



APPLICATION GUIDELINES FOR RF LOW TEMPERATURE REFRIGERATION COMPRESSORS

New hermetic compressors have been developed for the application with R-404A refrigerant suitable for use in Low Temperature applications. It must be noted however, that under low evaporating 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**.

Note: These compressors do not meet the starting and maximum load run down requirements for the use with R-507 refrigerant therefore they are not approved for R-507.

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" from the compressor and Set to cut-out the compressor at 225° maximum.
2. Low Temperature Pressure Control: Set to cut-out at 7 psig minimum.

Superheat Requirements

In order to ensure that liquid refrigerant does not return to the compressor during the running cycle, attention must be given to maintain 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 valve, to prevent refrigerant floodback.

Another method to determine if liquid is coming back to the compressor is to accurately measure the difference in temperature between the compressor oil crankcase and the return 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 3 lbs.**

Any system that exceeds the charge limit requires 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

The HFC refrigerant such as R-404A will require polyol ester lubricants to provide proper miscibility and lubricity. Copeland has approved only the following

lubricants at this time:

- Copeland Ultra 22CC
- Mobile Arctic EAL 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 will be more critical.
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 line heat exchangers may not be desirable if the return gas temperatures specified are to be maintained.

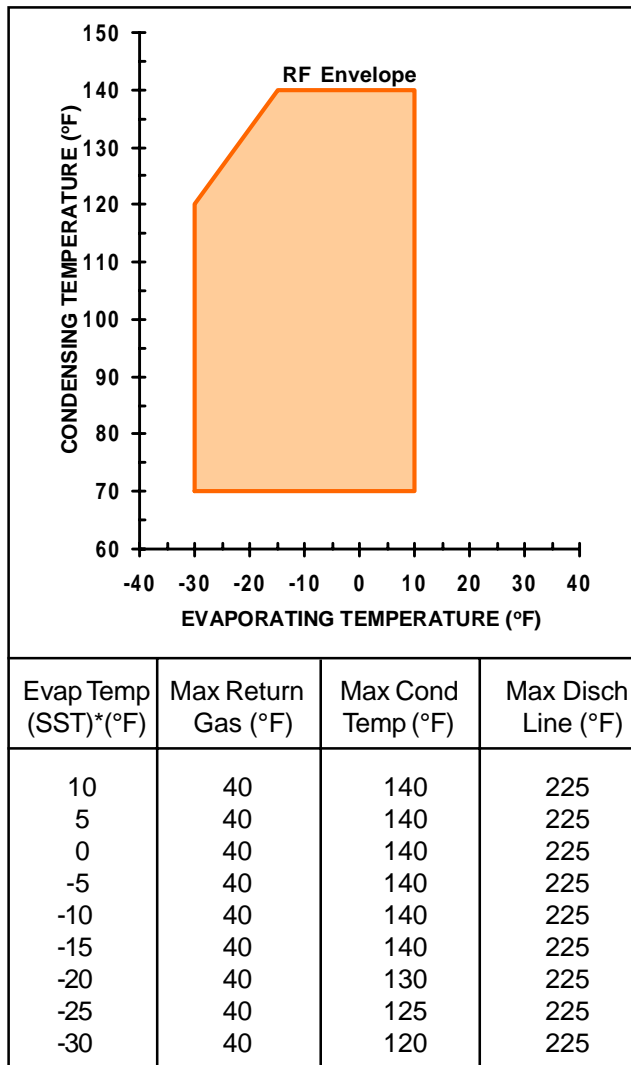


Figure 1