



HIPPS LOGIC SOLVER



HIPPS Package Integration

High Integrity Pressure Protection System





**HIPPS VALVES, ACTUATORS,
CONTROL SYSTEMS, LOGIC SOLVER -
INTEGRATED FUNCTIONAL TEST (I-FAT)**



**HIPPS AXIAL FLOW VALVE &
LINEAR SPRING RETURN ACTUATOR**



LOGIC SOLVER TESTING



**HYDRAULIC
POWER UNIT (HPU)**



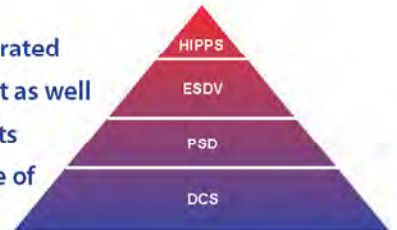
**48"/1500 TOP ENTRY BALL VALVE WITH DOUBLE
SCOTCH YOKE ACTUATOR**



**HELICAL SPLINE ACTUATORS FOR 20"/API5000
BALL VALVES**

What is a HIPPS (High Integrity Pressure Protection) System?

- An extremely reliable 'last protection layer' against catastrophic events, protecting personnel, installations and environment
- A pressure break system which permits downstream pipe/pipeline/plant to be down-rated
- A considerable cost saving in fabrication of thinner wall downstream lines/equipment as well as a weight reduction with consequent reduction in construction and installation costs
- Limitation of flare capacity requirements with benefits on environment and risk profile of the plant; high pressure and large flow rates can be handled safely with reduced costs



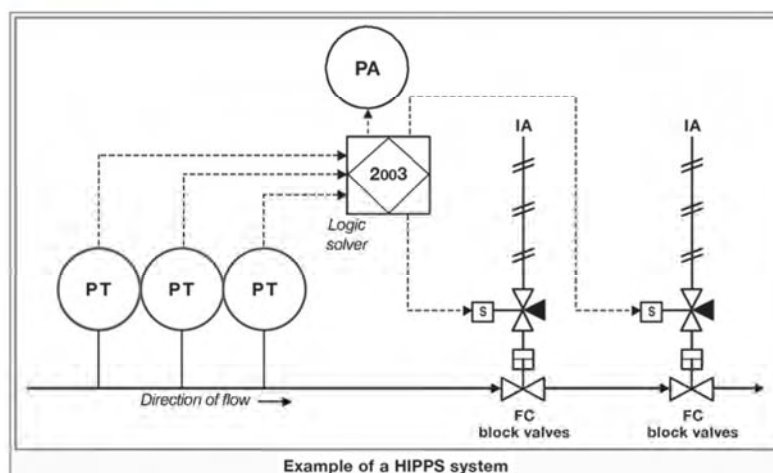
Main Features of HIPPS System

HIPPS System (valves, actuators, logic solver and instrumentation) shall be designed and manufactured to guarantee:

- Quick and safe operation on demand (Availability)
- The SIL (Safety Integrity Level) requirement (PFD)
- Suitability for continuous operation (Reliability)
- Tightness level required to achieve adequate isolation
- Compliance with process requirements (i.e.: function on Fail Safe mode, low pressure drop, low turbulence...)
- Easy to operate and maintain
- Piggability (for valves installed on Pipelines)

Safety integrity level (SIL)	Average probability of a dangerous failure on demand of the safety function (PFD _{avg})
4	$\geq 10^{-5}$ to $< 10^{-4}$
3	$\geq 10^{-4}$ to $< 10^{-3}$
2	$\geq 10^{-3}$ to $< 10^{-2}$
1	$\geq 10^{-2}$ to $< 10^{-1}$

