VALVTECHNOLOGIES

Valves for Oil and Gas Production and Development

Severe Service Valve Solutions

6A-0591
6D-0433

Severe-Service • Zero-Leakage • Metal-Seated

Oil & Gas Production Applications

ValvTechnologies provides field proven solutions for severe service applications.

Facilities

- Oil and gas production
- Gathering systems, manifolds and pipelines
- Produced water processing
- Oil processing
- Gas processing
- Molecular sieve dehydration
- Scraper launchers and receivers
- Compressor stations
- Underground oil and gas storage
- Steam generation
- Steam injection
- SAGD

Subsea

- Flow lines
- Emergency shutdown
- Subsea isolation

ValvTechnologies trunnion valves for subsea applications are designed for MOV coupling. A complete panel option is available. The trunnion valve is suitable for depths of 12,000' in subsea applications, available in sizes 2 – 36", API pressures 5000,10000, 15000 and in a variety of material options, including metal and PEEK™ seats. The ValvTechnologies trunnion design is an effective solution for subsea applications. The one-piece body design handles solids and requires minimum maintenance. Additionally, an option for hyperbaric testing by an independent lab offering a 12,000' certificate is available.

Enhanced oil recovery

- Molecular sieve switching
- Steam injection well isolation
- Steam electronic relief
- Boiler isolation
- Produced water isolation
- Sand filter isolation

Primary oil and gas production

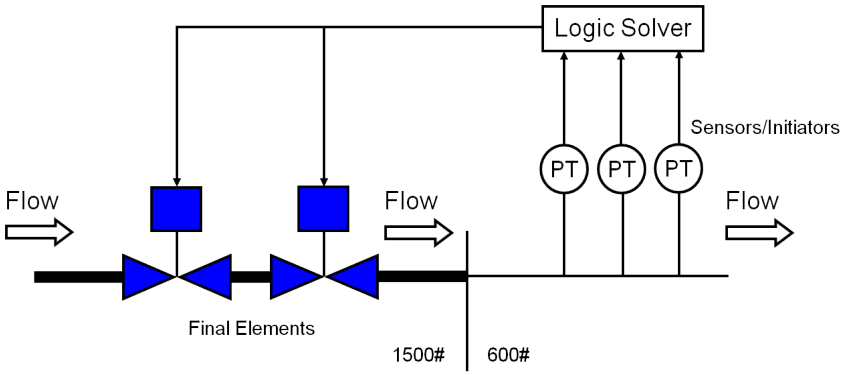
- Well shut-in
- Emergency shut down
- Switching valves on test and production header
- Flow line isolation
- Blowdown and venting
- Scraper trap isolation

LNG

- Turbine steam systems
- Molecular sieve switching
- Vents and drains
- Terminal inlet HIPPS

HIPPS protection

- Flow lines
- Receiving terminal
- LNG regasification outlet
- Subsea pipelines



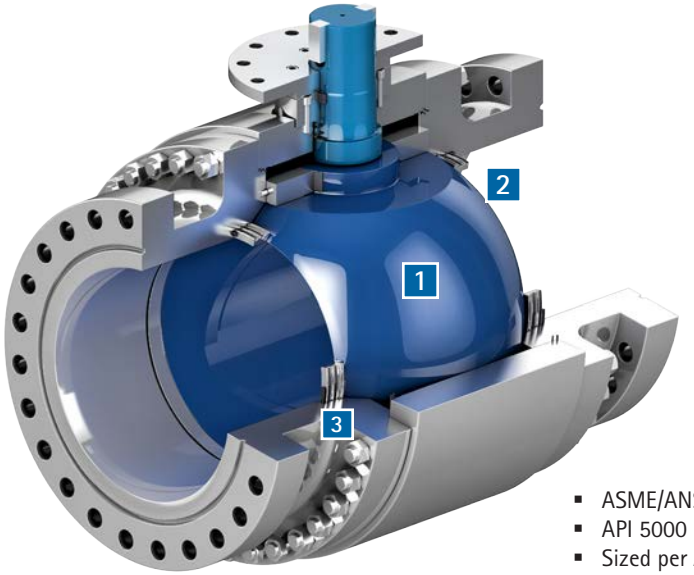
HIPPS Basic Layout

TRUNTECH™

The Next Generation in Trunnion Technology

The TrunTech™ trunnion design provides a severe service solution for tough, high cycling applications.

