

High Integrity Pressure Protection Systems

Background: The customer placed a large order for High Integrity Pressure Protection System (HIPPS) trunnion valves, which were 8" class 2500. These valves are used in oil and gas highpressure production lines to protect against pressure surges from the well. The scope was a total of 20 valves which were needed for the expansion of their gas field. Their excellent experience with ValvTechnologies' on a previous order influenced them to choose our services again.



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Requirement: The traditional method to provide protection against over pressure is a safety relief valve (SRV). Per code, the SRV needs to have a capacity equal to the well capacity without any restriction in the choke. This can become impractically large. Protection with SRV-s numerous drawbacks, which include:

- Potentially impractical size or number of parallel SRV-s
- Potential continuous leakage if the set point and operating pressure are close, like in this application where that delta in the pressures is only 50 psi
- Capital cost of flare, possibly with burner
- Nuisance to the environment of flare noise and the visual effect of the burner flame
- Emission of methane and CO₂. Both are greenhouse gases

Solution: HIPPS provide the same function as a relief valve, but instead of relieving the high pressure gas to atmosphere the HIPPS shuts in the pressure and contains the high pressure gas upstream of the lower pressure section of the piping.

The pressure transmitters forward the pressure signal to the logic solver. The program logic provides the set point and the voting rule. For example, the system may be based on closing the HIPPS if any two of the three pressure transmitters detect a pressure above the set point.

Upon closing of the HIPPS valves the down stream pressure is likely drop below the pressure safety threshold. Nevertheless, the HIPPS valves do not automatically re-open. Instead, a local, manual reset feature needs to be engaged forcing the operator to do a local, visual inspection and correction of the issue that caused the over pressure before allowing flow to restart. A key feature of HIPPS is the 'spec break', the transition from the high pressure piping to the lower pressure system. The spec break is indicated on the P&ID near the second HIPPS-valve.

Most importantly, a HIPPS is tightly regulated system, subject to regulator oversight and stands alone to protect a piping system against over pressure and consequent potential for catastrophic failure, loss of life, loss of assets and damage to the environment.