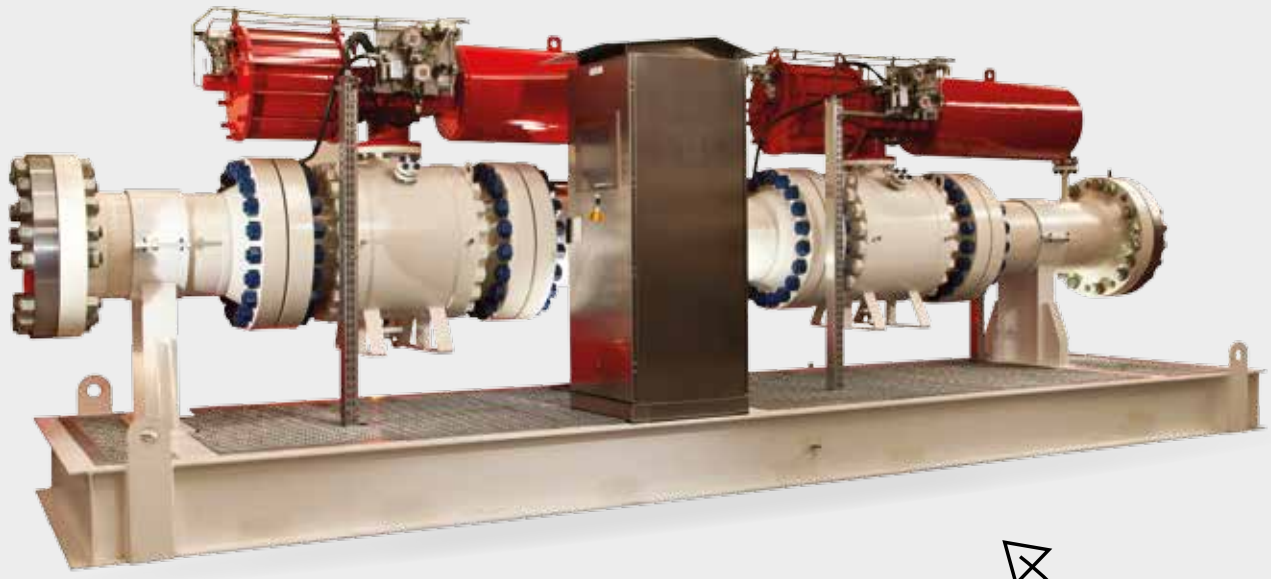
IMI CCI

High Integrity Pressure Protection System (HIPPS)



Engineering GREAT Solutions

Innovative custom engineered system approach

IMI Critical Engineering

HIPPS

HIPPS (also referred to as HIPS) systems are a series of components, specifically engineered to isolate the source of dangerous high pressure instead of relieving the excess flow, in the case of an overpressure event. HIPPS is an independent and reliable Safety Instrumented System that is designed with high integrity as per established ANSI/ISA and IEC standards, in order to equal or exceed the safety performance of conventional safety valves.

All systems are manufactured to the applicable industry standards

Key features

> **Initiators / process sensors**
Initiators are either electronic or electro-mechanical pressure switches or transmitters which measure the process variables (PV) to sense an event. The programmable electronic system receives the signals from the initiators, performs the required logics (voting, diagnostics, and partial stroke test routine) and engages the final elements.

> **Final elements**
The final elements are the physical units that are called upon to isolate the exposure, and are typically fail safe valves, open or closed using spring loaded, hydraulic or pneumatic actuators and solenoids. The final configuration is prescribed by, for the desired fail safe level. The IMI CCI HIPPS design may utilize dual devices in a 1oo2 (one out of two) configuration (two valves in series), where each valve has 1or 2 solenoids (in 1oo2 logic) powered by two independent outputs from the redundant SIL 3 certified Logic Solver.