The advantages of the trunnion-mounted ball valve include: low operating torque, very high flow rates (Cv), protected sealing surfaces when in the open and closed position, and the ability to operate in the presence of solids and other contamination. The TrunTech ™ design from ValvTechnologies withstands severe thermal swings, meets stringent emission requirements and provide long life in abrasive and erosive conditions.



- ASME/ANSI Class 150 - 2500
- API 5000 - 15000
- Sized per API 6A and 6D

Applications:

- HIPPS
- ESD
- Manual isolation
- Injection
- Gas storage (withdrawal)
- Gas transmission
- Other gas treatment processes

1 Carbide Sealing Surfaces

The sealing surfaces are overlaid with tungsten or chromium carbide using the ValvTechnologies-exclusive coating process. These surfaces have a hardness of 68 - 72 Rc to allow long periods of operation in the most severe conditions.

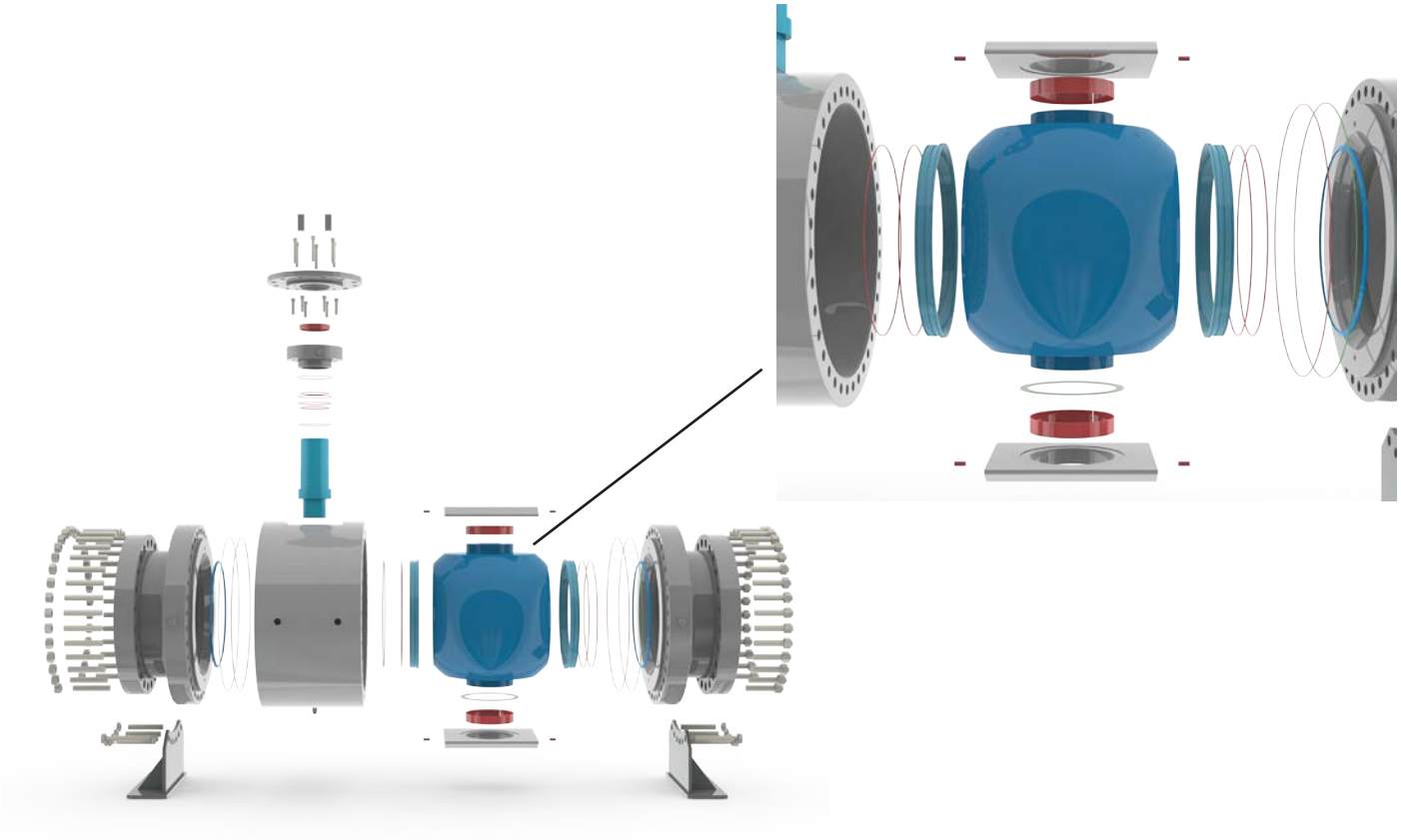
2 High Integrity Seat Surfaces

To prevent leaks around the seats, ValvTechnologies has developed an innovative double seal design for high temperature operation and/or high cycling applications. In low temperature, high cycling service, a secondary elastomer seal is installed on the seat perimeter.

3 Solids Resistance

