



**Application Engineering Bulletin  
AE-1283**

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**DISCUS R-22 ENVELOPE EXTENDED**

Due to the long term availability issue of Refrigerants 12 and 502, equipment end users are increasingly inquiring about the use of R-22 for medium and low temperature applications.

Historically, R-22 has been restricted to high temperature applications because of compressor reliability concerns. Use of R-22 under high compression ratio conditions has a tendency to cause overheating of compressors leading to oil breakdown, mechanical wear and motor failure.

Because of this overheating concern, Copeland has previously restricted the operating envelope of R-22 Discus compressors to a minimum saturated suction temperature of +10°F.

Since R-22 is a refrigerant currently not affected by the CFC regulations, Copeland has performed extensive testing to determine under what conditions the operating range of Discus compressors could be extended. Based on our testing, we are pleased to approve R-22 Discus compressors down to a minimum saturated suction temperature of -10°F with certain restrictions. This extension is possible primarily due to the significantly higher efficiency levels of today's Discus compressors compared to several years ago.

**-10°F R-22 Application Guidelines**

R-22 Discus compressors can be applied to a minimum saturated suction temperature of -10°F if the following criteria are met: (See Figure 1)

- Return gas temperature not to exceed 50°F
- Condensing temperature not to exceed 110°F
- A head cooling fan is used

From a system design standpoint, these criteria may require use of oversized condensers, insulated suction lines, low evaporator superheat settings and avoidance of liquid/suction line heat exchangers.

**-10°F R-22 Unloading Guidelines**

4D and 6D R-22 compressors can be applied to a minimum saturated suction temperature of -10°F **when unloaded** if the following criteria are met. (See Figure 2)

- Return gas temperature not to exceed 50°F
- Condensing temperature not to exceed 100°F
- A head cooling fan is used

It should be noted the maximum condensing temperature is lower (100° vs 110°F) during the unloaded mode. This is again due to overheating concerns under low mass flow conditions.

It should also be noted that at the time of this printing Moduload (3D Unloading) is not available for the extended R-22 envelope. The Moduload kits currently used for high temperature applications would require minor design modifications before they could be applied to the extended R-22 range because of the increase in compression ratio.