Typical HIPPS System Layout



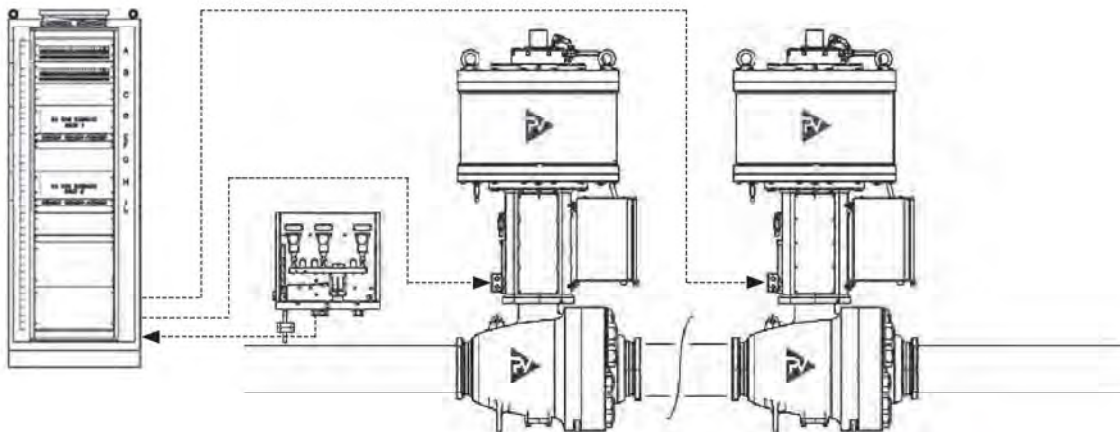
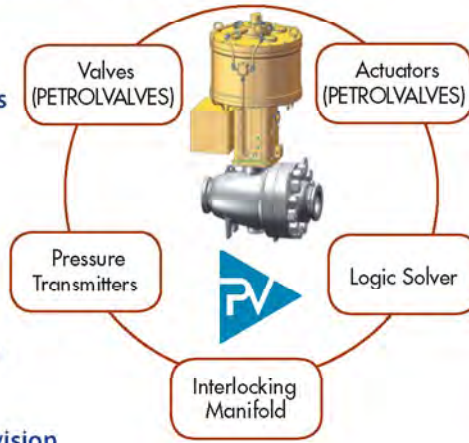
For a HIPPS system the following components are required:

- | | | |
|------------------------------|---------------|--------------------------|
| • A pressure sensing device: | INITIATOR | PRESSURE TRANSMITTERS |
| • Electronic Safety System: | ANALIZER | LOGIC SOLVER |
| • A shut-off isolation unit: | FINAL ELEMENT | HIPPS VALVES & ACTUATORS |

PetrolValves HIPPS SYSTEM INTEGRATOR

PetrolValves is experienced and certified to supply, as single point of source, the complete HIPPS (High Integrity Pressure Protection Systems) package composed by:

- Valves (axial flow, slab gate, ball)
- Hydraulic or Pneumatic Actuators
- Hydraulic or Pneumatic Control Systems
- Pressure Transmitters
- Interlocking Manifold
- Logic Solver
- Fireproof Protection
- SAR (Safety Analysis Report)
- SIL Certification (Safety Integrity Level)
- I-FAT (Integrated FAT test) testing
- FSE (Functional Safety Engineer) supervision



VALIDATION TEST OF RELIABILITY AND SIL CALCULATION USING SAME DIRTY AND ABRASIVE FLUID CONDITIONS (WATER AND SAND) OF THE SPECIFIC HIPPS PROJECT DN 16"/1500 AXIAL FLOW VALVE & LINEAR PNEUMATIC ACTUATOR - SNORRE A PLATFORM (NORWAY)

