Maximum Allowable Discharge Temperature

The discharge temperature limits are presented as both an application limit and a maximum discharge temperature shutdown set point. The Ariel Performance Software provides a blue and red flag on discharge temperature. The blue flag represents a guideline for applying a selection. The red flag represents the maximum discharge temperature shutdown set point. The maximum discharge temperature shutdown set point is listed in the instrumentation section of the Packager Standards.

Table: Discharge Temperature Flags and Limits by Service

Service	Application Limit	Max Shutdown
Lubricated	330 °F (165 °C)	350 °F (177 °C)
Non-Lubricated	275 °F (135 °C)	325 °F (163 °C)
PRC	275 °F (135 °C)	325 °F (163 °C)
Hydrogen Rich	275 °F (135 °C)	300 °F (149 °C)

The Ariel performance software will provide a red flag if the discharge temperature exceeds the maximum allowable discharge temperature shutdown limit. A blue flag will be provided when the discharge temperature exceeds the application guideline, a warning as the discharge temperature approaches the maximum allowable level. A warning will also be displayed when the average of the suction temperature and discharge temperature exceeds 285 F (140 C).

The discharge temperature calculated by current version of the Ariel Reciprocating Performance Program, is based on suction temperature plus cylinder pre-heat and internal compression ratio. The equation is as follows:

$$T_D = \left[\left(T_S + 460 \right) x \, R^{\frac{(k-1)}{k}} \right] - 460 \quad \text{or} \quad T_D = \left[\left(T_S + 273 \right) x \, R^{\frac{(k-1)}{k}} \right] - 273$$

for metric units

TD = Discharge Temperature, °F or °C

TS = Internal Suction Temperature, °F or °C

R = Internal Compression Ratio , pressure discharge / pressure suction

k = Ratio of Specific Heats

High discharge gas temperature shutdowns should be set as close as practical to the operating temperature.