



Ultra High Pressure Topside Valves

Technical brochure



Commitment made of steel

1. COMPANY PROFILE

AMPO is an **international leader** with over 50 years of experience in the design and manufacture of highly engineered valve solutions and Integrated Smart Solutions for the most severe applications across a wide variety of industry sectors.

Through our AMPO SERVICE team **we guarantee a prompt response** to customer needs wherever they are throughout the world: technical support in start-up stages, equipment selection, predictive and preventive maintenance, training, etc.



Fully inhouse manufacturing process



Worldwide references



Project based on people



Innovative spirit



700+ people



In more than 60 countries



Most important partners in the industry



Cutting edge technologies



Our commitment: the best service



Customer focus



Since 1964



2. INDUSTRY SECTOR: Upstream Oil & Gas – Topside

AMPO POYAM VALVES offer a highly engineered range of Ball, Gate and Check Valves, which are designed for all types of ultra-high-pressure applications where reliability and safety are both ours and our clients primary concern.

Our customised solutions and robust designs create complete reliability due to their optimum performance.

3. OUR ULTRA HIGH PRESSURE TOPSIDE VALVES

All AMPO topside ball valves have undergone extensive R&D to guarantee their reliability and suitability for a variety of ultra-high-pressure applications.

Design codes:

API 6A / ASME B16.34 / ASME B16. 5 / ASME VIII Div. 1 & Div2 / NACE MR0103

Options:

- Full Bore standard design, reduced bore available.
- Trunnion mounted.
- Valve body configurations; top entry, two-piece split body and three-piece split body.
- Metal to metal valve seat, soft seat as option
- Single Piston Effect (SPE) or Double Piston Effect (DPE) seat design available.
- Double or single block configurations.
- Different sealing technologies available.
- Standard PTFE lip seal design, metallic ring joint as an option.
- Various end connections options.
- Smooth internal bore for optimum pig movement.
- CRA overlay available-sealing areas or all wetted areas.
- Material Class AA-BB-CC-DD-EE-FF-HH.
- Temperature: L-U (-46°C/+121°C), other range on request.
- Fire Safe Design
- PSL 1 to 4
- PR1 / PR2 / PR2F

Sizes & Pressure Ratings:

API 6A (ISO 10423)		
2.000 – 5.000	10.000	15.000
1 13/16" - 16 3/4"	1 13/16" - 13 5/8"	1 13/16" - 9"

Other sizes and pressure range on request.

Actuation Options:

- Manual
- Hydraulic
- Electric
- Pneumatic

TOPSIDE BALL VALVES



TOPSIDE THROUGH CONDUIT SLAB GATE VALVES

All AMPO through conduit slab gate valves are designed in accordance with latest industry standards.

Design codes:

API 6A / ASME B16.34 / ASME B16. 5 / ASME VIII Div. 1
& Div2 / NACE MR0103

Options:

- Full Bore standard design, reduced bore available.
- Valve body configurations; top entry.
- Metal to metal gate and seat sealing, with tungsten carbide hard facing.
- Internal bi-directional sealing, allowing cavity relief in both the open and closed position.
- Double or single block configurations, DIB1, DIB 2, DBB
- Different stem sealing technologies available.
- Reverse acting option available.
- Balance system configuration available.
- Rising and non-rising stem available upon request.
- Various end connections options.
- Smooth internal bore for optimum pig movement.
- CRA overlay available-sealing areas or all wetted areas
- Material Class AA-BB-CC-DD-EE-FF-HH.
- Temperature: L-U (-46°C/+121°C), other range on request.
- Fire Safe Design
- PSL 1 to 4
- PR1 / PR2 / PR2F

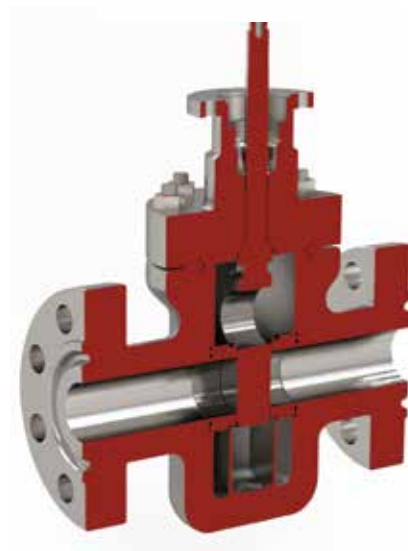
Sizes & Pressure Ratings:

API 6A (ISO 10423)		
2.000 – 5.000	10.000	15.000
1 13/16" - 16 3/4"	1 13/16" - 9"	1 13/16" - 9"

Other sizes and pressure range on request.

