PETROLVALVES GROUP
enabling your energy flow

VSI CONTROLS
A PETROLVALVES COMPANY

CONTROL VALVES
AND ENGINEERED SOLUTIONS

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01 WE ARE PETROLVALVES GROUP

Mission

VSI Controls is dedicated to providing engineered, “best-fit” solutions for the most critical applications. We combine advanced technology with manufacturing excellence to deliver products whose quality surpasses industry standards, ensuring competitive pricing and on-time delivery for every project.

Vision

Our vision is built on a seamless interface between local sales expertise and factory innovation. By integrating specialized manufacturing know-how with strict specification compliance, we set the industry standard for controllability, performance, and reliability, delivering systems with unmatched precision.

The Group Synergy

As an integral part of PetrolValves Group, VSI Controls leverages the financial and operational strength of our headquarters in Castellanza, Italy. This synergy merges decades of profound manufacturing heritage with an agile, forward-thinking approach. By utilizing the Group’s global reach, we push technological boundaries to enable your energy flow with maximum reliability.

The PetrolValves Advantage

Established in 2017, the control valve division complements our world-class on-off valves portfolio, offering a premier alternative to traditional market players through:

- **Custom-Engineered Excellence:** High-specification products tailored to the most complex requirements.
- **Operational Efficiency:** Fast, responsive service with reduced lead times and a highly competitive supply chain.
- **Integrated Solutions:** A complete, end-to-end portfolio of On-Off and Control Valve systems.

Comprehensive Product Portfolio Designed for the rigorous demands of the Energy sector and the challenges of the Energy transition, our versatile range includes:

- **Globe and Rotary Control Valves**
- **Desuperheaters**
- **Specialty Engineered Valves**

At PetrolValves, we merge our Italian heritage with a technically sophisticated approach to solve the industry’s most critical challenges and energize what’s yet to come.

02 CAPABILITY & QUALITY

GLOBAL MANUFACTURING & TESTING CAPABILITY

PetrolValves provides VSI with an elite global infrastructure spanning over 100,000 m² across four specialized plants in Italy, Saudi Arabia, the USA, and Kazakhstan. With an annual capacity of over 10,000 valves, the Group operates without limitations regarding size, pressure, or temperature.

Our primary hub in Castellanza (60,000 m²) features:

HEAVY-DUTY INFRASTRUCTURE:

Lifting capacities up to 120 tons and advanced machining centers.

ADVANCED ASSEMBLY:

14 dedicated areas, including a “White Room” for clean assembly.

RIGOROUS TESTING:

Full validation for valves up to 100” and classes up to ASME 4500 / API 20K.

To ensure total reliability, we utilize specialized protocols:

Environmental Compliance: PR2 and Fugitive Emission Testing (FET).

Extreme-condition testing: Cryogenic, high-temperature, and high-pressure testing.

Subsea Validation: Hyperbaric chamber testing for deep-water performance.

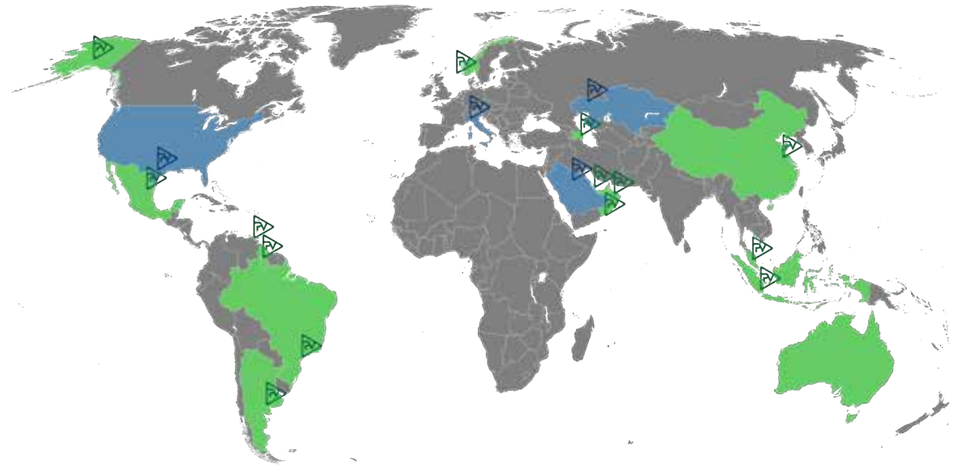
QUALITY SYSTEM & CERTIFICATION

Quality is a key improvement driver for us and is an integral part of our business. **PetrolValves and VSI** products are designed, manufactured, and tested according to the highest available standards, as we are committed to continuous improvement.

To serve the global market, we have obtained the most significant system certifications and product licenses, operating in compliance with all major applicable international industry standards: **ISO 9001 – PED – ATEX – SIL – CU TR 010 – CU TR 012 – CU TR 032 – ISO 14001 – ISO 45001 - TSG/SELO.**

03 GLOBAL EXPERTISE, LOCAL SUPPORT

PETROLVALVES GROUP GRANTS TO ITS CUSTOMER ACCESS TO ITS OWNED SHOPS NETWORK AND TO ITS AUTHORIZED REPAIR CENTERS TO COVER ALMOST ALL WORLD GEOGRAPHIES:



PETROLVALVES AND VSI FACILITIES AND SERVICE SHOPS

- **Italy** – Milan (headquarter)
- **USA** – Houston (Texas)
- **Kazakhstan**
- **Saudi Arabia** – Dammam