Typology of HIPPS Valves & Actuators available from PetrolValves



Axial Flow Valve
+
Linear Actuator



Slab Gate Valve
+
Linear Actuator



Top Entry Ball Valve



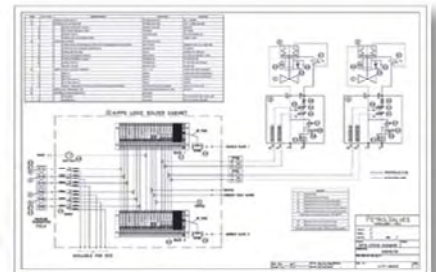
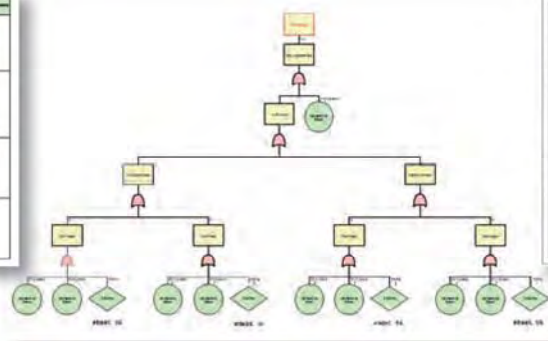
Side Entry Ball Valve

+
Quarter Turn Actuator

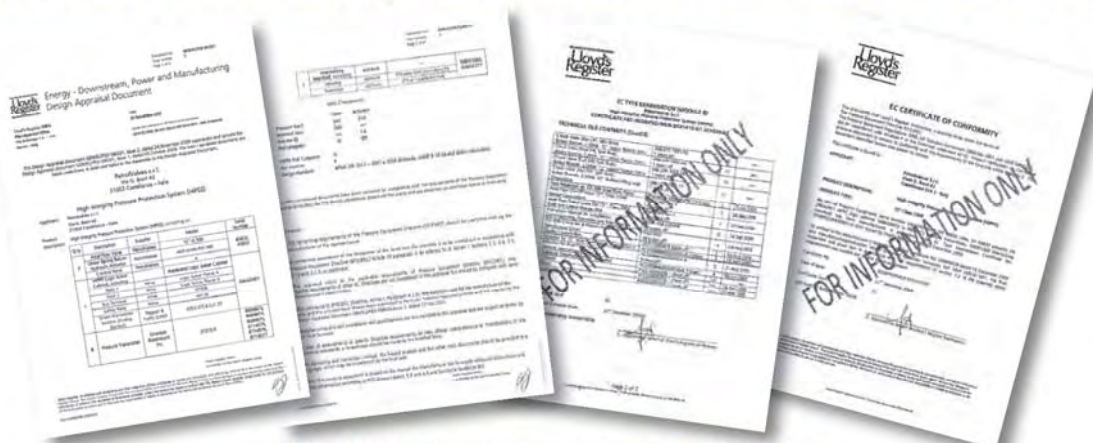


SIL Certification and SAR (Safety Analysis Report) – IEC 61508 and IEC61511

Item	Code	Description	Material	Quantity	Unit	Weight	Volume	Notes
1	101	Valve Body	SS316	1	kg	10.5	0.001	
2	102	Actuator	Al6061	1	kg	15.0	0.002	
3	103	Ball	SS316	1	kg	0.5	0.0001	
4	104	Seat	SS316	2	kg	0.2	0.0002	
5	105	Stem	SS316	1	kg	0.8	0.0001	
6	106	Washer	SS316	2	kg	0.1	0.0001	
7	107	Lock Washer	SS316	2	kg	0.1	0.0001	
8	108	Nut	SS316	2	kg	0.1	0.0001	
9	109	Bracket	SS316	1	kg	2.0	0.0005	
10	110	Flange	SS316	1	kg	1.0	0.0002	
11	111	Seal	PTFE	1	kg	0.05	0.0001	
12	112	Key	SS316	1	kg	0.05	0.0001	
13	113	Pin	SS316	1	kg	0.05	0.0001	
14	114	Washer	SS316	1	kg	0.05	0.0001	
15	115	Nut	SS316	1	kg	0.05	0.0001	



Certification of the complete HIPPS PACKAGE as SAFETY ELEMENT according to the Pressure Equipment Directive PED 97/23/EC - CATEGORY IV