Actuation Options:

- Manual
- Hydraulic
- Electric
- Pneumatic



BALANCED STEM

The balanced stem design is a good technical solution for the manual and actuated valves to reduce the operation torque, mainly applicable on highest pressure and largest sizes.



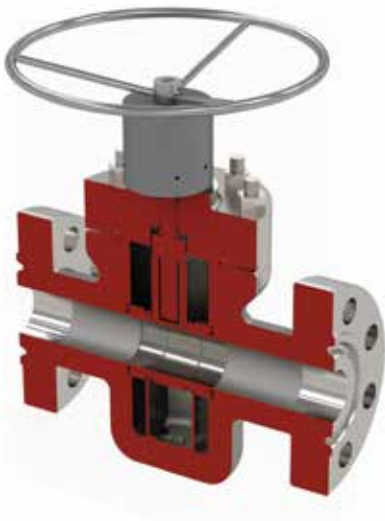
Balanced stem design

STANDARD / REVERSE ACTING VALVES

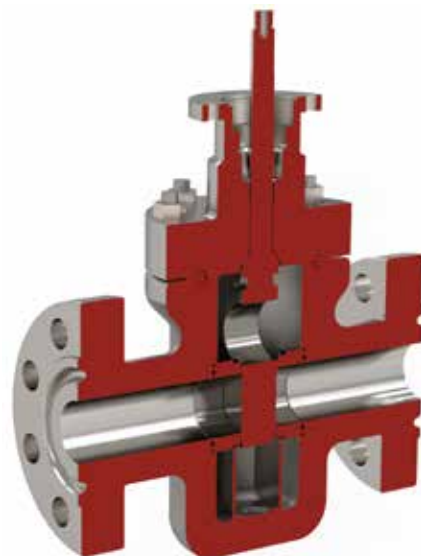
Standard acting Through Conduit Slab Gate valve is open when the gate/stem goes upwards, but Reverse acting Slab Gate valve is closed when the gate/stem goes upwards.

Reverse configuration valves are typically used when:

- Fail to close configuration is required, in this case the "stem ejection force" assist on closing operation.
- Very dirty applications, when fluid sediments can be deposited on the bottom of the valve body.



Standard acting wedge



Reverse acting wedge

TOPSIDE SWING CHECK VALVES

All AMPO topside check valves have undergone extensive R&D to guarantee their reliability and suitability for a variety of ultra-high-pressure applications.

Design codes:

API 6A / ASME B16.34 / ASME B16.5 / ASME VIII Div. 1 & Div2 / NACE MR0103

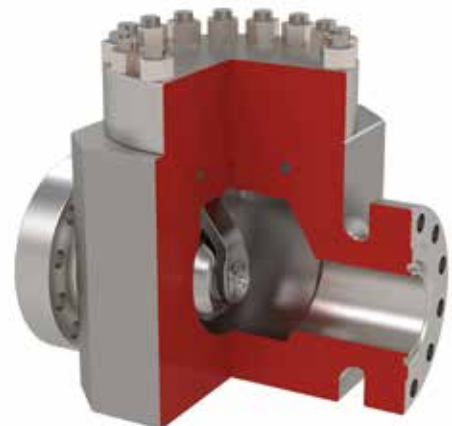
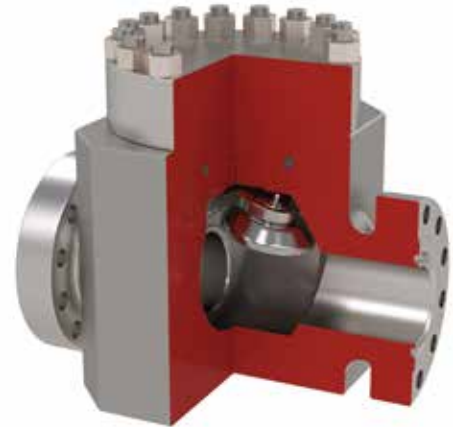
Options:

- Full opening design, Regular opening available.
- Valve body configurations; top entry.
- Full Metal to metal valve.
- Metal to metal seats, with tungsten carbide or Stellite hard facing available.
- Metallic ring joint for Body sealing.
- Double pin system for perfect seat to disc contact.
- Various end connections options.
- Smooth internal bore for optimum pig movement.
- CRA overlay available-sealing areas or all wetted areas.
- Material Class AA-BB-CC-DD-EE-FF-HH.
- Temperature: L-U (-46°C/+121°C), other range on request.
- Fire Safe Design
- PSL 1 to 4
- PR1 / PR2 / PR2F

Sizes & Pressure Ratings:

API 6A (ISO 10423)		
2.000 – 5.000	10.000	15.000
1 ¹³ / ₁₆ " - 16 ³ / ₄ "	1 ¹³ / ₁₆ " - 13 ⁵ / ₈ "	1 ¹³ / ₁₆ " - 9"

Other sizes and pressure range on request.