In addition to the carbide coatings which will allow the valve to function in highly abrasive applications, the individual valve parts have additional seals to prevent interference from solids in the system. This provides for outstanding service in severe-service isolation applications with high particle content from sand, elemental sulfur, hydrate, perforation shrapnel, molecular sieve catalyst and pipe corrosion products.

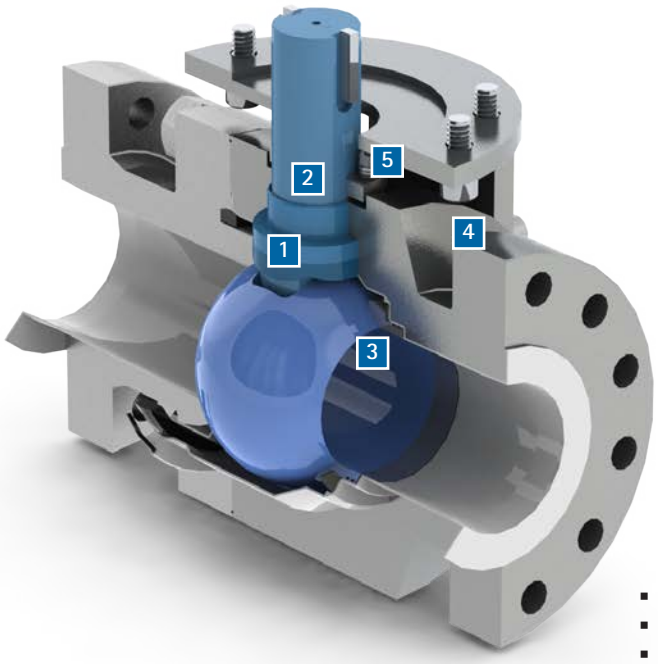
Truntech Key Performance Features and Benefits	
Features	**Benefits**
Guaranteed tight shut-off	Enhanced process safety and repeatable sealing allows operation under process excursions
True metal-to-metal sealing without using secondary elastomeric seals	Inherent fire safety
Solid-proofed by design	Process reliability
Exclusive coating technology	Extended life
Grafoil® fire-safe seals	Reduced maintenance costs
Double block and bleed capability	Enhanced process safety
High cycling capability	Process reliability
Bi-directional sealing by design	Enhanced process safety, lower maintenance, less downtime
Single-piece anti blow-out stem design	Enhanced process safety
Impervious to high thermal cycling	Enhanced process safety
Certified to use in SIL-3 loop in single-valve and SIL-4 loop in two-valve with minimum MTBF 1,280 years	Enhanced process safety
Fire safe certification: API-607 / API 6FA	Enhanced process safety
Stem fugitive emissions per ISO 15848-1 Class B	Lower emissions and enhanced process safety