AUTHORIZED SERVICE SHOPS

- **Malaysia – Kuala Lumpur**
- **Indonesia – Jakarta**
- **China – Qingdao and Tianjin**
- **Azebaijan - Baku**
- **Guyana - Georgetown**
- **USA – Alaska**
- **Argentina – Buenos Aires**
- **UAE – Abu Dhabi**
- **Qatar – Doha**
- **Oman – Muscat**
- **Australia – Perth**
- **Brazil – Itapema**
- **Mexico – Nuevo Leon**
- **Trinidad & Tobago**
- **Norway**

04 COMPREHENSIVE GLOBAL SERVICE & SUPPORT

PetrolValves and VSI provide a world-class, “one-stop-shop” service network, leveraging over 65 years of engineering heritage and a massive installed base of 1,000,000 valves. We offer high-value support for PetrolValves products and third-party equipment through four key pillars:

ON-SITE ASSISTANCE & GLOBAL SUPPORT

24/7 Availability: A dedicated team of Service Engineers is available around the clock to provide comprehensive global support.

Rapid Response: Our extensive network enables on-site intervention within 24 hours of an urgent request, minimizing critical system downtime.

Mobile Workshops: Fully equipped mobile units deliver immediate on-site maintenance for both on-off and control valves.

SPARE PARTS & VALVE SUPPLY

Legacy Support: We provide genuine spare parts for valves installed over 50 years ago, ensuring long-term operational continuity.

Strategic Management: Our experts assist operators in defining proactive maintenance programs and determining strategic spare parts for planned shutdowns.

Proactive Maintenance: We offer long-term preservation and storage solutions, including periodic testing to ensure reliability even after prolonged downtime.

VALVE NEW LIFE

Asset Revitalization: A game-changing program designed to refurbish, upgrade, and revitalize end-of-life valves to peak performance.

Economic Efficiency: VNL can reduce CAPEX investments by up to 40% while eliminating replacement lead times.

Guaranteed Quality: Through reverse engineering and rigorous testing, revitalized valves are delivered with a new mechanical warranty.

SPECIAL SERVICES & INNOVATION

Advanced Diagnostics: In-service diagnostics, boroscopic analysis, and leak detection allow for performance assessment without interrupting operations.

Predictive Maintenance: Our proprietary torque sensor tool provides real-time insights into valve behavior, allowing for remote data analysis and early fault detection.

Environmental Compliance: Specialized fugitive emission campaigns help operators measure and comply with stringent environmental regulations.

05 ENGINEERING & INNOVATION

At **PetrolValves Group**, our heritage is the foundation of our future. Our VSI division harnesses 70 years of profound know-how in the most critical Oil & Gas and Energy sectors to deliver high-quality, engineered flow solutions. Our strength lies in a dedicated pool of over 50 professionals including Design Engineers, Project Engineers, and R&D specialists who utilize advanced computational technologies such as Finite Element Analysis (FEA) and Computational Fluid Dynamics (CFD) to redefine industry standards.

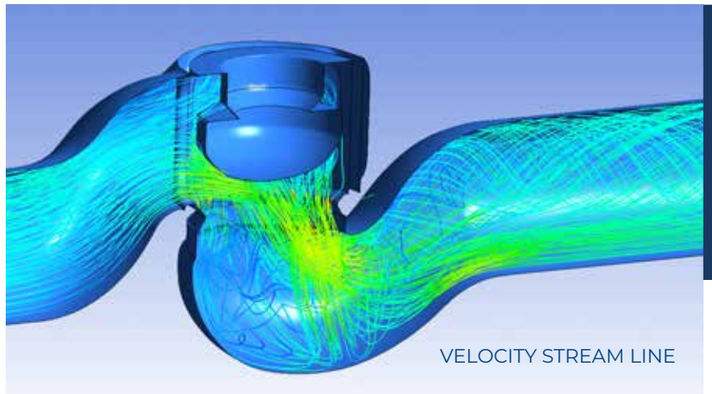
The Foundations of Excellence

Every project begins with a fully 3D design for assembly studio and CAD-CAM technology. We perform rigorous CFD simulations and FEM analyses to optimize every valve in terms of fluid-dynamic performance and structural integrity, ensuring weights and shapes are meticulously refined. Our modular designs are engineered for versatility, allowing configurations that satisfy even the most challenging operating conditions.

Precision and Performance

At PetrolValves, quality shapes our processes. Valve sizing and sound pressure level predictions are strictly performed according to the IEC 60534 standard. Our trim and material selection process is the result of careful process data analysis and decades of experience gained from an extensive installed base. We pay uncompromising attention to dynamic behavior, noise control, cavitation, and erosion. By combining advanced mechanical technologies such as Overlay, Hard facings, solid Tungsten Carbide, and Additive Manufacturing with value engineering techniques, we continuously improve performance to exceed customer expectations.

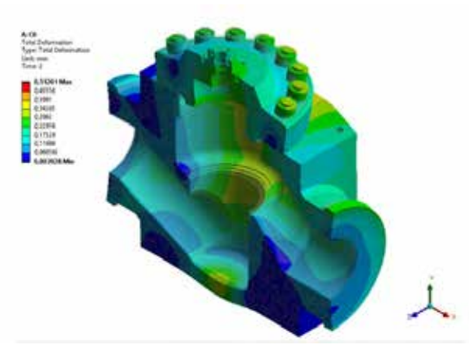
FROM 3D DESIGN TO REALITY: REDEFINING INDUSTRY STANDARDS THROUGH ADDITIVE MANUFACTURING