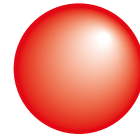
4. WHY CHOOSE OUR ULTRA HIGH PRESSURE TOPSIDE VALVES



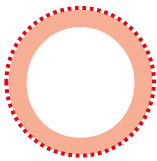
FEA ASSISTED DESIGN and validated as per R&D most critical tests to guarantee reliability in demanding applications.



METALLURGY SELECTION and high-quality control for any high-pressure application.



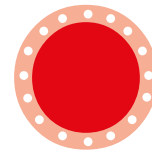
HIGH STRENGTH material selection for all pressure classes.



CORROSION CONTROLLED by cladding at wetted parts or sealing pocket, as requested.



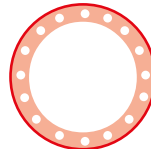
Fabrication controls and **SURFACE FINISHING KNOW HOW** for tight shutoff at high pressure gas test.



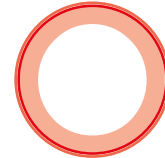
The seat **TIGHT SHUT OFF** is maintained without need to inject any sealant compound.



High severity **TESTING IN-HOUSE**: PSL4 gas testing, PR2F endurance, Fugitive emission...



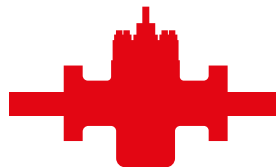
Wide range of **SEALING TECHNOLOGIES** available to match the application most demanding needs.



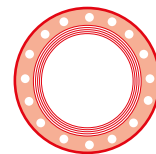
Energized **METALLIC SEALING** and **MULTI BARRIER POLYMERIC SEALS** avoids any fugitive emission to atmosphere.



Full bore design makes this valves **PIGGABLE** while minimizing the pressure drops and turbulence.



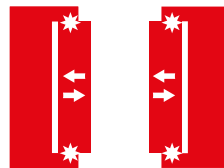
SMOOTH CONNECTIONS to pipeline, ensuring proper transition to thick schedule pipelines.



Proper distribution of the body thickness and design with the floating seats allow valves to **ABSORB THE MECHANICAL AND THERMAL LOAD** of the pipeline without compromise the sealing and blocking the valve stroke.



The design avoids body pressure surge due to temperature change releasing the overpressure in the inlet pipeline **PRESERVING THE AMBIENT AND THE OUTLET PIPELINE**: no need to install safety overpressure external valves on the body.



The full metal to metal floating design seats maintain the contact in open and close position makes the **SEALING SURFACES OUT OF THE FLOWLINE** increasing their life.



This **ISOLATION** avoid that the solid parts contained in the flow could be accumulated in the bottom parts of the valve body making the complete closure impossible without the valve draining.

5. TECHNICAL FEATURES

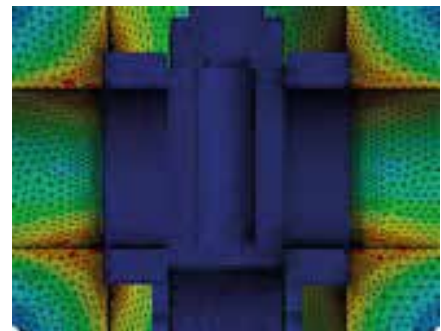
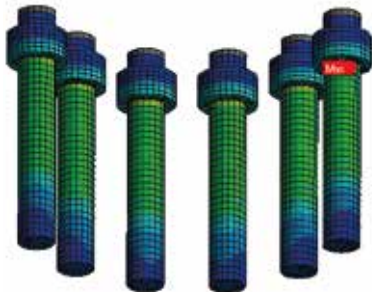
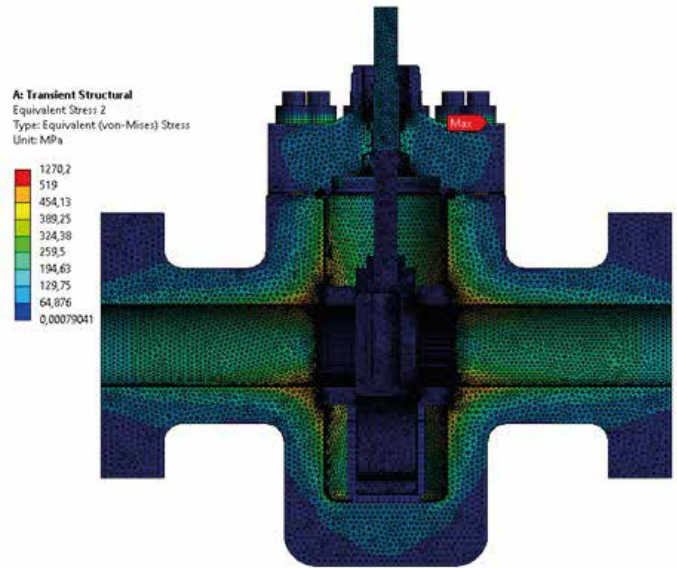
5.1 STRUCTURAL INTEGRITY