V1 SERIES

Industry Leader in High Temperature Service

The ValvTechnologies' design features are the implementation of extensive industry experience.



- ASME/ANSI Class 150 - 2500
- API 5000 - 15000
- Sized per API 6A and 6D

Applications:

- Injection steam generations
- Steam distribution
- Production
- Molecular sieve
- LNG - steam
- Scrubber level control
- Other gas treatment processes

1 Integral Metal Seat

With the patented ceramet and exclusive coating process, the integral seat in ValvTechnologies' rotary operating valves are resistant from the attack of abrasive magnetite or ferrous oxides in the steam flow.

2 Body Seal Ring

ValvTechnologies employs a field proven seal ring technology to ensure sealing under all operating conditions, up to 1400° F. The body seal ring is loaded at a pressure higher than 20,000 psi. In addition, valves sized 3" and above contain a secondary Grafoil® seal to further guarantee reliability.

3 Patented Coating Process

The sealing surfaces are overlaid with tungsten or chromium carbide using our exclusive coating process. These surfaces have a hardness of 68 - 72 Rc to allow long periods of operation in the most severe conditions.

4 Live Loaded Gland Area

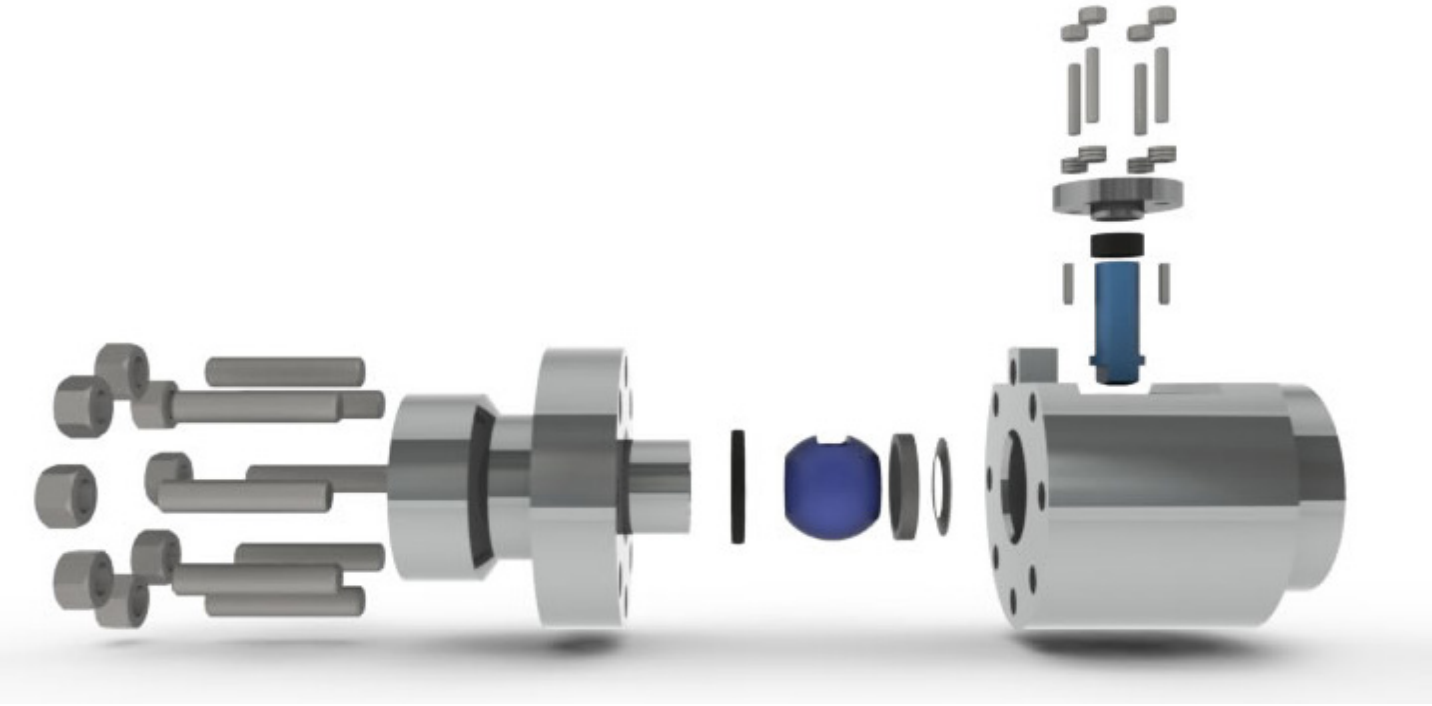
The V1 Series gland packing design features a four stud, live-loaded assembly designed for heavy industrial applications. The packing material is high purity Grafoil® surrounded by carbon fiber / Inconel anti-extrusion rings. The six Bellville springs (per stud) provide constant load pressure through extreme thermal shocks and prevent wear leaks in high cycle service.