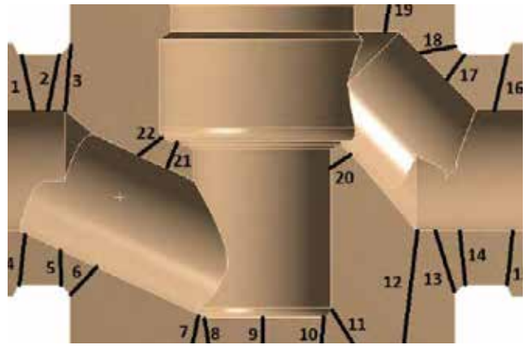


BRIDGING 70 YEARS OF HERITAGE WITH THE FUTURE OF FLOW: ENGINEERING WITHOUT LIMITS

Key Benefits of Our Engineering Approach

- **Technological Leadership:** Integration of 70 years of PetrolValves expertise with a pool of 50+ specialized engineers.
- **Design Optimization:** Advanced FEA and CFD simulations for maximum structural and fluid-dynamic efficiency.
- **Innovative Manufacturing:** Surpassing traditional limits through Additive Manufacturing and advanced materials like Tungsten Carbide.
- **Reliability & Compliance:** Precision sizing according to IEC 60534 and advanced measuring and control systems.





06 G-STREAM GLOBE VALVES

G-STREAM:
A versatile series designed for a wide range of configurations in continuous process industries.

Sizes:
1/2” through 36”

Rating Class:
Up to ANSI 4500 and API 20K.

Configurations:
In line, angle or 3-way body.
Forged or cast body.

Special Features:
Special trim for severe applications, Cryogenic design, microflow trim, bellows seal, and steam-jacketing.

THREE-WAY

The Three-way G-Stream bodies are used in applications with converging flow (mixing action) or diverging flow (bypass action). Most of the components are common with the globe-style valve, thus minimizing spare parts required for the plant maintenance.

ANGLE-STYLE BODY

The “Angle-Body Style” G-Stream has the same components of the standard G-Stream globe-style valve, so it is fully interchangeable except for the body itself. Depending on the application for which the valve is intended, the G-Stream valve with angle-style body may be supplied with an extended seat ring (venturi seat), that provides additional protection against the erosive action of the fluid.

07 G-STREAM SPECIAL TRIMS

ENGINEERED FOR THE EXTREME

ALPHA & BETA
Alfa trim is a cage trim suitable for cavitating applications: the drilling scheme in the cage is designed in order to increase valve F_L coefficient, to reduce cavitation bubble creation in the vena contracta. Beta trim is suitable for noise reduction: the micro-drilled cage increases the noise production frequencies, in order to maximize the transmission loss (piping noise absorption). Both Alfa and Beta trim are made with hardened material, in order to prevent galling phenomena between the plug and cage, and to maximize the life cycle of the valve. Alfa and Beta trim are available in the double cage configuration, for enhanced cavitation and noise reduction.

EPSILON & DELTA

This type of trim is specific for extreme cavitation, severe flashing and noise reduction. They are designed with the concept of the multi-stage – multi-path: fluid flow is divided in several independent channels where the pressure drop is split in multiple stages. The number of stages, size and expansion ratio of the channels are designed for each specific application.

Delta trim is manufactured by means of a disc stack, while Epsilon trim is an additive manufactured trim, and it guarantees a shortened lead time to market. Both Epsilon and Delta trim are available in variable resistance configurations, that is: less stages from bottom to top of the stack, resulting in an increase of the incremental C_v along the travel.

GAMMA
Multistage cascade trim for high pressure, dirt, cavitating and erosive liquid flow. The trim is constituted by several plug sections working in cascade with increasing passage areas to guarantee excellent anti-cavitation performances. Main features are:
Variable number of stages with different area ratios to cover different process conditions. Large passage sections allow processes including liquids with large particles to pass without damaging and plugging.
Shutoff performances are highly reliable due to the plug overlap in regulating sections. Reduced clearances between plug and guide improve stability and minimize vibrations.

ZETA
The Zeta trim is especially designed for high pressure applications on high differential pressure water or steam condensate service.
This particular design of trim with intermediate, cage guided, double plug, allows to separate the sealing surfaces from the modulating surfaces, providing perfect and reliable sealing.
The use of multiple cages guarantees extended life even in presence of cavitation or severe flashing.

ALPHA & BETA
(drilled cage)

- Low and medium cavitation
- Noise Reduction

EPSILON
(labyrinth trim, additive man.)

- Severe Cavitation
- Noise Reduction

DELTA
(multistage-variable resistance)

- Severe cavitation
- Noise Reduction
- High Rangeability

GAMMA
(cascade trim)

- Severe Cavitation
- Noise Reduction
- Dirty fluids

MICRO-GAMMA
(microflow cascade)

- Severe cavitation
- Control very low flow rate

ZETA
(tandem, plug)

- Severe Cavitation
- Severe flashing
- Extreme applications on water

08 B-DISC BUTTERFLY VALVES

VSI Controls' B-Disc series represents the pinnacle of double-offset engineering, specifically designed to provide unwavering reliability in both shut-off and precision throttling control within the most demanding industrial environments.

Drawing from PetrolValves' extensive heritage, these valves are engineered to manage substantial flow rates under moderate pressure drops.

Their versatile design makes them the ideal solution for both gaseous and liquid media across a broad spectrum of critical sectors:

- **Oil & Gas**
- **Power Generation**
- **Steel Production**
- **Water Treatment**

Sizes: 3" through 100"

Rating Class: from PN6 – Class 150 to PN 420 – Class 2500

With an expansive range of sizes from 2" to 100" and above the B-Disc series is built to scale alongside the most ambitious infrastructure projects.

ADVANCED ENGINEERING FOR CRITICAL CONTROL

The B-Disc series is defined by its ability to perform where standard solutions fail. Every component is optimized to maximize efficiency and protect the integrity of the process.