HIPPS can improve safety for numerous applications in the Process Industry

Benefits

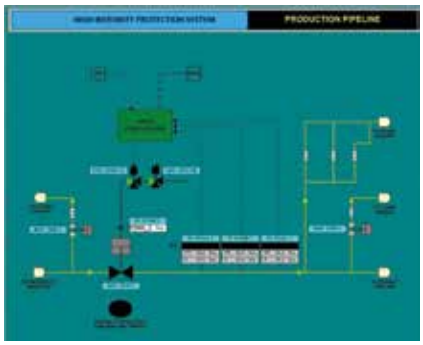
> **Safety**
As a Safety Instrumented System (SIS), HIPPS requires each specific applications to be investigated thoroughly. The main metric of the SIS is the safety integrity level (SIL). The SIL represents the necessary risk reduction to obtain the desired tolerable risk, as recognised in a user's risk analysis. Every HIPPS subsystem (sensors, logic solver, final elements) is designed so that together the components are capable of achieving the overall SIL of the complete loop. The international standards IEC 61508 establishes a framework for the design of instrumented systems that are used to mitigate safety-related risks, while IEC 61511 and the ANSI/ISA S84.00.01 are intended to address the application of SIS in the process industry.

> **Precision and performance**
When the process industry has a severe duty application, like HIPPS, where product integrity is imperative, IMI CCI has the engineering and products to meet the challenge. Our custom designed solution will have industry leading analytics applied to ensure that the overall integrity level of the system will be achieved; which is supported by a third party SIL certification. Safety requirements are exceeded using the specific equipment to maximise operation time. Standard diagnostics include input signal monitoring, logic solver diagnostics and automatic partial stroke testing, when applicable, of the final element sub-system.

HIPPS is a Safety Instrumented System (SIS)

Measurement of process variables

Pressure is the process variable (PV) most commonly measured in a HIPPS system. The evolution of the electronics has made the use of analogue transmitters more suitable than the traditional discrete switches which have been used as input sensors to logic solvers in the past. An advantage of the analogue transmitters is that they can be continuously monitored and the operability of the transmitters readily observed, thus reducing the potential for initiator related failure events. Most HIPPS applications require 2 or 3 transmitters (1 out of 2 or 2 out of 3 voting logic) as field devices. The use of redundant inputs enables system designers to incorporate diagnostics into the HIPPS, which significantly reduces the probability to fail on field input demand. Other options like independent process connections and diversity in pressure instruments, when practicable, are also recommended.



Display example

The logic solver

All HIPPS logic solver hardware is designed and certified in compliance with SIL3 or SIL4 performance requirements, as provided in IEC 61508. Additionally, ANSI/ISA S84.00.01-1996 and IEC 61511 recommend the HIPPS safety logic to be independent from the basic process control and lower layer protection systems. Although the logic solver can be provided with fully pneumatic logic solver (requiring no power consumption), solid state, or programmable electronic systems (PES); the preferred IMI CCI solution uses the PES to provide a high level of self diagnostics, enhanced availability and fault tolerance.

System Logic Solver

Diagnostics

IMI CCI provides, on demand, advanced diagnostic systems (hardware and software) that enable on line tests to be performed which may detect a possible failure in the safety loop. The main characteristics of the automatic test are:

- > Performs without any production loss and checks the state of the final element loop
- > Doesn't inhibit the safety function at any time
- > Enables an extension to the full stroke test interval
- > Reduces the probability of a valve sticking
- > Provides a comparison between final element signature and the profile acquired during each test

Options

Once the engineering is complete, the full advantages of working with IMI CCI will become clear as the breadth of products we offer will be evaluated to meet your integrity level. The product advantage extends beyond the valve size and design to include the technology embodied in other options.

- > The actuator with quarter turn movement with a very quick closing time
- > Damper free valve design, due to the absence of mechanical shocks at the stroke end
- > The valve construction intrinsically permits the pipeline to be pig inspected
- > The full bore valve has nearly no pressure loss when open

Full valve selection available on our website

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