HIPPS

High Integry Pressure Protection System

SMART IN FLOW CONTROL

COMPANY OVERVIEW

Ringo Válvulas (RV) is located in the industrial city of Zaragoza, Spain. Since its establishment RV has designed and manufactured its own cast and forged valves. Our experience of over 40 years on the valve industry is the key to our international success and recognition. We export more than 75% of our production all over the world.

RV activities include the design, material procurement, manufacturing, assembly and thesting of valves. We supply Gate, Globe, Check, Ball Plug, Butterfly, Control and Special Valves produced according to different standards (ASME-ANSI, DIN, API, BS), sizes, pressure ratings and materials (Carbon Steel, Alloy Steel, Stainless Steel, Duplex, Monel, etc.).

Our valves are used in many different applications such as Oil & Gas, chemical and Petrochemical, Cryogenic and Power Generation (including Nuclear, Combined Cycle, Thermoelectric and Hydraulic Plants).

RV facilities are modern and fitted with advanced equipment for manufacturing, assembly, testing and inspection. This equipment guarantees the conformity with the most stringent specifications.

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QUALITY

Ringo Válvulas is totally committed to Quality, and a smooth integration of all departments with the Quality Assurance and Quality Procedures.

Ringo Válvulas is qualified to ISO 9001, ISO 14001, OSHAS 18001, SA 8000, PED, ATEX, TUV AD-2000 HPO & WO, EN-ISO 3834-2 and Functional Safety Management system (SIL) among others.

This guarantees that all our products are designed, manufactured and delivered in accordance with the most strict customer requirements. By this we achieve our main goal "to offer a high quality product and service to ensure a high degree of satisfaction and fidelity of our customers".

MARKETS

Our valves are used in many different applications such as Nuclear Power Plants, Conventional Power Plants, Oil & Gas, upstream and downstream offshore, chemical, petrochemical, cryogenic, etc.

We export more than 75% of our production to countries all over the world.

Worldwide customer service, we provide spare parts and field engineers to support our customers anywhere.

Ringo Válvulas has been involved in many large international projects carried out by the world's leading engineering construction companies.

OUR INTERNATIONAL ACREDITATIONS:

ISO 9001

ISO 14001

OHSAS 18001

CE stamp holder
PED 2019/68/EU

ATEX stamp holder

EAC

Management System SA 8000:2008
TÜVRheinland CERTIFIED
www.tuv.com ID 9105075752

N

NPT

SIL IEC 61508 Validated

TÜV SÜD Industrie Service

Certified by TÜV according to EN ISO 3834-2
Certified by TÜV according to AD 2000-Merkblatt HP 0, TRD 201
Certified by TÜV according to AD 2000-Merkblatt W 0/A4

Inspection Type Certificate issued by KIWA INSPECTA nuclear

ISCIR Cetificate of authorization

01. HIPPS CONTEPT

Definition & Philosophy

Definition & HIPPS Philosophy
HIPPS is the acronym for High Integrity Pressure Protection System. Main function of HIPPS is an independently instrumented system whose function is to protect an installation from the overpressure produced in the high pressure part of the same, isolating the low pressure part from it.

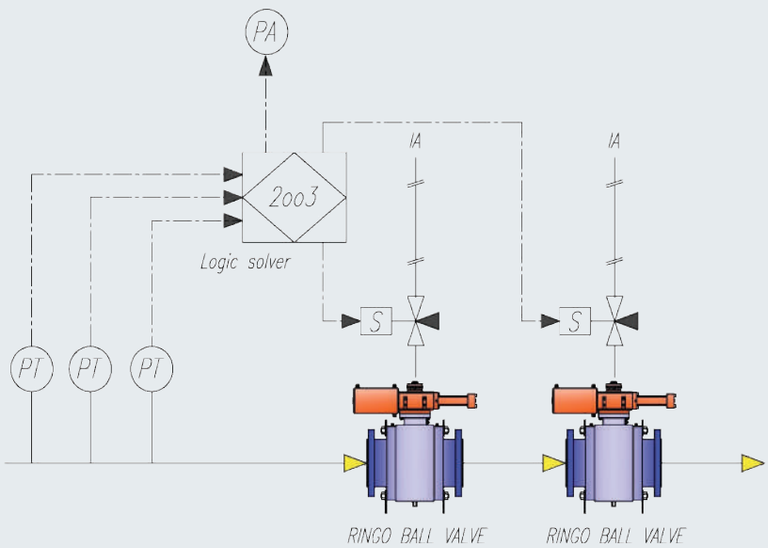
Idea of HIPPS is to be used instead of traditional safety systems such as relief devices with four main advantages:

- Environment protection: relief systems release the service fluid to the atmosphere which while HIPPS avoid fluid to be released out of the system keeping the environment free of emissions.
- HIPPS have to be a safety level equal or higher than the traditional relief methods; calculated safety levels shown the HIPPS to be ten times more reliable than traditional methods.
- Creating a frontier between two parts of the installation allows the downstream part of the valves of the HIPPS to have lower pressure and therefore, to reduce the cost of pipes and related pressure equipments installed on that part.

Hipps Scheme

The complete HIPPS consist of several elements that are detailed below:

- Initiators (Pressure Transmitters). HIPPS are typically supplied with three pressure transmitters that monitor the pressure in the line and provide the information to the next element.
- Logic Solver: it receives the information from Pressure Transmitters and it is configured to send the signal to operate the final elements, when the received input is above the preconfigured pressure value.
- Final elements: Final elements have the function of isolating the downstream part of the installation from the overpressure. Typically, final elements consist of two valves with their related actuators installed in serial to be closed when the signal is received from the logic solver.



02. APPLICABLE STANDARDS AND SAFETY INTEGRITY LEVEL

HIPPS are designed according to following standards:

- IEC 61508: “Functional Safety of Electrical/Electronic/Programmable Electronic Safety Related System”
- IEC 61511: “Functional Safety: safety instrumented systems for the process industry sector”
- ANSI/ISA S84.01: “Application of Safety Instrumented Systems of the Processed Industries”

Standards mentioned above are performance based so design of HIPPS is also based on the required Safety Integrity Level (SIL). SIL has four categories, from 1 to 4, and it is defined by plant end user by means of making a risk analysis of the process and it is related to the fulfillment of the tolerance risk: this means that SIL level results of the combination of two factors:

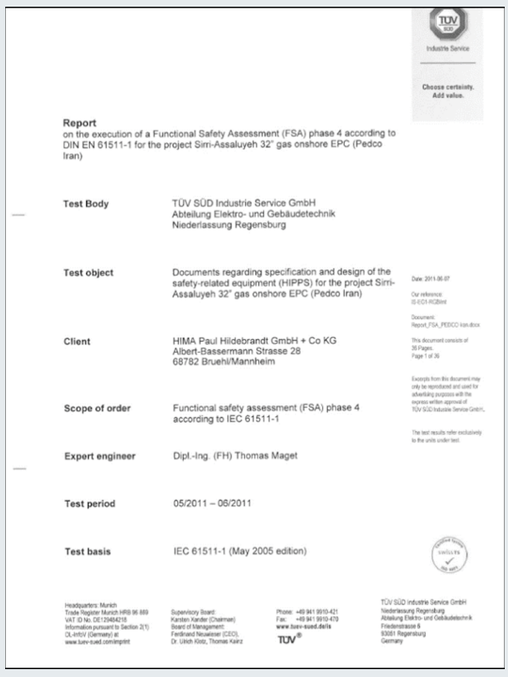
- Frequency of fail occurrence
- Consideration of the consequences of fail (dangerous failure or safe failure)

Safety Instrumented Function (SIF) defines the level of protection against failure and it is defined by the Probability of Failure on Demand (PFD). PFDavg is defined as the average probability of failure the safety function between 0 to 1. Standard EIC61508 defines the maximum allowable PFDavg value depending how often the demand of SIF is:

- High demand: safety demand interval shorter than one year
- Low demand: safety demand interval longer than a year.