Tailored Sealing & Specialized Trims

To meet specific operational requirements, the series features both **soft and metal seat** options. For applications facing severe service challenges, we offer a specialized **drilled wing design**, specifically engineered for:

- **Anti-Cavitation:** Protecting the valve and piping from fluid-dynamic damage.
- **Noise Reduction:** Ensuring compliance with stringent environmental and safety standards.

Efficiency in Motion

The B-Disc geometry is meticulously designed to minimize pressure drop when in the fully open position, maximizing overall system performance.

Rapid Response Actuation

In critical stop and control turbine applications, timing is everything. Our B-Disc valves are equipped for fast stroke speeds, utilizing high-performance pneumatic or hydraulic actuation to ensure immediate and precise response when it matters most.

09 V-SHAPE V-NOTCH VALVES

The **V-Shape series** is engineered to bridge the gap between the ruggedness of a globe valve and the high-efficiency performance of rotary technology. Specifically designed for precise throttling, these valves feature a segmented ball with a V-shaped notch, delivering an equal-percentage flow characteristic.

This series is the preferred choice for operators seeking a combination of high capacity and exceptional rangeability in the most demanding environments.

ENGINEERED FOR EXTREME SERVICE

Tough Service Resilience: Built to endure the harshest conditions, including sour gas and slurry applications.

Advanced Flow Control: Available with specialized trims designed for noise reduction and cavitation prevention.

Simplified Maintenance: Optimized body design allows for easy seal replacement at the inlet, reducing downtime.

Superior Durability: High-strength construction ensures long-lasting performance even in erosive services.

Sizes: 3” through 20”

Rating Class: Class 150 to 600

10 EX-PLUG ECCENTRIC PLUG VALVES

The **Ex-Plug series** represents the commitment to innovation in flow solutions. Its defining characteristic is a specialized off-center (eccentric) rotation path, designed to optimize the lifecycle of the sealing components.

By ensuring the plug only engages the seat at the final moment of closure, the Ex-Plug effectively eliminates friction and rubbing throughout the entire stroke.

OPTIMIZED FLUID DYNAMICS

Straight-Through Flow Path: The internal body architecture is designed to minimize turbulence and pressure drop.

Suitable for high-viscosity fluids: Highly effective for handling thick, viscous, or contaminated fluids that would challenge standard valve designs.

Frictionless Operation: The eccentric movement prevents premature wear, ensuring consistent sealing performance.

Sizes: 3” through 12”

Rating Class: Class 150 to 600

11 AXIAL FLOW CONTROL VALVES

Leveraging **PetrolValves**' decades of specialized experience in **Axial Flow** isolation and check valves, VSI has engineered an advanced Axial flow control valve designed for peak performance in demanding energy environments. This solution integrates our legacy of reliability with cutting-edge flow technology to meet the most rigorous industrial requirements.

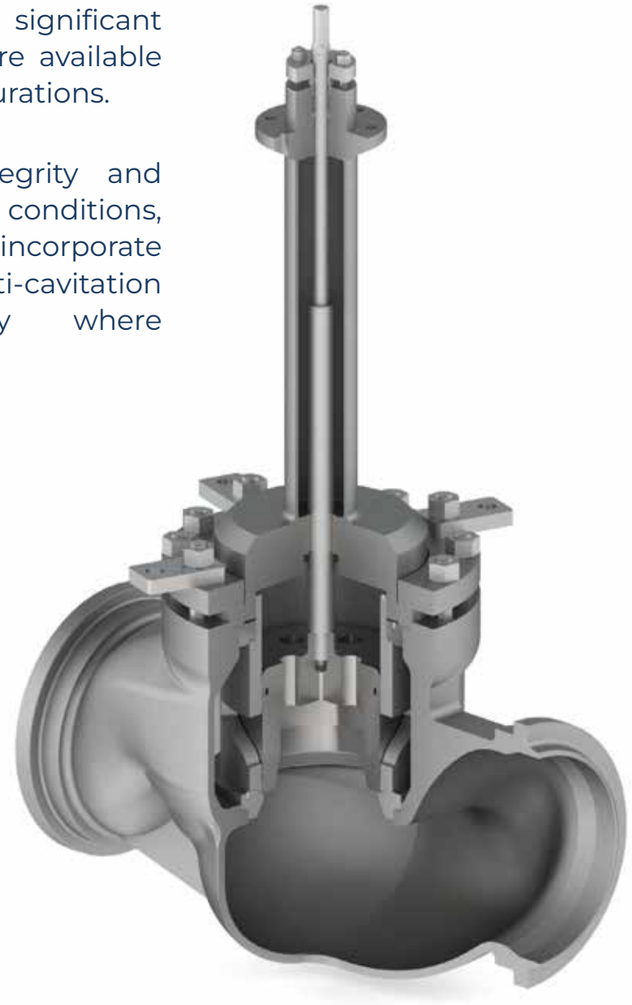
Our **VSI Axial flow control valves** are characterized by a **compact, two-piece body** featuring a streamlined internal path. This architectural design ensures high flow capacity and significantly reduced pressure drops while maintaining minimal turbulence. To guarantee operational precision, the system utilizes a **balanced plug** for smooth, reliable control, facilitating fast stroking options essential for critical processes. Furthermore, the VSI range offers **fully customizable trims** to address anti-cavitation and noise reduction, high rangeability, and bi-directional sealing, making it an ideal choice for both liquid and gas applications.

12 CRYOGENIC CONTROL VALVES PRECISION FOR THE LNG VALUE CHAIN

PetrolValves provides a specialized range of VSI cryogenic valves designed to meet the most challenging applications in the LNG and cryogenic sectors. Our solutions ensure precise flow, pressure, and temperature management across the entire value chain from liquefaction to regasification.