**2D, 3D, 4D, 6D Standard Discus Compressors**  
R-22 Extended Operating Envelope

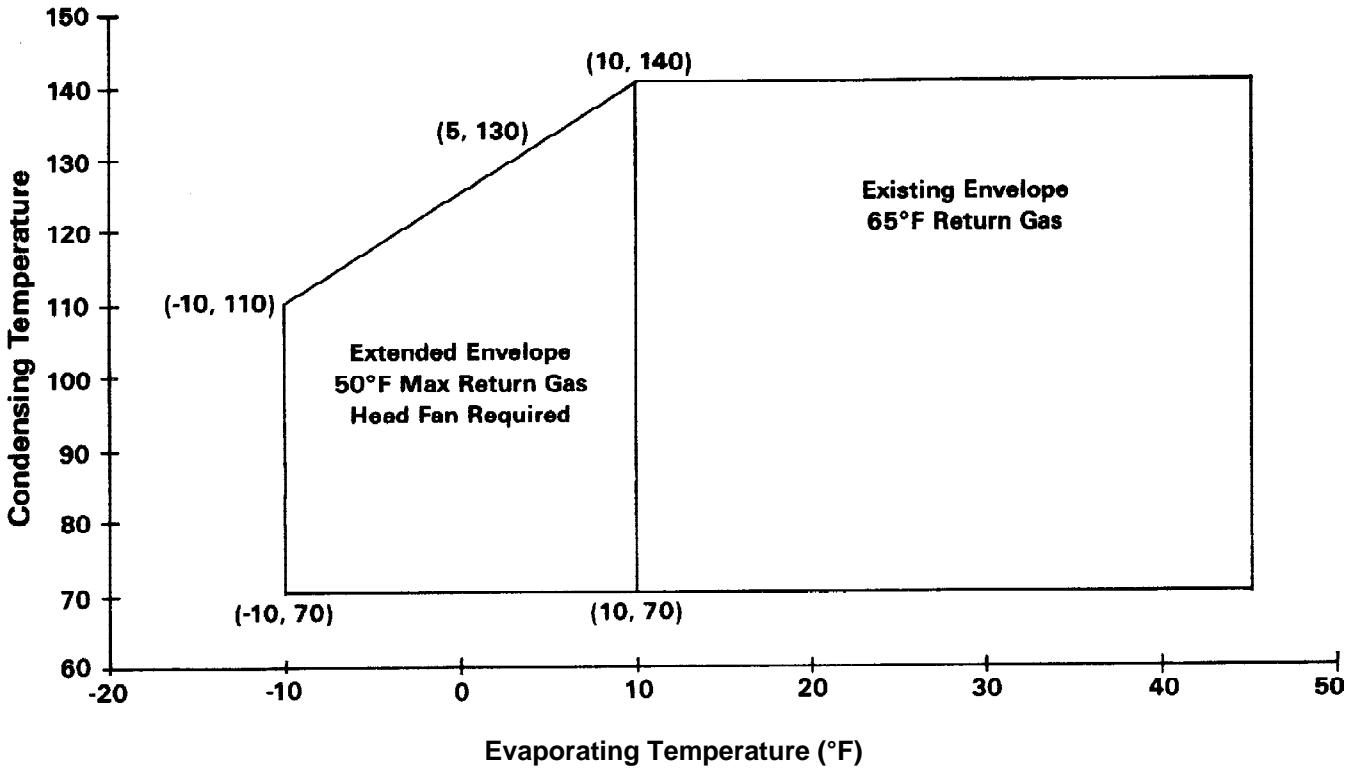


Figure 1

**4D, 6D Unloader Model Compressors**  
R-22 Extended Operating Envelope

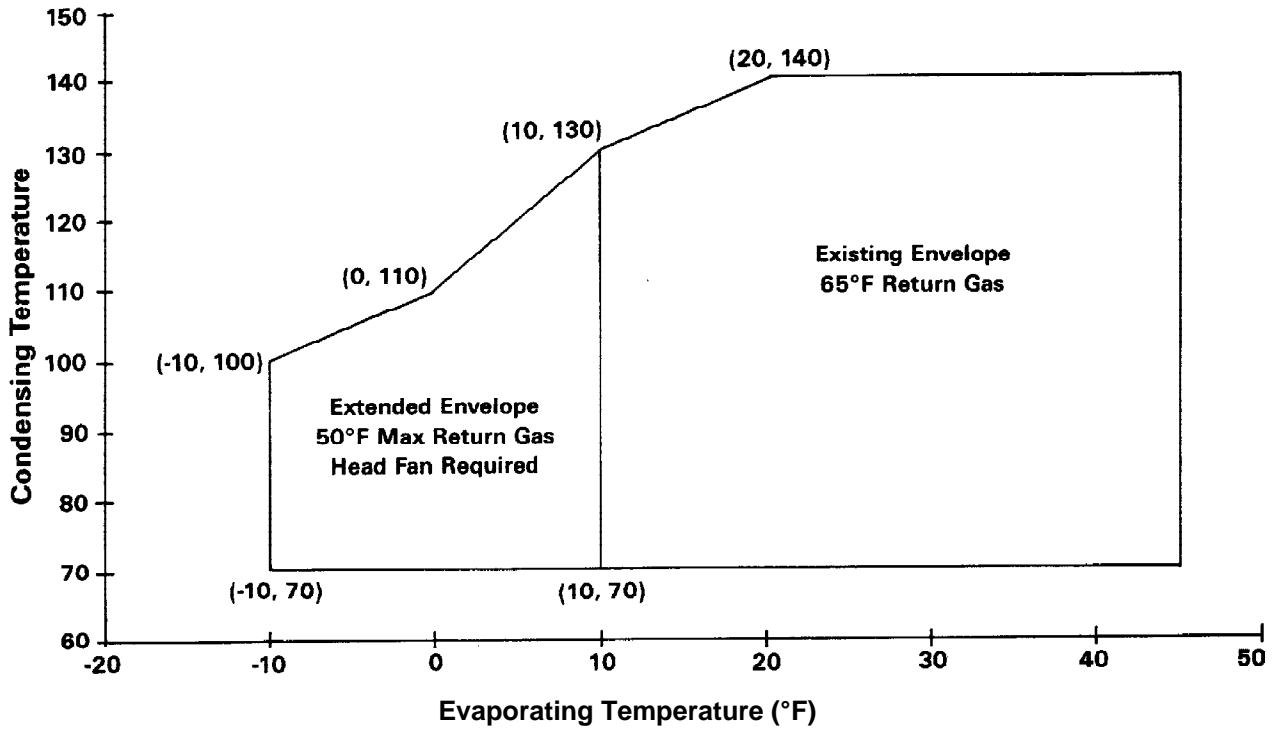


Figure 2