SIL Level is related to a this PFDavg value and must be considered for the complete functional loop, all its elements and between them. Samson Ringo has the capability to make the SIL calculation of the integrated package. Certification to be made by a recognized Third Party. Samson Ringo is able to provide complete HIPPS system qualified for SIL 3& SIL 4 Based on the required redundancies, partial stroke test, etc.In addition, Samson Ringo can provide the complete HIPPS system SKID MOUNTED, with all the components assembled, connected and tested together in order to be installed directly into the plant.

SIL	PROBABLY OF FAILURE PER HOUR	
1	0.00001-0.000001	10^{-5} - 10^{-6}
2	0.000001-0.0000001	10^{-6} - 10^{-7}
3	0.0000001-0.00000001	$10e^{-7}$ - $10e^{-8}$
4	0.00000001-0.000000001	10^{-8} - 10^{-9}



TÜV SÜD Industrie Service

Choose certainty. Add value.

Report
on the execution of a Functional Safety Assessment (FSA) phase 4 according to DIN EN 61511-1 for the project Sirri-Assaluyeh 32" gas onshore EPC (Pedco Iran)

Test Body	TÜV SÜD Industrie Service GmbH Abteilung Elektro- und Gebäudetechnik Niederlassung Regensburg
Test object	Documents regarding specification and design of the safety-related equipment (HIPPS) for the project Sirri-Assaluyeh 32" gas onshore EPC (Pedco Iran)
Client	HIMA Paul Hildebrandt GmbH + Co KG Albert-Bassermann Strasse 28 68782 Bruehl/Mannheim
Scope of order	Functional safety assessment (FSA) phase 4 according to IEC 61511-1
Expert engineer	Dipl.-Ing. (FH) Thomas Maget
Test period	05/2011 – 08/2011
Test basis	IEC 61511-1 (May 2005 edition)

Date: 2011-06-07

Our reference: IS-ECI-RG\bmt

Document: Report_FSA_PEDCO Iran.docx

This document consists of 36 Pages. Page 1 of 36

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The test results refer exclusively to the units under test.

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01. SAMSON RINGO HIPPS IS PROVIDED

Initiators (pressure transmitters)

Typically Samson Ringo HIPPS is supplied with three pressure transmitters that monitor the pressure in the line and provide the information to the next element. This three elements are selected from three different ones; supplying the pressure transmitters of three different brand avoid what it is call a "common fail", for instance a quality problem in a lot of Pressure Transmitters produced by the same manufacturer that could affect to the proper performance of the HIPPS. HIPPS is designed to be able work only with two Pressure Transmitters for a while.
This is to allow to make some checking or to replace any of them with the HIPPS under operation. In such case, system is working in "degraded mode" and logic solver receives that information.

Logic Solvers

Samson Ringo provides Logic solver which is the device in charge of processing the input signals received from the initiators and it is configured to send the signal to operate the final elements, when the received input is above the preconfigured pressure value. Ringo can supply HIPPS with different types of logic solvers:

- Central Processing Unit (CPU): software can be programmed to configure the response based on the inlet signals. This type is certified up to SIL 3.
- Solid State Logic (SSL), with a configuration of intelligent cards. This type cannot be programmed but can be certified up to SIL 4.