Engineered to perform under extreme low temperatures and handle significant pressure drops, these valves are available in both linear and rotary configurations.

To maintain operational integrity and performance in these harsh conditions, VSI designs frequently incorporate advanced multi-stage or anti-cavitation trims, ensuring reliability where it matters most.



ADVANCED FLOW SOLUTIONS FOR THE POWER GENERATION INDUSTRY

PetrolValves delivers high-performance flow control solutions through the VSI brand, **specifically engineered for the rigorous demands of the global power market**. From traditional fossil fuel plants to **Geothermal**, **Solar**, and **Nuclear applications**, we provide the technical expertise required to optimize efficiency and operational reliability.

OUR SPECIALIZED POWER PORTFOLIO

We offer a comprehensive range of mission-critical solutions designed for extreme environments:

- **Critical Boiler Service Valves**: Engineered for high-pressure and high-temperature steam/water cycles.
- **Turbine Bypass Systems**: Ensuring asset protection and operational flexibility during transients.
- **Advanced Desuperheaters**: A complete range for precise steam temperature control and superior atomization.

PRECISION ENGINEERING: THE VSI ADVANTAGE

Equipped with balanced plugs for fast-stroking and smooth control, these systems include customizable trims to address cavitation, noise, and high rangeability. Whether managing liquid or steam, PetrolValves provides the reliability needed to energize the future of power generation.

13 TURBINE BYPASS VALVES AND PRDS

Pressure Reducing and Desuperheating Stations (PRDS) Valve

A Pressure Reducing and Desuperheating Stations (PRDS) control valve is a specialized component used in steam systems to simultaneously lower steam pressure and temperature to meet specific downstream process requirements.

Turbine Bypass Valve (TBV)

A turbine bypass valve (TBV) is a high-capacity, fast-acting control valve used in steam power plants to redirect steam away from the turbine during non-standard operations, such as startup, shutdown, or emergency trips.

The **VSI TBV and PRDS** are available in either in-line or angle body configurations, specifically engineered to reduce steam pressure while effectively managing high flow rates and significant pressure drops.

These valves are equipped with an integrated desuperheating system at the outlet section to decrease steam temperature, utilizing advanced logic based on either temperature control (feedback loop) or enthalpy control (feedforward loop).

- High temperature (up to 650°C)
- High pressure (up to 270 bar)
- Metal balanced or piloted plug
- Multicage or outlet silencers
- Cr-Mo or high-Cr steel
- Body bonnet pressure seal connection

14 DESUPERHEATERS

Desuperheaters are utilized within the Power and Oil & Gas industries to reduce steam temperature through the direct injection of water into the superheated steam flow.

PetrolValves provides a comprehensive range of VSI desuperheating systems designed for precision and durability, including:

- Venturi Desuperheater (DVT)
- Variable area spring-assisted, probe or wall mounted layout (DSP and DSE)
- Multinozzle, integrated type (DVP)
- Injection chambers supplied upon request.

DVP *Variable Area*

SIZES	1” through 3” water side 3” through 4” steam side
RATING CLASS	150 through 2500
BODY MATERIALS	Carbon Steel, Chrome Moly, Stainless Steel
END CONNECTIONS	Flanged ANSI 150-2500
TRIM	Stainless Steel, Most other Alloys
ACTUATOR	Double Acting cylinder with spring for failsafe action
FEATURES	High rangeability, good water atomization also at minimum flow, variety of size of spray nozzle sizes, accurate control capability, minimum dimension thanks to built-in control system, available for cryogenic application, high differential pressure allowed, with multistage trim design

DSP *Spring Assisted Probe*

SIZES	1” through 3” water side - 2” through 8” steam side
RATING CLASS	150 through 2500
BODY MATERIALS	Carbon Steel, Chrome Moly, Stainless Steel
END CONNECTIONS	Flanged ANSI 150-2500
TRIM	Stainless Steel, Most other Alloys
FEATURES	Easy and versatile design, no practical limitations in flow rate and operating conditions, no upper limitations in pipe size, with multiple nozzle layout

DSE *Spring Assisted External Mounting*

SIZES	1/2” through 2” water side 2” through 40” steam side
RATING CLASS	150 through 2500
BODY MATERIALS	Carbon Steel, Chrome Moly, Stainless Steel
END CONNECTIONS	Integral flanges, Flangeless (water-style assembly), BW
TRIM	Stainless Steel, Most other Alloys
ACTUATOR	Double Acting cylinder with spring for failsafe action
FEATURES	A variety of nozzle dimensions available, no practical limitations in flow rate and operating conditions, no upper limitations in pipe size, with multiple nozzle layout, internal protection linear available, water distribution piping designed with free expanding design