PED CATEGORY IV - Module B & Module F

LICENSES & CERTIFICATIONS

API LICENSES: API 6A

API 17D

API 600

API 6D

API 6DSS



PED (Pressure Equipment Directive) 97/23/EC



ISO 9001:2008



ISO 14001:2004



OSHAS 18001:2007



CE ATEX



GGTN-K KAZAKHSTAN



BYELORUSSIAN PERMIT

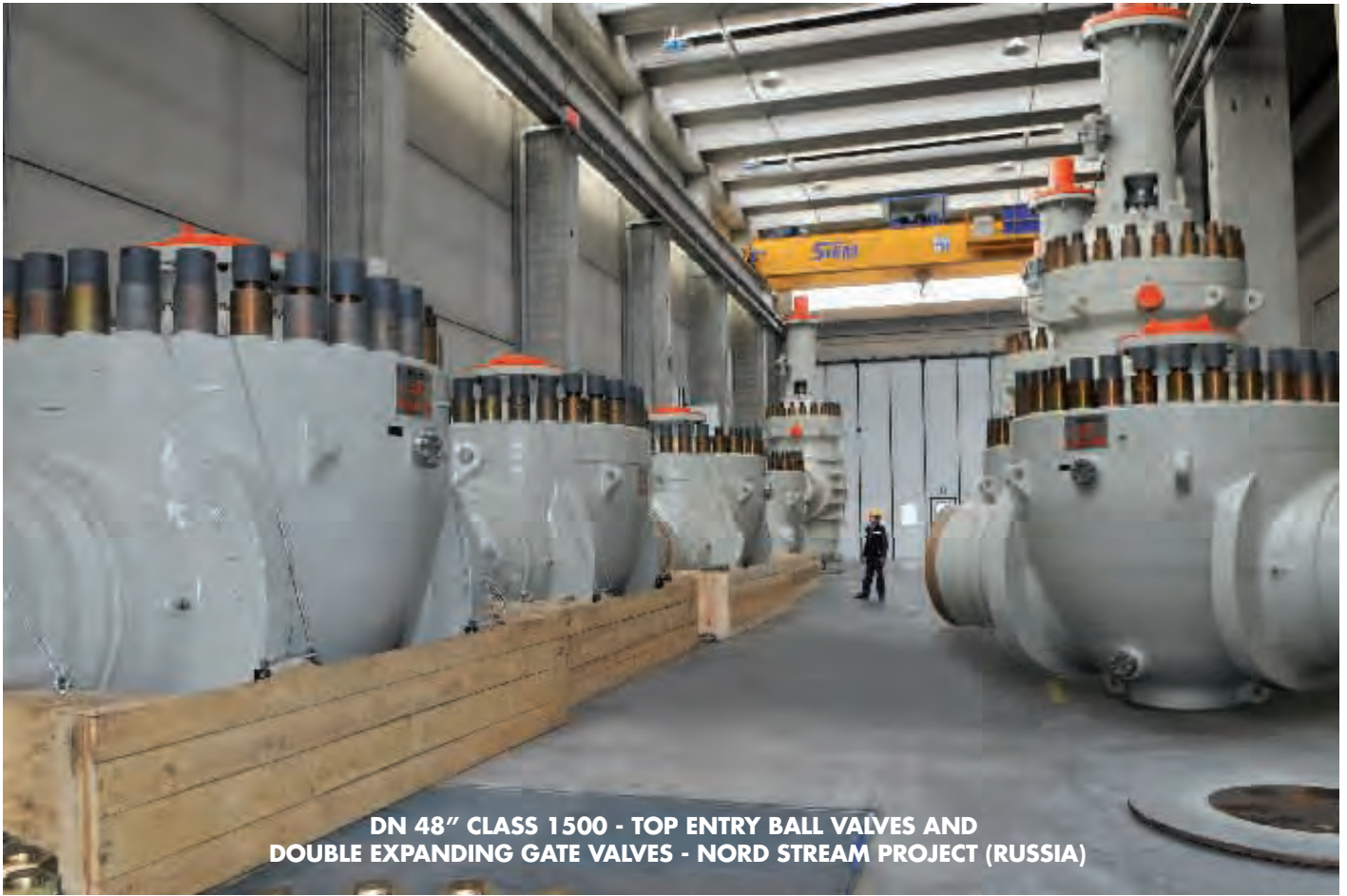


ACHILLES JQS



