SUBSEA VALVES
PETROLVALVES has been a leader in the manufacture of Subsea valves since the early 1970s, with our first installations in the North Sea.

Today, the Company’s valves and actuators are installed worldwide in a very large number of Subsea pipelines and production modules.

This is a testament to the level of confidence that major End Users and EPCs have in PETROLVALVES.

As line pressures continue to rise and the water depths extend beyond 10,000 ft / 3000 meters, PETROLVALVES continues to improve product reliability to provide customized solution for each unique operational requirement.

**design**

**FE & CFD**

PETROLVALVES Engineering uses the most sophisticated and advanced Numerical Simulation Tools.

Both Elastic and Elastic-Plastic FE simulations are utilized to optimize performances and improve reliability in operation under any predictable loading conditions including internal & external pressure, mechanical loads and thermal gradients. Extensive use of CFD is made to verify valve fluid-dynamic performance.

The experienced PETROLVALVES Engineering Team can develop customized solutions to suit any specific operational requirement up through API 20 K.
product

**QUALIFICATION**

**PETROLVALVES** has an extremely large record of previous qualifications successfully performed:
- PR2 Design Validation Test according to API 6A / ISO 10423 Annex F
- Endurance Test According to API 17D
- Sand slurry test according to API 6A/ISO 10423 ANNEX I Class II
- Sand slurry test according to API 6AV1
- Hyperbaric Test according to API 17D Annex L
- A number of customized qualification Procedures

materials

<table>
<thead>
<tr>
<th>VALVE TYPE</th>
<th>AVAILABLE BODY MATERIAL SELECTION</th>
<th>AVAILABLE OBTRURATOR MATERIAL SELECTION</th>
<th>AVAILABLE SEAT MATERIAL SELECTION</th>
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</thead>
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<tr>
<td>BALL</td>
<td>Cast or Forged: LTCS, Inconel Cladded</td>
<td>Forged: LTCS or Low Alloy Steel, Inconel Cladded</td>
<td>Forged: Duplex, Super Duplex, Ni Alloy</td>
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<td>GATE</td>
<td>Forged: Low Alloy Steel, Inconel Cladded</td>
<td>Cast or Forged: Duplex, Super Duplex, Ni Alloy</td>
<td>HardFacing: TCC</td>
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<td>CHECK</td>
<td>Cast or Forged: Duplex, SuperDuplex, Ni Alloy</td>
<td>Cast or Forged: LTCS, Inconel cladded</td>
<td>Forged: Duplex, Super Duplex, Ni Alloy</td>
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<td>Forged: Low Alloy Steel, Inconel cladded</td>
<td>Forged: Duplex, SuperDuplex, Ni Alloy</td>
<td>HardFacing: Stellite</td>
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</table>

seals

**BODY SEALS**

All primary body gaskets are bi directional metal-to-metal to provide tight seal both toward and from environment. Typical arrangement also include a secondary environmental soft seal which provides an additional barrier to seawater ingress into the valve.

**STEM SEALS**

**PETROLVALVES** (proprietary design) subsea stem gasket is qualified up to 12,500 psi internal pressure and 3000 m water depth.

In addition, PV's patented Infinity Seal is available as an option. Through the employment of this metal to metal stem gasket, the guaranteed operational life can be extended.
hp metal floating ball (triforce)

SUBSEA

- No internal valve part can become stuck: valve provides tight seal and full operability even with fluids that can solidify or crystallize
- The valve and all the components, including gaskets, are designed for deep subsea installation & operation
- Seat and ball sealing surfaces match under low contact stress and self-cleaning operation
- Superior resistance to abrasion and wear

<table>
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<tr>
<th>AVAILABLE RANGE*</th>
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<tbody>
<tr>
<td>API 6DSS</td>
</tr>
<tr>
<td>150 to 1500</td>
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<tr>
<td>2K to 5K</td>
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<tr>
<td>11/16&quot; to 20&quot;</td>
</tr>
<tr>
<td>11/16&quot; to 6&quot;</td>
</tr>
</tbody>
</table>

(*) For non-listed dimensions contact PV’s staff
trunnion supported ball valves

SUBSEA

- PETROLVALVES trunnion mounted, full or reduced bore, metal seated.
- The valve and all the components, including gaskets, are the result of extensive Design and R&D programs aimed to verify their suitability for deep Subsea installation & operation.
- The valve internal profile is shaped to minimize turbulence and to avoid any potential obstacle for the passage of pigs.
- The valve body is designed to accommodate all predictable loads, including induced loads during installation.
- Seat & ball flexibility/rigidity is designed to accommodate mutual elastic displacements.
- Standard construction includes primary metal-to-metal, bi-directional body-to-environment seal.
- Large variety of stem seal options available, including Infinity metal stem seal (PETROLVALVES patent).
- Both Self-Relieving (SPE) and Double Piston Effect (DPE) seat designs are available.
- Double isolation construction (two trims in one unique body) is also available.