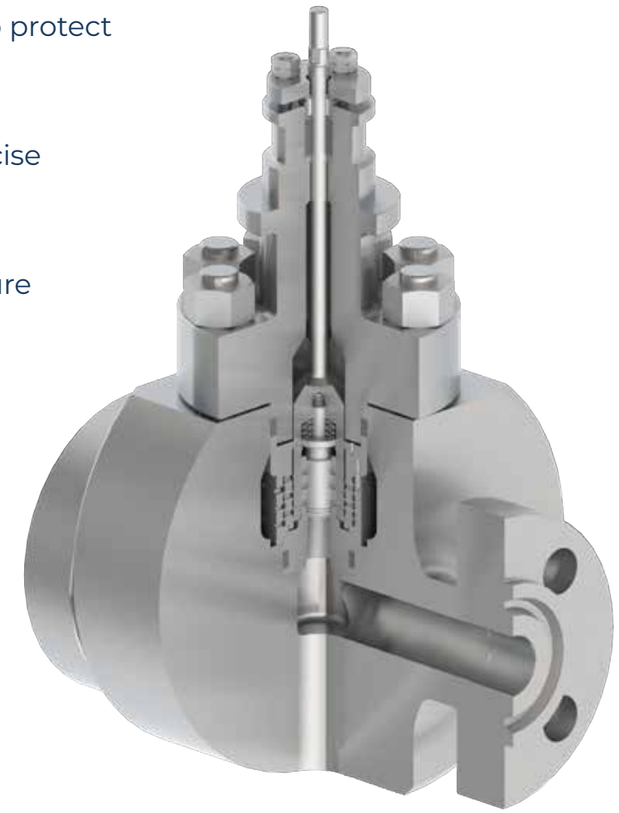
DVT *Venturi Type*

SIZES	1/2” through 2” water side 2” through 10” steam side
RATING CLASS	150 through 2500
BODY MATERIALS	Carbon Steel, Chrome Moly, Stainless Steel
END CONNECTIONS	Integral flanges, Flangeless (water-style assembly), BW
TRIM	Stainless Steel, Most other Alloys
FEATURES	Good atomization even with very low steam velocity, suitable for very low flow rates

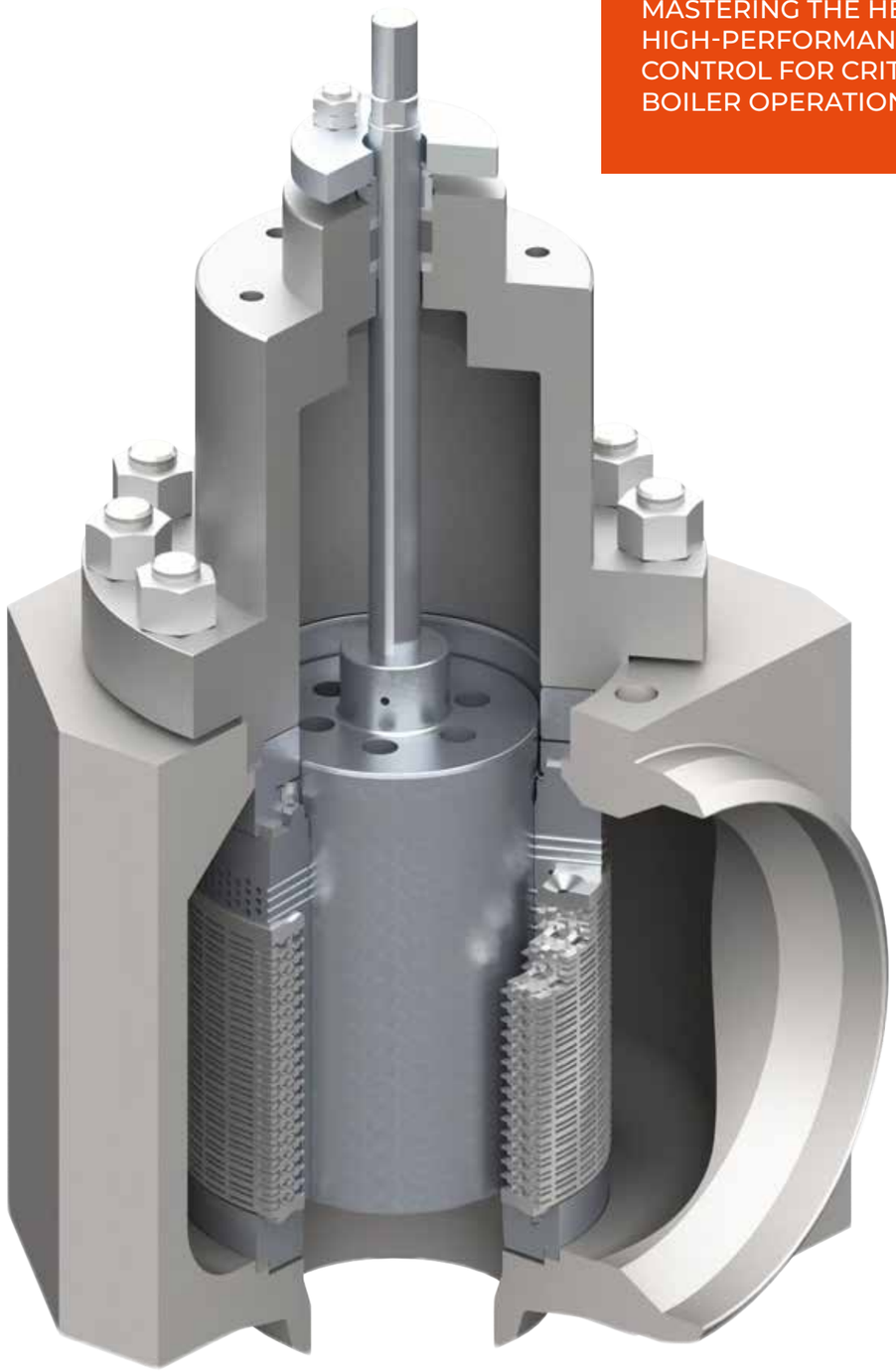
15 BOILER VALVES

VSI specializes in the engineering and manufacturing of high-performance Control Valves tailored for the most demanding steam boiler applications. Our solutions are designed to ensure safety, efficiency, and longevity within the critical thermal cycles of power plants and industrial facilities. The PetrolValves boiler portfolio includes:

- **Blowdown Control Valves** for effective discharge of high-pressure fluid.
- **Vent valves** to manage pressure during startup and emergency conditions.
- **Feedpump recirculating valves** to protect high-pressure pumps during low-flow operations.
- **Feedwater Control Valves** for precise boiler drum level regulation.
- **Desuperheating control valves** to ensure accurate steam temperature modulation.
- **Turbine and main steam drain valves** engineered to handle condensate removal.