RUSSIAN GOST CERTIFICATION

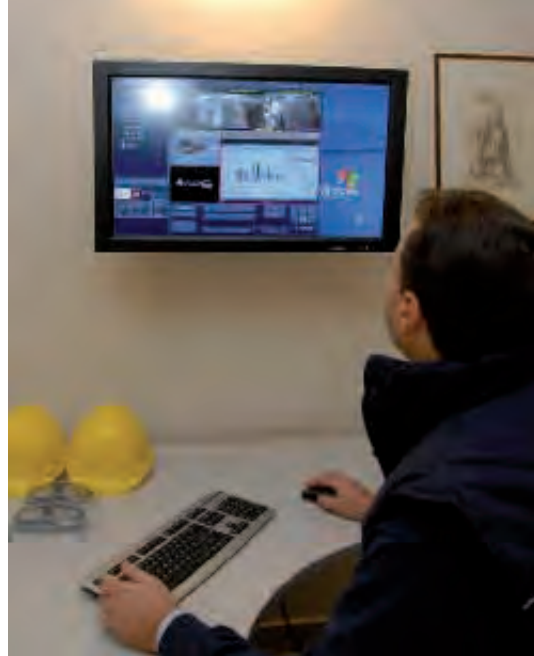
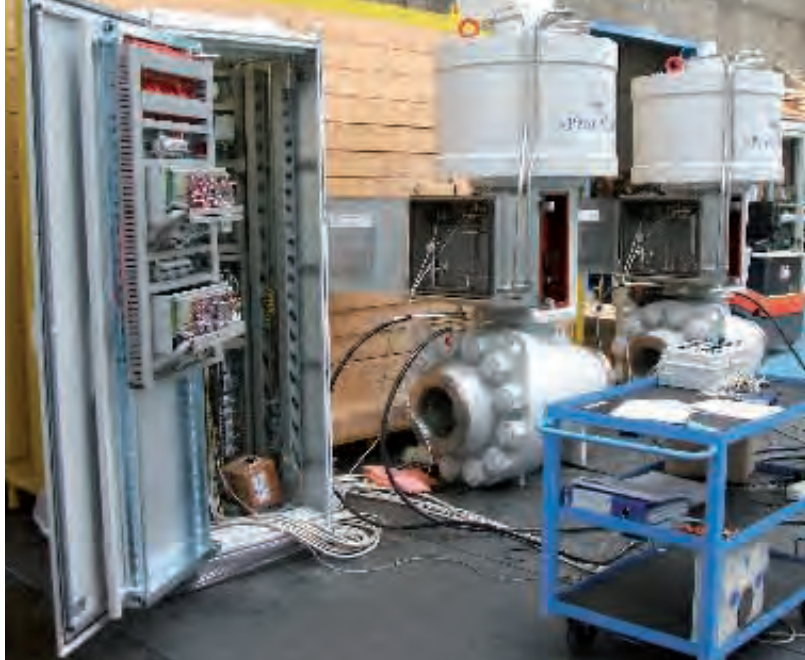




**DN 48" CLASS 1500 - TOP ENTRY BALL VALVES AND
DOUBLE EXPANDING GATE VALVES - NORD STREAM PROJECT (RUSSIA)**



DN 42" CLASS 1500 - DOUBLE EXPANDING GATE VALVES - LANGELED PROJECT (NORWAY)



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