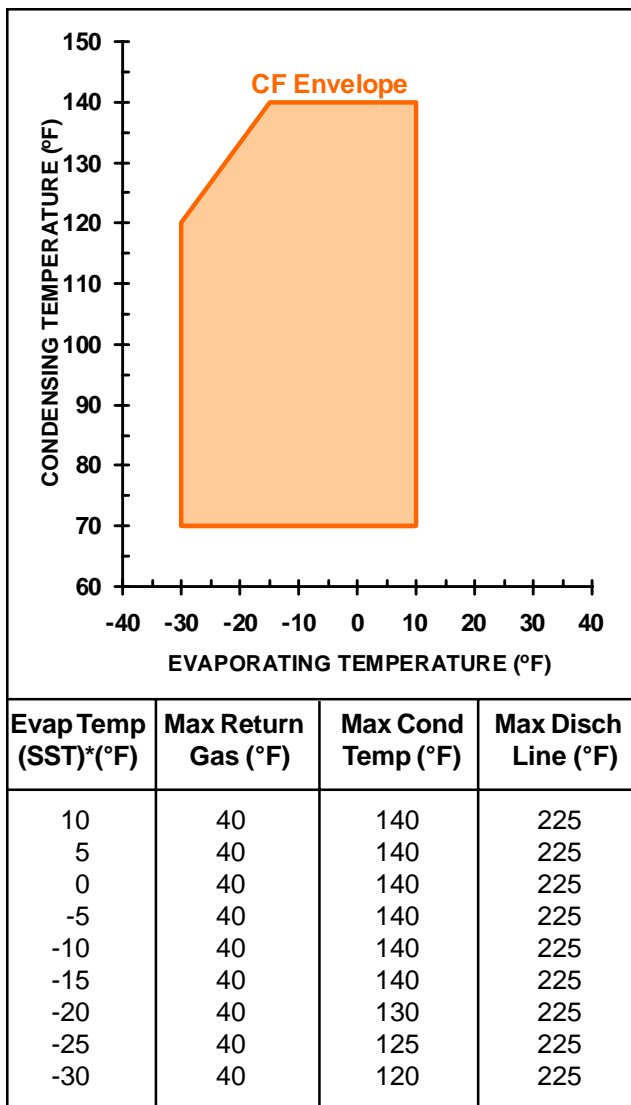


Figure 1