

Inadequate Surge Volume

Pulsation vessels are required for both reducing pressure pulsations in the gas piping system and providing a surge volume of gas to allow the cylinders to breath well during suction and discharge events. Refer to API-618 for pulsation vessel sizing criteria.

If the suction or discharge system is too restrictive, ratio inside the cylinder will be increased— the suction pressure inside the cylinder will be lower, and the discharge pressure will be higher. This higher internal ratio can result in less flow when compared to predicted flow. This can also result in higher temperatures, higher gas rod loads, and higher power consumption. Significant impacts have been seen due to restrictive inlet and discharge gas piping systems.

Restrictive gas piping systems can be from additional equipment in the pulsation vessel, such as orifices, or from the use of piping without a surge volume. Though pulsation vessels are required, some smaller power units are built without pulsation vessels. Piping in and out of a cylinder can create these higher internal ratios. If applying piping rather than pulsation vessels, we have seen a reduction of the restrictive piping effects through the use of expanded pipe sections at the cylinder inlet and discharge.

API-618 includes an initial sizing recommendation for pulsation vessels.

3500 3000 HE Bore with Bottle Discharge Line with Bottles 2500 HE Bore without Bottles Discharge Line without Bottle Pressure, psia 2000 1500 1000 500 0 45 90 135 180 225 270 315 360 Crank Angle, deg

Figure: PT Card with Comparison of Volumes

	With Bottles	Without Bottles
Power (HP)	211	221
Flow (MMSCFD)	4.55	4.41
Discharge Temp (°F)	231	240
Specific Power (HP/MM)	46.37	50.11