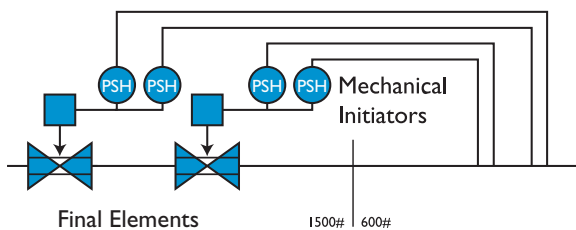


Mokveld **HIPPS**

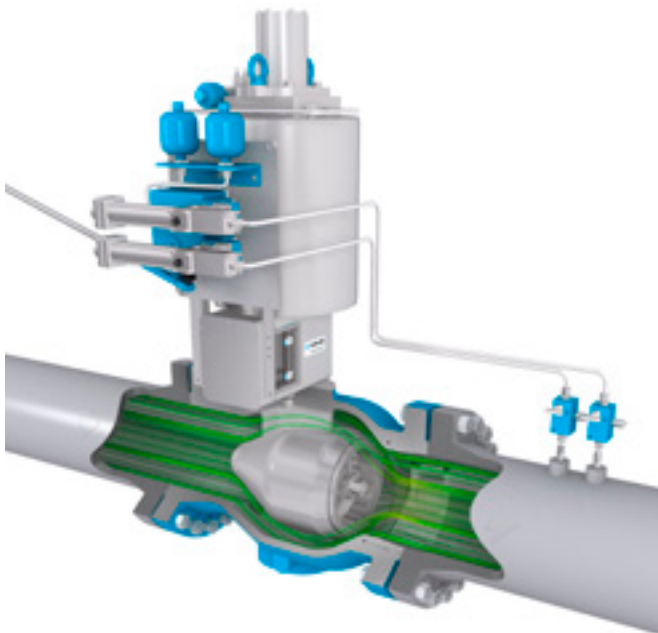
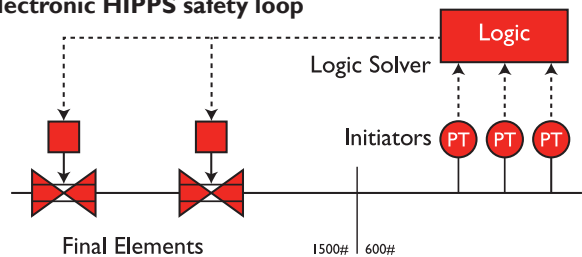
summary sheet

Application	High Integrity Pressure Protection System (HIPPS)
Final element	Mokveld's axial on-off valve with integrated actuator and solenoid or mechanical initiators
Scope	Sizes: 2" - 48" Ratings: ASME 150 - 2500 or API 3000 - 10 000 Higher pressure ratings upon request EN14382 certified (former DIN3381) Full closure in 2 seconds
In preference to	Flare systems Venting or relief systems
Other designations	Safety shut-down systems (SSD) Safety Instrumented System (SIS) Safety Instrumented Function (SIF) Over-pressure protection systems (OPPS)

Mechanical HIPPS safety loop



Electronic HIPPS safety loop



An integral mechanical HIPPS 1002

Mokveld HIPPS offer the following main features:

• Advantages of HIPPS

HIPPS provides a technically sound and economically attractive solutions to protect equipment in cases where:

- High pressures and / or flow rates are processed
- The environment is to be protected
- The economic viability of a development needs improvement
- The risk profile of the plant must be reduced

• What is HIPPS?

HIPPS is an instrumented safety system that is designed and built in accordance with the IEC 61508 and IEC 61511 standards. These international standards refer to safety functions (SF) and Safety Instrumented Systems (SIS) when discussing a solution to protect equipment, personnel and environment. A system that closes the source of over-pressure within 2 seconds, with at least the same reliability as a safety relief valve, is usually identified as a HIPPS.

A HIPPS is a complete functional loop consisting of:

- The initiators that detect the high pressure.
These initiators may be electronic or mechanical.
- For electronic HIPPS, a logic solver, which processes the input from the initiators to an output to the final element.
- The final elements, that actually perform the corrective action in the field by bringing the process to a safe state. The final elements consists of a valve and actuator and possibly solenoids or mechanical initiators.

• Mokveld reliability

Third parties, like the German TÜV and Atomic Energy Agency, have validated the Mokveld database of installations and the derived reliability data. Failure rates for both clean and unclean fluids are available for 2 seconds stroking time applications. Mokveld's vast experience in fast stroking final elements totals over of 35 000 operational years (with more than 2500 valves). The Mokveld final elements are therefore proven-in-use for high reliability safety applications in natural gas and multiphase hydrocarbons.

The certified Mokveld failure rate for the final element (being the valve including actuator) for a failure to deliver a full stroke in 2 seconds for applications in untreated hydrocarbons is: $\lambda_d = 1,0 \times 10^{-4} / \text{year}$. The failure rate for a single Mokveld hydraulic mechanical initiator is: $\lambda_d = 9,7 \times 10^{-4} / \text{year}$. This enables Mokveld to supply a HIPPS to suit SIL 3 or even SIL 4 with a proof test interval of 1 year. This can be achieved without additional electronics, like partial stroke testing. A separate technical datasheet on this subject is available.

For more detailed information, please contact Mokveld.