Structural integrity of each pressure containing component and pressure controlling components are validated with advanced FEA simulation tools that assure the correct performance of each component ensuring long life service and ultimately a robust valve design.

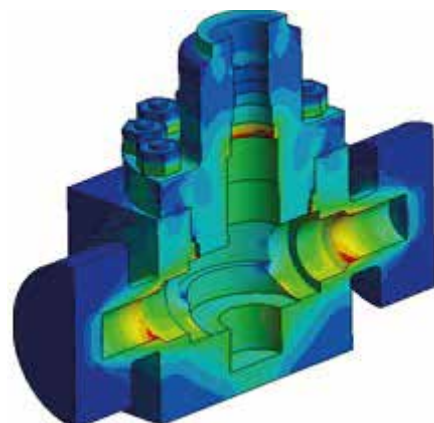
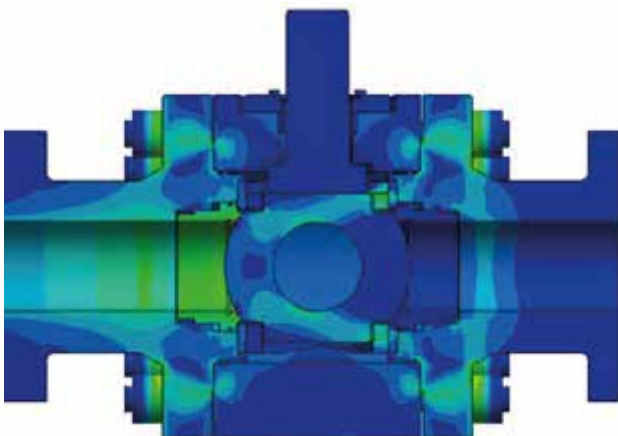
CFD capacities to verify fluid dynamic performance.

Valve assembly sealing performance is engineered for operating load combinations applied. Valve operation is verified when the maximum operating load combination from the connected piping is applied. FEA report demonstrated by the analysis of bending moments, pressure effects, external loads, thermal analysis, thermo mechanical analysis and functional verification are available upon request.

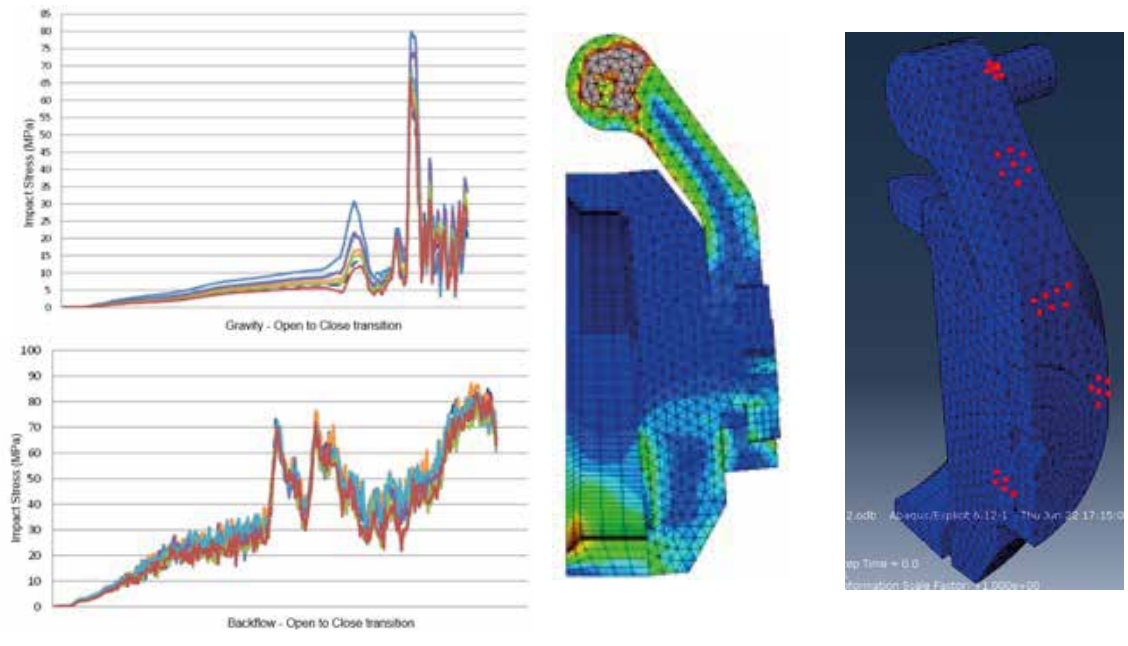
FEA ANALYSIS FOR BODY – BONNET AND BOLTING:



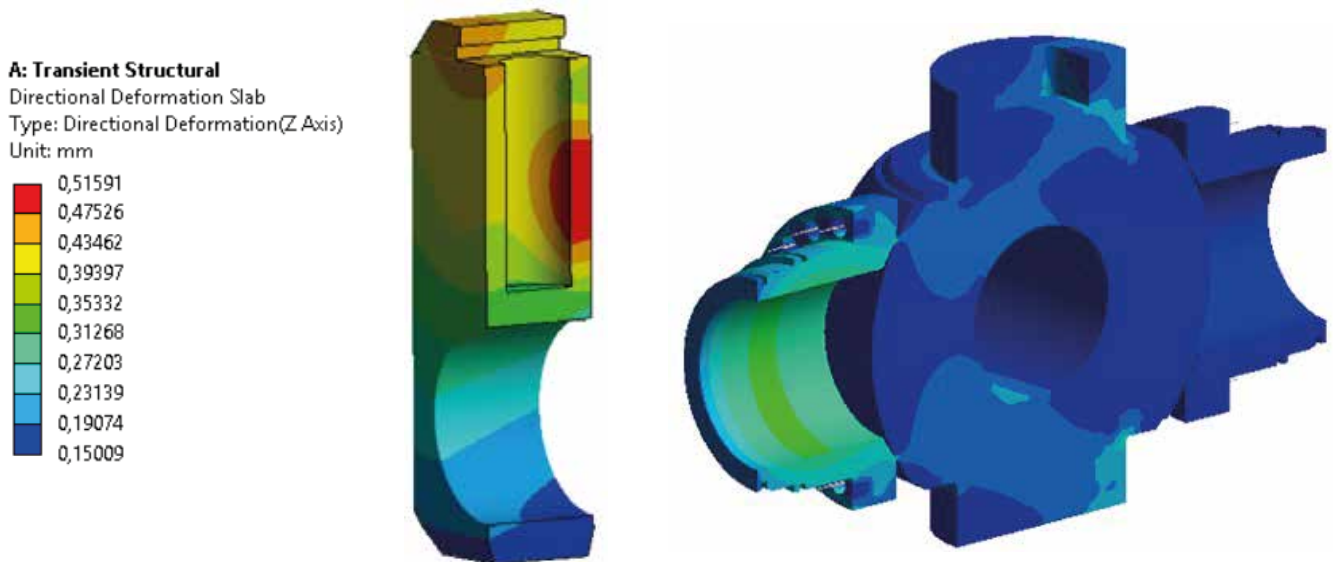
COMPLETE FEA CALCULATION ON BALL VALVES:



DYNAMIC ANALYSIS OF SWING CHECK ARM:



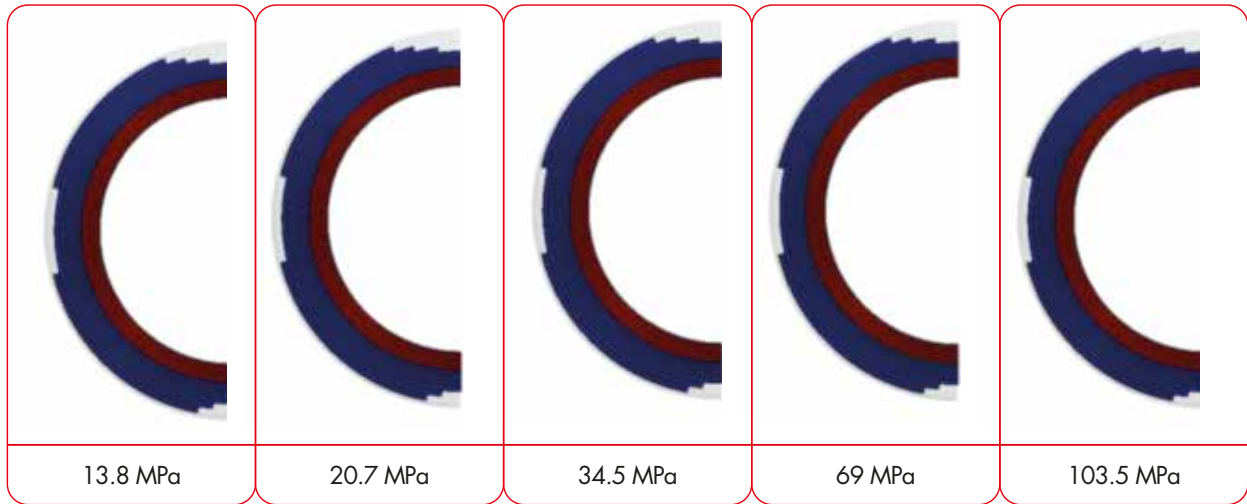
FEA STATIC / STRUCTURAL ANALYSIS FOR WEDGE:



Wedge static structural analysis

FEA PRESSURE CONTACT ANALYSIS TO ENSURE THE CORRECT SEAL:

FEA analysis on Obturator to Seat confirms sealing capabilities for gas tight shutoff at all pressure range and verifying that no contact overpressure is reached.



Contact pressure distribution between wedge and seat

5.2 SEALING TECHNOLOGIES

ENVIRONMENTAL METAL SEALING:

METAL seal or Spring energized polymeric Lip Seal can be used to achieve reliable and low emission sealing as all AMPO's high pressure design.



INTERNAL SEALING RELIABILITY:

FEA based Precision engineering designs combined with proven knowhow surface quality provide a reliable sealing performance. Calculation includes stationary position and transient calculation for functionality verification.

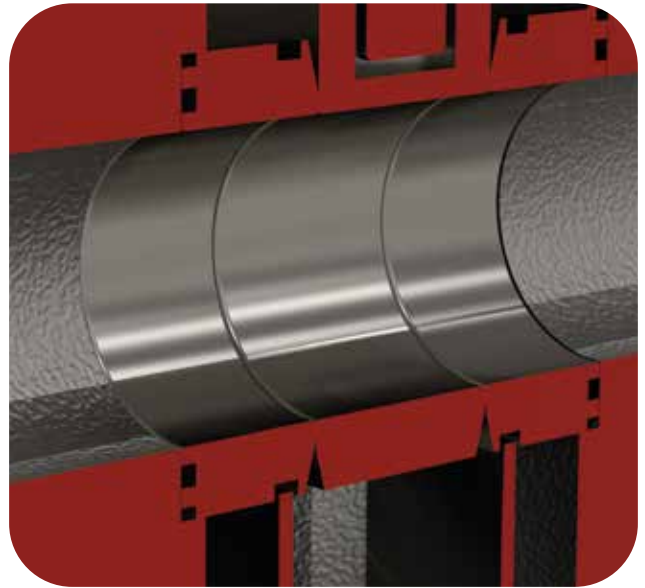
Downstream sealing, Single piston (SPE) or double piston effect (DPE) design available as requested. SPE seat design with cavity relief to the line at low pressure.

Hard-faced metal to metal sealing as standard design, soft seat upon requested

Different sealing technologies available, spring energized polymeric as standard, and all of them are engineered with FEA analysis.

Spring energized floating seat with a positive shutoff as standard design for ball valve and available upon requested for slab gate valve.

Fluid property dependent bore dimensioning for optimum performance available for swing check valves.



STEM SEALS:

AMPO POYAM High pressure valve stems seal design compounds a multi barrier system for linear and quarter turn valves. Complying Fire Safe design and ensuring no fugitive emission to atmosphere.

Stem dynamic sealing solution includes, PTFE based packing compound on spring energized polymeric and V-stack multi sealing solution to assure good operability valve stem vertical position. Compressed graphite rings for Fire safe designs are

Multiple choice for dynamic sealing solutions are available.



V-pack stem seal

6. QUALIFICATION & IN-HOUSE TESTING



AMPO values quality and therefore our operating and production processes are implemented and controlled by a quality assurance system, certified since 1991 under the ISO 9001 Standard, API Spec Q1&6A and SIL 3 and accredited by the most important external organizations in the market, such as Lloyd's Register, Bureau Veritas (BV), Det Norske Veritas (DNV) and American Bureau (ABS).