5 Blow-out Proof Stem

ValvTechnologies design utilizes a one piece, hard-faced, blow-out proof stem that is inserted through the inside of the body cavity eliminating the possibility of blow-out through the gland area.

V1 Series Key Performance Features and Benefits

Features	Benefits
Guaranteed tight shut-off	Enhanced process safety
Long service life in severe applications	Reduced maintenance costs, long service life
Quarter turn operation - Readily automated	Increased safety, ease of operation, reduced space requirements
Low pressure drop - High Cv, Straight through flow	Reduced emissions
Dimensions to ANSI B16.10	Interchangeable with equivalent valves
Low emission packing and seals	Reduced emissions
Single-piece anti blow-out stem design	Enhanced process safety
Resistant to solids	Reduced maintenance costs, minimum downtime
Certified to use in SIL-3 loop in single-valve and SIL-4 loop in two-valve with minimum MTBF 1,280 years	Enhanced process safety
Live-load stem packing (four bolts design)	Lower emissions
Stem fugitive emissions per ISO 15848-1 Class B	Lower emissions and enhanced process safety
Fire safe certification: API-607	Enhanced process safety
Custom engineered	Process optimization



ELECTRONIC RELIEF VALVE

Pilot operated relief system
Four year, zero leakage guarantee

Application:
- Injection steam generation

The Electronic Relief Valve (ERV) package combines ValvTechnologies zero leakage isolation valve with electronic controls to monitor and regulate system pressure. Whether in a capacity relieving function requiring the ASME V-stamp or simply in an over pressure protection application, the ERV provides reliable protection for standard safety valves in many industries.

- ASME/ANSI Class 150 - 4500
- ½ – 12"

ERV Key Performance Features and Benefits

Features	Benefits
Integral metal seat	Reduced maintenance costs
Single-piece anti blow-out stem design	Enhanced process safety
Live-loaded stem packing (four bolts design)	Lower emissions
Body seal is out of flow path	Reduced maintenance costs, minimum downtime
Carbide coated sealing surfaces	Reduced maintenance costs, long service life
High precision reliable electronics	
Repeatable tight shut=off, accurate to 1/4 or 1 psi	Enhanced process safety
Dimensions to ANSI B16.10	Interchangeable with equivalent valves
Customed-engineered	Easily adapts to existing control suites
Optional integrated isolation valve available	Reduced maintenance costs

XACTROL®

Characterized Trim
Leak Free Isolation and Control in One

The Xactrol® product group unites ValvTechnologies' zero-leakage technology with special designs that allow rotary modulating control. From the Mark I's design that features a characterized upstream seat to the Mark III's precision engineered stacked disks, the Xactrol® allows the customer to combine precise flow control with tight shut-off. The Xactrol® is typically used in applications where minimum flow and relatively high differential pressures are required.