### AVAILABLE RANGE

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<tr>
<td>150 to 1500</td>
<td>2500</td>
</tr>
<tr>
<td>2'' to 48''</td>
<td>32''</td>
</tr>
</tbody>
</table>

(*) For non-listed dimensions contact PV’s staff.
slab gate valves

SUBSEA

- Metal-to-metal seat seal
- Primary metal seat-to-body seal
- Standard construction includes metal-to-metal, bi-directional body-to-environment seal
- Large variety of stem seals available, including Infinity metal stem seal [PETROLVALVES patent]
- Proven design for extreme deepwater installation.
- Slab & seat rings match on fully hard-faced surfaces
- Both upstream and downstream seat seal designs are available
- Double isolation construction (two gate trims in one body also available)
- Twin seats design available for subsea pipeline installation

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<td>30&quot;</td>
<td>1(\frac{1}{16})&quot; to 30&quot;</td>
</tr>
</tbody>
</table>

(*) For non-listed dimensions contact PV’s staff
double expanding gate valves

SUBSEA

Double Expanding Gate Valves seal via mechanical means, stem thrust achieves bubble-tight seal simultaneously and independently at both upstream and downstream seat.

Thus the valve creates a true and intrinsic double barrier.

- Proven design for extreme deep subsea installation
- Fully metal-metal seal (both seat-body and seat-gate)
- Double block & bleed, double barrier
- Extremely highly reliable in severe service, including deep subsea installations
- Large variety of stem seals available, including Infinity metal stem seal (PETROLVALVES patent)
- Flexible seat design guarantees low contact stresses for an extended cyclic life
- Any valve end connection is available

### AVAILABLE RANGE *

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<tr>
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<td>30”</td>
</tr>
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</table>

(*) For non-listed dimensions contact PV’s staff
swing check valves

SUBSEA

- Designed for deep subsea installation and operations
- Standard seat seal: metal-to-metal
- Lock open via ROV engagement
- Smooth transition of internal conduit for safe pigging operations
- Pig guide, integral with clapper, permits safe pigging in either direction
- Different clapper-locking mechanism design are available to allow safe ‘reverse’ pigging operations
- Large variety of stem seals available, including Infinity metal stem seal

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<td></td>
<td>15K</td>
<td>1 1/16&quot; to 8&quot;</td>
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(*) For non-listed dimensions contact PV’s staff
**non slam check valves**

**SUBSEA**

- Suitable for deep subsea installation and operations
- Non-Slam; quick (spring assisted) closure
- Standard seat seal: metal-to-metal

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<td>1/2&quot; to 20&quot;</td>
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<td>1/2&quot; to 12&quot;</td>
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**high integrity pipeline protection system (hipps)**

**SUBSEA**

Our HIPP System scope includes **PETROLVALVES**’ proprietary design and manufacture of valves and actuators.

SIL figures are evaluated on **PETROLVALVES**’ own data base of reliability records constructed from feedback from field operators using our products over many years of service.

(*) For non-listed dimensions contact PV’s staff
**control valves**

**SUBSEA**

**PETROLVALVES** production range includes a large variety of control valve types specifically designed for deep subsea installation and operations.

Control valve designs available include: Globe, Cage Ball (both top entry and end entry construction) and Axial Flow valve.

- Different trim selections are available to suit the client’s required CV curve.
- Large variety of stem seals available, including Infinity metal stem seal
- **PV**’s technical department can develop designs suitable to meet specific operating performance, including dynamic response.
PETROLVALVES has a complete product line of subsea actuators and ROV driven gear boxes to suit any operational requirement. Where envelope dimensional space is limited, posing challenges to considering traditional rack and pinion designs, we have as an option, space saving helical spline designs. Our actuators are able to be incorporated with diver or ROV retrievability for safely retrieving of the entire actuator assembly for maintenance, should over-pressurization of the cylinders occur, or external damage from sinking objects striking the installed equipment. Further, PV have a patented Subsea Electric Actuator for our clients’ consideration.
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