Logic Solver can be supplied with different configurations, based on customer specifications. Cabinets with IP protection grade for hazardous area are available. Interface with the user are customized, by instance touch screen or light and push bottoms panel. Logic solvers can be supplied to support any communicating protocol:

- Mod bus, OPC, Profibus, Send and Receive TCP & HART

Final elements

Final elements have the function of isolating the downstream part of the installation from the overpressure. Typically, final elements consist of two valves with their related actuators installed in serial to be closed when the signal is received from the logic solver. Samson Ringo can supply both pneumatic or hydraulic actuators and are supplied with their own control panel, including the solenoid valves to govern their operation. Actuators are sized to provide a very fast operation time (less than 2 seconds). Samson Ringo offers two type of valves for HIPPS: Ball and Axial.

a) Valves

a.1) Ball Valves

Samson Ringo offer a full range of trunnion mounted ball valves designed and produced according to API 6D/ ISO 14313, API 6DSS / ISO 14723, BS5351, ASME B16.34 and other international standards as well as customer specifications on with all the possible configuration:

TRUNNION MOUNTED BALL VALVES, SIL CERTIFIED				
		Size Range	Rating Range	Design Temperature
Construction Seats	Side entry/ Top entry Soft seated / Metal seated	2" to 60"	150# to 4500# in API 6D 3000# to 15000# in API 6A	-196° up to 550°C

Standars features

Bidirectional flow
Trunnion Design for Low Torque Operation
Soft seated or Metal Seated construction
Automatic Cavity Pressure Relief
Anti Blow-Out Stem
Grease Fittings
Drain and vent
Antistatic Device
Fire Safe Design & Certified API 6FA, API607 and BS6755

Optionals features

Double Piston Effect
Double Block-Bleed
Locking Device
Flanged grease fittings, vents and drains
Stem extension
Low emission packing
Live loaded packing
Lip Seals

a.2) Axial Valves

Design

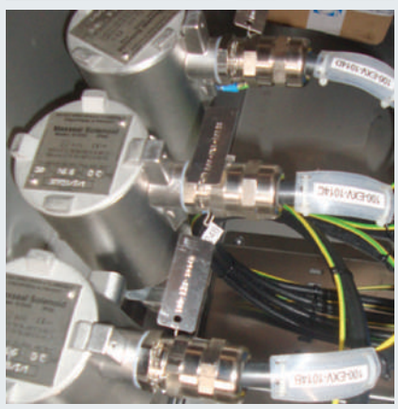
A stream lined body with constant sectional area, offers a very reduced coefficient resistance and gives larger Cv values for the same sizes.

AXIAL FLOW SIL CERTIFIED			
	Size Range	Rating Range	Design Temperature
Axial Flow	4" to 48"	150" to 4500# API 6A 3000# to 15000	-196°C to 200°C

Fluid is channeled into an annular path between the inner and outer bodies until it reaches

Smooth changes in flow direction and no turbulences contribute to lower noise levels. The high capacity, combined with the large range ability, make our axial valve to be acknowledged as the ideal design to control over the full range of process conditions with a single valve.

As an option extended body neck is offered for cryogenic operations, with a variety of sealing wafer. Zero emission is guaranteed by the O-ring seals combined with back-up packing. Distance between flanges is in accordance with ISA 75.03 when data are available or API 6D for larger sizes. All types of quarter turn actuator are easily mounted.



- Our model RAX Cv features.
- Larger Cv value, combined with high rangeability.
- Standard at 90° reduced torque actuator.
- No backlash, low friction drive mechanism, with reduced torque requirements.
- Zero stem leakage.
- Cage guided balanced plug for smooth operation.
- Linear, equal percent or other characteristics.
- Effective noise reduction and cavitation.
- Soft seated, bubble tight shut-off.
  Variety of cage designs to handle gas and liquid critical applications.

Further information about Axial Valves is available in Samson Ringo Axial flow valves brochure PRD-VAXL-ING-001-R1

b) Materials

Samson Ringo ball and axial valves are supplied with all material types to fulfill all the different combinations of service fluid, and temperature. Valves can be supplied either forged or casted based on customer specifications:

- Carbon Steel for General Use and for low Temperature.
- Alloy Steel for High Temperature
- Stainless Steel Corrosion Resistant
- Duplex & Superduplex Stainless Steel
- Nickel Base Alloys / Aluminium Bronze / Titanium
- Cladded materials
- Tungsten carbide trim for axial valves