We are equipped with the most modern testing facilities and highly qualified Internal Quality Control Personnel to ensure the reliability of our valves. We carry out Non-Destructive Testing such as X-ray, Dye Penetrant, Ultrasonic Test, Magnetic Particle and PMI (Positive Material Identification), Impact Tests, Visual inspections, Hydrostatic Tests, Pneumatic Tests, Low Temperature Tests, Fugitive Emission Tests, Vacuum Tests, High Temperature Tests, High Pressure Tests, etc.

Our management is completely based on the strictest quality standards, which is the foundation to enable AMPO to develop the product which best satisfies our customer. The standard testing procedure of our Ultra High Pressure Topside valves is based on the API 6A:

- Hydrostatic body test and hydrostatic seat test per ISO 10423/API 6A
- Submerged gas body and gas seat testing according to ISO 10423/API 6A
- Functional and performance testing of valve w/ operator and torque control for bare stem valves
- Sand Slurry testing according to ISO 10423-Annex I.
- PR2F design validation. Pressure and temperature cycle testing according to API6A Annex F.
- Functional verification and endurance cycling testing.
- Qualification test with External Bending Moment loading.
- All the painting works are performed fully in house, special requirements for high temperatures or adhesions test are available for the special processes.



7. MATERIAL SELECTION

AMPO values reliability and therefore our valves are designed considering the most demanding criteria of API6A. As standard, high strength steels are applying for pressure containing parts in high pressure application, while Duplex and nickel base alloys are included in case of sour service-severe corrosion is founded.

API6A MATERIAL CLASS:

MATERIAL CLASS		Body, bonnet, end and outlet connections	Pressure-controlling parts, stems and mandrel hangers
AA	General service	Carbon or low-alloy steel	Carbon or low-alloy steel
BB	General service	Carbon or low-alloy steel	Stainless steel
CC	General service	Stainless steel	Stainless steel
DD	Sour Service	Carbon or low-alloy steel	Carbon or low-alloy steel
EE	Sour Service	Carbon or low-alloy steel	Stainless steel
FF	Sour Service	Stainless steel	Stainless steel
HH	Sour Service	CRA	CRA

MATERIAL SELECTION AS PER API6A MATERIAL CLASS:

Material designation	0.2% offset yield strength	Tensile Strength	Elongation in 50mm (2in)	Reduction in Area
	MPa (psi)	MPa (psi)	min %	min %
36K	248 (36,000)	483 (70,000)	21	Not requirement
45K	310 (45,000)	483 (70,000)	19	32
60K	414 (60,000)	586 (85,000)	18	35
75K	517 (75,000)	655 (95,000)	17	35

PRESSURE CONTAINING COMPONENTS:

Part	13.8 MPa	20.7 MPa	34.5 MPa	69 MPa	103.5 MPa
Body, Bonnet	36K, 45K, 60K, 75K, NS				
Flanged Body	60K, 75K, NS				75K, NS

Pressure Containing Components - Forged or Cast

Carbon steel, low alloy steel, stainless steel, duplex, super duplex and Inconel

Pressure Controlling Components – Forged

Stainless steel, duplex, super duplex, nickel-based alloys

Hard Facing – Tungsten Carbide, Stellite

PRESSURE CONTAINING & CONTROLLING COMPONENTS – QUALITY:

AMPO valves meets required Product Specification Level (PSL) and Product Performance (PR) as per API6A minimum and guidelines. Specific PSL&PR level upon requested.

