

Valves

Compressor valves are finely tuned check valves, cycling up to 1800 times per minute. The variations in operating pressures, gas composition, gas density, operating speed, and load steps are all designed into the specific valve configuration for a given application. The valve design consists of the proper size, plate mass, plate lift, spring force, and plate and spring materials.

The valve selection is optimized for the specific operating conditions provided within each compressor application. When operating conditions vary outside the original parameters, the valve selection should be reviewed to confirm appropriate plate motion. This may mean a change in valve springs, plates, or sometimes entire valve.

Operating across a wide speed range, as with a variable speed electric motor driver (VFD), will require special consideration in the valve selection. The speed range will depend upon several variables. Generally the valve selection will not tolerate a speed range greater than a 2:1 turndown. Further consideration may be needed below half frame rated speed, as this may impact valve reliability.

Commissioning and Operation of the Compressor

Once the compressor is installed and the operating conditions confirmed, the valve configuration should be reviewed. If the current operating pressures are much different than the expected operating conditions, contact the Ariel Response Center (ARC) to confirm the valve configuration. Different springs may be necessary to ensure proper valve dynamic motion.

If the valve life proves shorter than expected, contact Ariel with the unit serial numbers, current valve part numbers and current operating conditions. The valve configuration can be confirmed, or altered as necessary.

Valve Analyses

A valve dynamic motion analysis can be provided for the valve design condition upon request. This is a mass spring damped motion review of the plate motion, including impact velocities and motion analysis. Response to the acoustical pulsations is not included in the valve motion study.

Valve Lift

The current CP valve type is offered in one valve lift. This lower lift offers improved valve reliability, while maintaining or improving upon valve efficiency (flow area).

Older valve styles were offered in varying lift configurations to accommodate wider, or varying operating conditions. Low lift valves improved reliability by reducing impact stresses or improving closing timing. However, this also increased power usage, rod loads and discharge temperatures. The increase may be slight in most cases, but should be reviewed and considered.

Low lift valves were required when suction pressure, discharge pressure, and / or operating speed vary greater than 25%. Contact Ariel with the full range of operating conditions for review of valve type and lift.

See Also:

Valve Lift Pseudo-q Value Suction Valve Unloaders High Clearance Valve Assembly Adjusted Equivalent Valve Area