MASTERING THE HEAT: HIGH-PERFORMANCE CONTROL FOR CRITICAL BOILER OPERATIONS.



SPECIALIZED FLOW SOLUTIONS
FOR THE OIL & GAS INDUSTRY

The Oil & Gas sector demands exceptional durability and precision to manage complex fluids and extreme operating conditions. PetrolValves provides a targeted portfolio of VSI control solutions engineered to optimize production and ensure the integrity of critical assets.

Our expertise covers high-performance Chemical Injection Control Valves and Choke Valves for precise flow regulation, alongside specialized FPSO Control Valves designed for the unique constraints of offshore floating facilities.

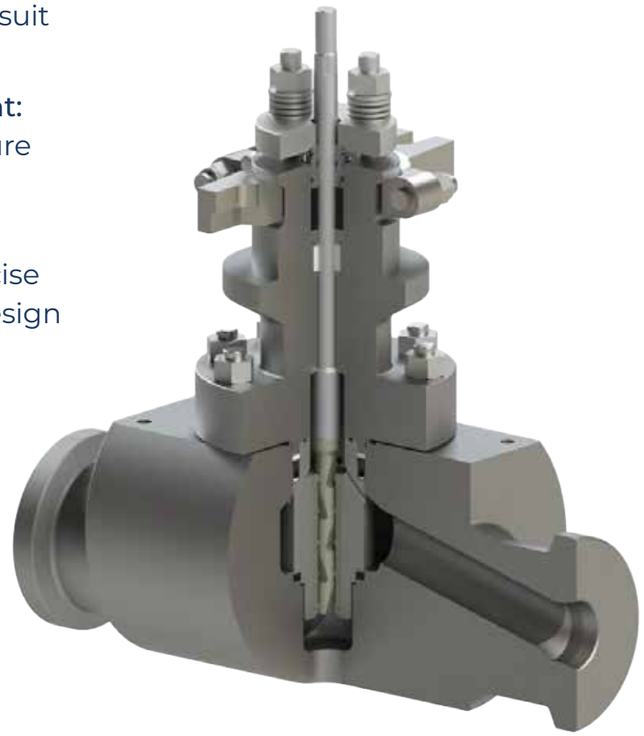
For the most demanding applications, we deliver advanced Compressor Antisurge Valves to protect vital equipment from instability, and high-specification Cryogenic Valves engineered for reliable performance in liquefied gas and low-temperature environments.

16 CHEMICAL INJECTION CONTROL VALVES

Our chemical injection valves provide stable and accurate flow delivery with long-lasting performance, specifically engineered to withstand the most demanding operational environments. This reliability is achieved through the strategic use of multistage trims, which effectively manage the energy of the flow and mitigate the risks associated with high-pressure processes.

Designed for both Flow Control and Backpressure Regulation, the PetrolValves VSI range offers exceptional flexibility and technical sophistication:

- **Advanced Trim Options:** Features two specialized trim designs, Micro-Gamma and Epsilon, tailored to specific rated C_v requirements.
- **Versatile Architecture:** Available in in-line or angle body configurations with hub or autoclave fitting connections to suit diverse installation needs.
- **Extreme Condition Management:** Capable of handling high pressure drops (up to 15,000 PSI) on both cavitating and flashing fluids.
- **Superior Accuracy:** Ensures precise control through a long stroke design and exceptionally tight trim tolerances.
- **Durability and Consistency:** The multistage design extends service life by reducing wear, ensuring repetitive and reliable performance over time.



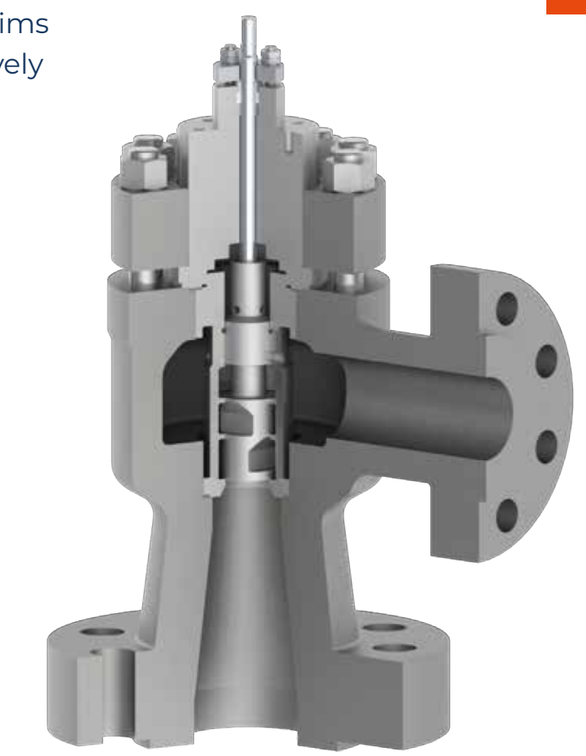
17 CHOKE VALVES ROBUST CONTROL

Our engineered choke valves are meticulously designed to manage high-energy and high-pressure flows, specifically for severe throttling tasks where precision and durability are non-negotiable.

PetrolValves provides a robust solution capable of maintaining operational integrity under the most strenuous conditions of the Oil & Gas industry.

