High Gas Molecular Weight

It is always recommended to use a gas analysis for the highest accuracy for predicted performance. For the normal natural gas mixtures with .56 to .80 specific gravity a specific gravity entered for performance predictions is acceptable. If the gas contains gas constituents outside the normal pipeline gas mixtures (ie., carbon dioxide, nitrogen, hydrogen sulfide, hydrogen...) a gas analysis will provide more accurate performance results.

When gas mixtures are lighter than .35 specific gravity (10 mole weight) or heavier than 1.35 specific gravity (39 mole weight) it is recommended to contact Ariel Applications Engineering. The VMG gas method should be used for gasses outside the use of natural gas.

When only a specific gravity is specified, the gas properties (K value and compressibility) are based upon a generalized hydrocarbon mixture. This could lead to inaccurate compressor performance predictions when other gas constituents are present outside the normal natural gas mixture. Air should never be entered by a specific gravity.

Heavier gasses will create higher pressure losses through the valves. This pressure loss is calculated through the pseudo-Q values. When the pseudo-Q values are high, reaching or exceeding 15, a slower piston speed will be necessary.

Often times heavy gas applications are also wet gas or low suction pressure applications.

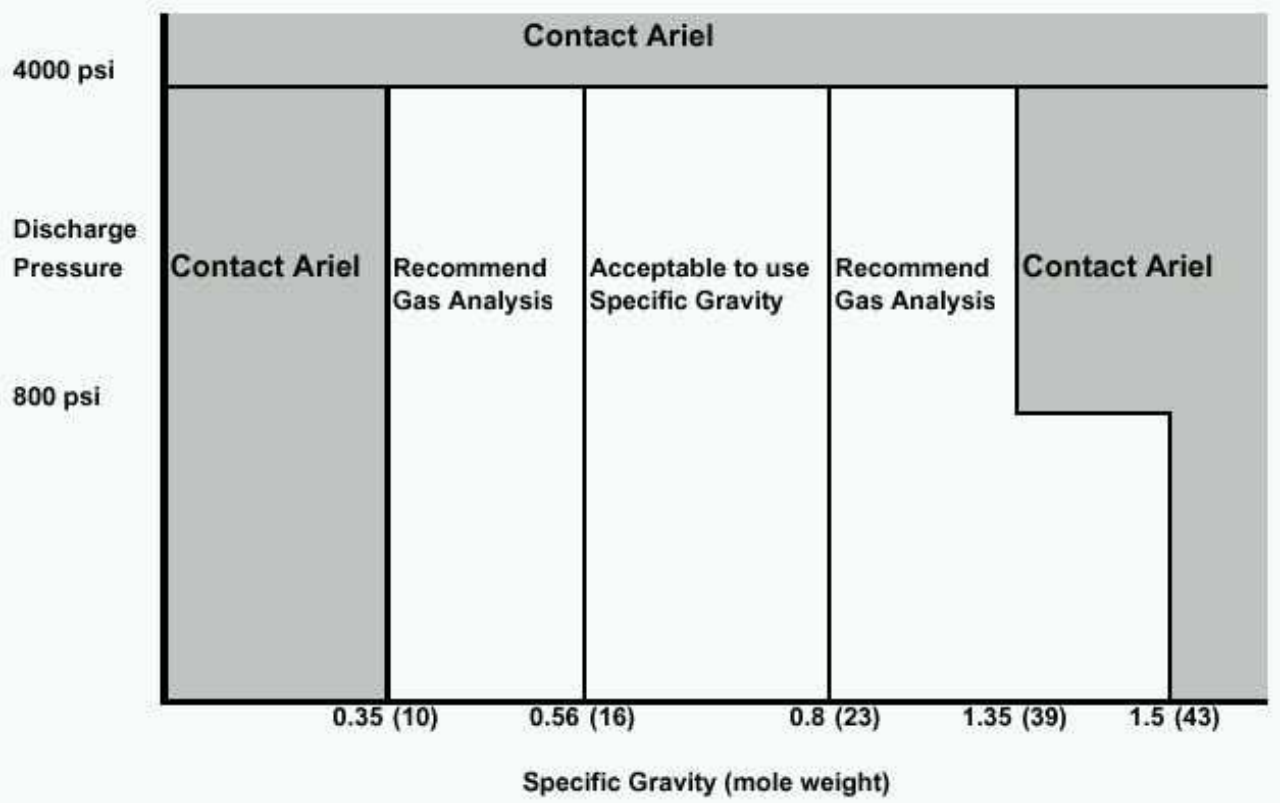
See the Packager Standards Section 6: Lubrication for information on applying the appropriate cylinder lubricant and rates for high gas molecular weight applications.

Heavier gasses may approach the dew point at the higher pressure interstages. If so, temperature controls for the interstage may be necessary to avoid gas product condensates.

Light gasses, molecular weight less than 12 (specific gravity less than 0.4), are considered low molecular weight applications and must be reviewed by Ariel Application Engineering. A valid gas analysis must be provided for these applications. The VMG gas method should be used for light molecular weight gasses.

Special attention will be paid to the selection of compressor valves for low molecular weight applications. The pseudo-Q-value must exceed 1.0 for all operating conditions. The application will be reviewed with the valve supplier to select the proper compressor valve. Ariel will also adjust the expected compressor capacity to account for higher piston ring blow by. It must be noted that any changes to the compressor valves that may be required to increase the pseudo-Q-value and any capacity adjustments may result in an increased HP (kW) requirement.

Applications that involve higher than 50% by volume of hydrogen shall be sized to limit the internal discharge temperature to 275 °F. Cylinders in these applications must have a helium leak test and packing cases with lapped cups.


Contact Ariel
4000 psi
Discharge Pressure
800 psi
Contact Ariel
Recommend Gas Analysis
Acceptable to use Specific Gravity
Recommend Gas Analysis
Contact Ariel
0.35 (10)
0.56 (16)
0.8 (23)
1.35 (39)
1.5 (43)
Specific Gravity (mole weight)