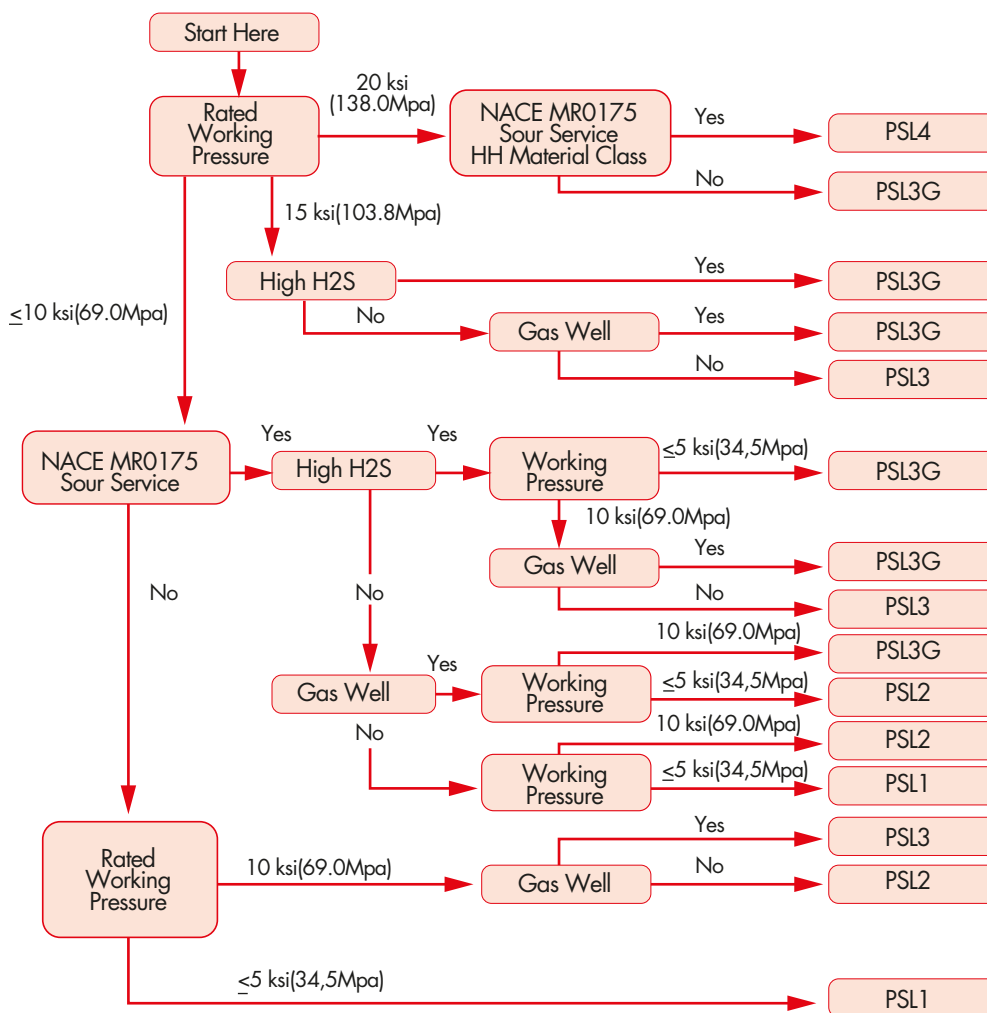
Product Specification Levels:

PSL1 / PSL2/ PSL3 / PSL3G / PSL4 available

API6A Minimum PSL requirement:

Material Class	13.8 MPa (2000psi)	20.7 MPa (3000psi)	34.5 MPa (5000psi)	69 MPa (10,000psi)	103.5 MPa (15,000psi)
AA, BB, CC	PSL 1	PSL 1	PSL 1	PSL 2	PSL 3
DD, EE, FF	PSL 1	PSL 1	PSL 1	PSL 2	PSL 3
HH, ZZ	PSL 3	PSL 3	PSL 3	PSL 3	PSL 4

API6A Annex B.4 Product Specification Level guideline:



Performance Requirement:

PR1 / PR2 / PR2F validation available

API6A PR testing summary:

Performance Requirement Level	Operating cycles
PR 1	3 cycles
PR 2*	200 cycles
PR 2F	API6A Annex F Validation

*Other PR2 validation procedures available upon requested.

8. AMPO SERVICE

AMPO SERVICE has a wide experience in guaranteeing a **prompt response** (72 hours at site if needed) to customer needs **all over the world** with a highly experienced, customer oriented and specialized team. It provides a wide range of **ad-hoc and high added value services**:

- **MRO SERVICES.** Plug and play valves. Fast track.
- **SPARE PARTS.** Optimized Management Program. Fast track services.
- **TRAINING SERVICES**
- **FIELD ENGINEERING SERVICES (FES):** Consulting services during plant construction. Commissioning and start-up services. Planned shut-down services. Troubleshooting.
- **PREDICTIVE MAINTENANCE SERVICE:** Patented AMPO RCM system (Remote Valve Condition Monitoring Service)
- **PREVENTIVE MAINTENANCE SERVICE:** Maintenance Plan developments.
- **WORLDWIDE REPAIR AND MAINTENANCE CENTERS**
- **TAILORED ENGINEERING SOLUTIONS**
- **MASTER SERVICE AGREEMENTS WITH END USERS**

Our main aim is to fulfill customer needs worldwide with the following key premises: **reliability, safety, trust and efficiency.**

