

# 1.0 – System Design Considerations

## 1.1 General Application Information

The 06D and 06E compressors are versatile in their application. Compressors are available for operation in low temperature R-502, medium temperature R-12, and air conditioning R-22 applications. Recent design modifications allow the use of HFC refrigerants R-134a, R-404A, R-407C, and R-507. This guide provides information and recommendations for the successful application of compressors in HVACR.

Maximum operating conditions of the compressor models are generally defined in the performance curves and will differ with each model. Operating conditions should be controlled so that the discharge gas does not exceed 275°F (135°C) at the discharge service valve and that oil temperature does not exceed 160°F (71°C). For HFC/POE applications the maximum recommended discharge temperature is 250°F (121°C).

## 1.2 Compressor Rating Notes

Performance for most standard conditions are plotted in tabular data or rating curves. For special requests, contact Carlyle Application Engineering. Carlyle also provides computer software data that allows system designers access to Carlyle compressor performance with IBM compatible PC computers.

The compressor capacity and power ratings found in the 06D/E refrigeration compressor specification sheets are based on the following conditions:

Compressor ratings are based on nominal voltage, 60 hertz (1750 rpm) operation and 50 hertz (1450 rpm) operation, with 0°F (0°C) subcooling.

Note: Some Carlyle air conditioning ratings are at ARI (Air Conditioning & Refrigeration Institution) rating conditions and with 15°F subcooling. Ratings may be interpolated but not extrapolated.

Liquid subcooling increases system capacity by approximately 1/2 of 1% for each degree Fahrenheit (.5°C) of subcooling for R-12, R-22, and R-502. With HFC refrigerants R-134a, R-404A, and R-507, the subcooling correction is higher and in most cases a correction of 6/10 of 1% for each degree Fahrenheit (.5°C) can be used. When correcting for subcooling, power input to the compressor motor does not change.

Refrigerant temperatures (suction and condensing) are saturation temperatures corresponding to pressures indicated at the compressor service valves. Actual gas temperatures are higher because of superheat.

Capacities are based on the actual suction gas temperatures to the compressor of 65°F (18°C) for refrigerants 12, 502, 134a, 404A, and 507. Superheating occurs in the evaporator and in the suction line within the refrigerated space, or in a liquid-suction heat exchanger so that all the superheat produces useful cooling. Superheating that occurs outside the refrigerated space is a loss, but is a compressor load. If increases in return gas temperatures are obtained outside of the refrigerated space or if the compressor is operated at a lower return gas temperature than 65°F (18°C), a capacity correction is required. Capacity corrections for R-12, 502, 134a, 404A, and 507 for other than rated suction gas temperatures may be obtained from Table 1 (Page 18). Due to the number of the variables involved in correcting for superheat, this table is only an estimate and should be used as a guide for the system designer. For R-22, ratings at 65°F (18°C) return gas temperature, the same adjustments as noted above with R-502 should apply. For R-22 ratings based on a suction gas superheat of 20°F (-11°C), it is assumed that all the superheat is useful and the capacity can be used without adjustment.