- ASME/ANSI Class 150 - 2500
- ½ – 36"
- Integral, characterized downstream seat
- Upstream disc inserts for modulation

Xactrol Key Performance Features and Benefits	
Features	**Benefits**
Pressure drop occurs in upstream seat	Downstream sealing seat protected
Repeatable tight shut-off	Enhanced process safety
Body seal is out of flow path	Reduced maintenance costs, minimum downtime
Integral downstream seat	Reduced leakpaths

ValvTechnologies Standard Products
for Upstream Oil & Gas

Model	Bore	End Size (inches)	Class	Body Materials	End Connections
TrunTech™ (Trunnion mounted)	per API 6D ISO 14313 and API 6A ISO 10423	Per API 6A and 6D	ASME 150-2500 API 6A 5000-15000	A105 A350 LF2 A350LF6 F51 F53 Alloy 625 Cladded 4130	BW RF RTJ Hub
V1 Series (Seat supported ball valve)	.38 .625 1.06 1.50 2.125	.25 – 4	900-4500	A105 A182-F22 Cl.3 A182-F91 A182-F31	BW SW FNPT
ERV	.625 6.06 1.06 8.06 2.13 10.06 3.06 12.06 4.06	.5 - 12	150 - 4500	A105 A350 LF2 F51 F53 Alloy 625 Cladded 4130	BW RF
XACTROL® (Control Valve)	Specially configured to customer specifications.	.5 - 36	1500 - 4500	A182-F22 Cl.3 A105 A182-F316 A182-F91	BW RF SW

Actuation and control

- Pneumatic - single and double acting
- Hydraulic - single and double acting
- Electric
- Electro-hydraulic
- Self contained with pressure pilots
- SIL-III instrumentation and logic solver
- Gears and levers

Fluids

- Steam from produced or aquifer water
- Gas-oil-water mixture with CO_2, chlorides H_2S and particles
- Molecular sieve raw gas and recycle gas
- Injection water and gas
- Brine and brine-containing oil
- Turbine steam
- LNG

Materials comply with the requirements of NACE MR-01-75

From a customer's perspective:

- Safe operations
- Responsible development
- Reliable operation
- Asset preservation

Testimonials from global oil companies operating in the Gulf of Mexico, Middle East, Latin America and Asia

"Our H2S detectors are set at a very low threshold. We need low emissions despite the thermo cycling of our treatment process. Triggering the detectors causes evacuation of the plant and shut down."

"The critical valves in our processing facility are not reliable, the production losses this year have been between $100 and $500 million."

"Our first priority is uninterrupted production. High-reliability valves are the cornerstone of our strategy to optimize production."

"The production losses from valve problems amount to over (2%) of our revenues. Most of the valve problems are the result of incorrect application engineering."

"In recent years, our company incurred $400 million per year of production losses attributable to valves alone."

Valves for Upstream Oil and Gas

ValvTechnologies, Inc. is a global leader in the design and manufacturing of flow control devices. Founded in 1987 and headquartered in Houston, Texas, ValvTechnologies remains focused on helping customers meet their daily production and process challenges safely and efficiently.

Having built a global reputation for superior quality and dependability across every industry served with products designed to fulfill the requirements of standard applications to the most sophisticated, severe-service processes, ValvTechnologies meets the demands for total flow control solutions, whether one valve at a time, or system-wide.

Bringing together the best people and the latest in technological design and manufacturing processes, ValvTechnologies has created an atmosphere where quality and dependability are built into every product, start to finish.

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