Materials also meet the requirements of NACE MR-0175/ISO 15156 when sour gas services are specified. Our technical ready and available to provide customized material selection for those special customer applications Samson Ringo always provides with suitable information of material selection which is agreed prior valves are manufactured.

c) Actuators

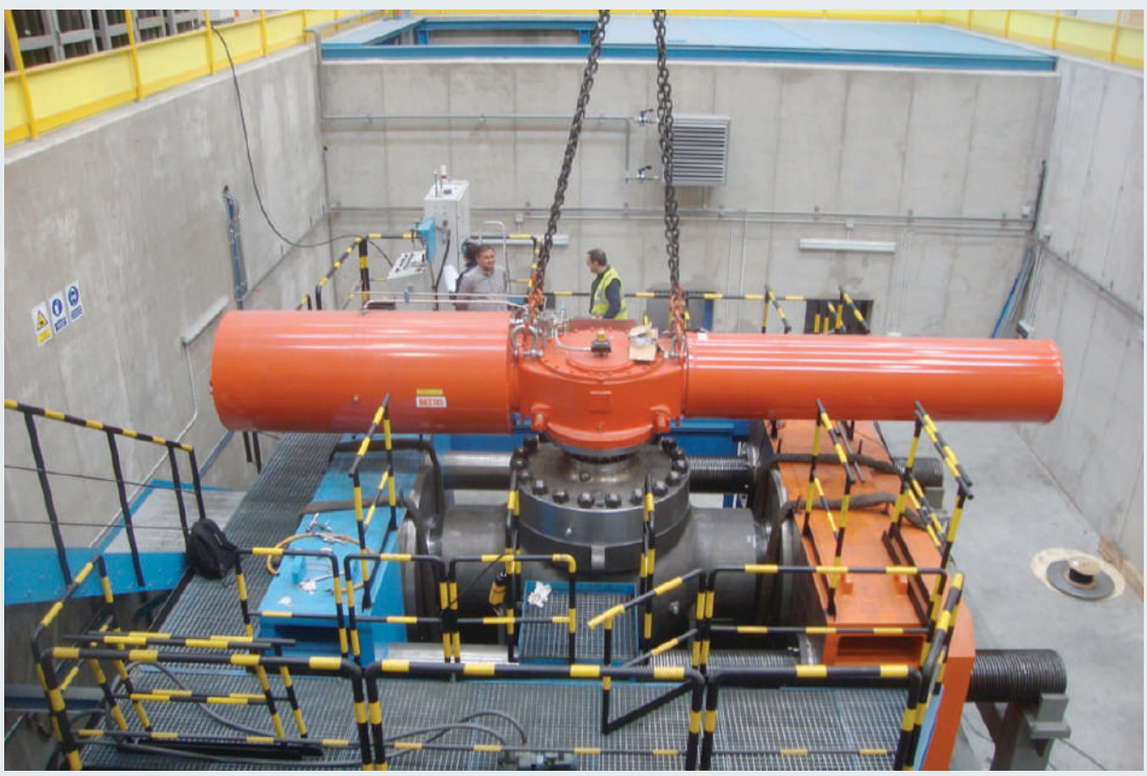
Actuators assembled with Ringo valves for the HIPPS systems can be pneumatic or hydraulic and they are supply in full compliance with customer specifications. Actuators include the control panel as specified, with solenoid valves.
Partial Stroke Test is available depend on SIL classification requirements.

04. FACTORY ACCEPTANCE TEST /SIL CERTIFICATION OF THE COMPLETE HIPPS

Samson Ringo has state of the art facilities for the assembly and testing of the final elements and integration of the HIPPS system.

Samson Ringo offers full integration of the HIPPS elements in the factory: initiators, logic solver and final elements (valves + actuators + control panel):

- Performance of Factory Acceptance Test of the completely integrated HIPPS. Test can be witnessed by customer or by his nominated Third Party Inspection agency.



SAMSON

RINGO VALVULAS

N NPT

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SMART IN FLOW CONTROL