The VSI Choke Valve range is characterized by its technical versatility and advanced material science:

- **Standard Compliance:** Available in both ANSI and API 6A pressure classes to meet diverse global specifications.
- **Flexible Architecture:** Offered in in-line or angle body configurations to facilitate seamless integration into existing piping layouts.
- **Advanced Trim Technology:** Features various trim options, including multistage trims designed to dissipate energy effectively and prevent erosion.
- **Material Excellence:** Includes a solid tungsten carbide trim option, providing superior resistance against wear and abrasive fluids.

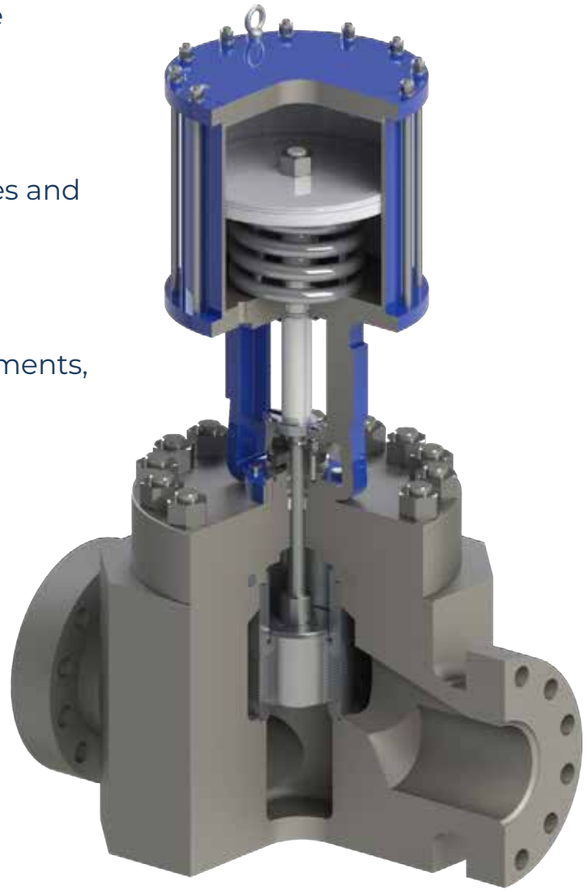


18 FPSO CONTROL VALVES

With over 30 years of specialized experience in FPSO and offshore platform applications, PetrolValves provides a comprehensive range of control flow solutions, including globe and rotary valves in both ANSI and API 6A classes. Our engineering focus is dedicated to reducing weight and dimensions while optimizing performance to meet the unique space and load constraints of floating facilities.

The VSI offshore portfolio is defined by rigorous design standards and high-reliability features:

- **Optimized Construction:** Available in cast or forged bodies with both flanged and hub connections.
- **Advanced Engineering:** We utilize CFD-based designs for valve bodies and trims to minimize weight without compromising flow efficiency.
- **Structural Integrity:** Designs meet the most stringent API 6X requirements, supported by extensive FEA (Finite Element Analysis) to ensure safety under extreme conditions.
- **Redundant Sealing:** Features a sophisticated body-bonnet flange double sealing system (Metal-to-Metal BX + Lip Seal) to provide redundant barriers for leak prevention.



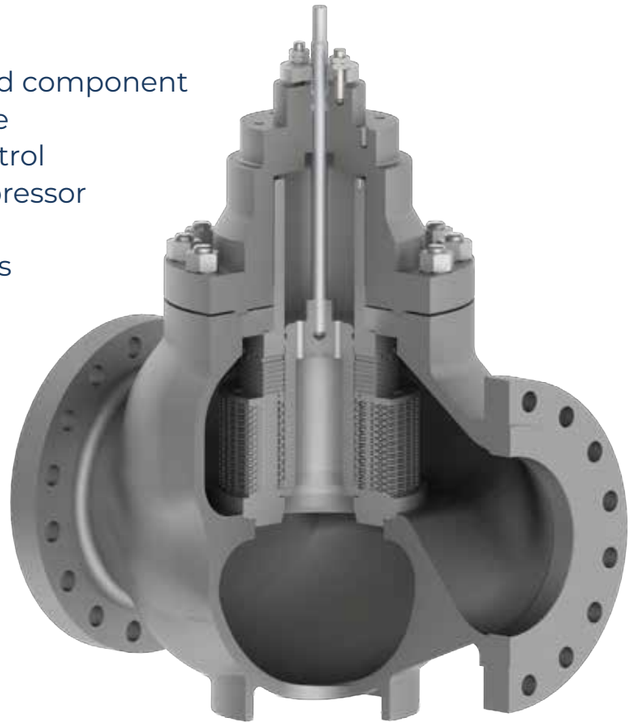
- **Actuation Efficiency:** The inclusion of a fully balanced plug significantly reduces the required actuator size, further contributing to the overall footprint reduction of the system.

19 COMPRESSOR ANTISURGE

The VSI **Compressor Antisurge Control Valve** offers a comprehensive severe service solution, where sizing and design are tailor-made for specific applications based on rigorous engineering criteria. Central to this solution is the High Flow Capacity (HFC) globe valve body, engineered to prevent surge under all operating conditions including startup and shutdown. Our design philosophy ensures the valve is never oversized; while an oversized valve leads to poor control precision, our extensive use of **CFD analysis** maximizes C_V rates for any given size, providing essential additional capacity when a compressor bypass is required. To manage high-flow discharge, expanded outlets are available, with or without silencers, to decrease fluid velocity at the valve exit.

Operational versatility is further enhanced by our variable resistance trim, specifically designed to manage the transition between Low C_V at high pressure drop and High C_V at low pressure drop conditions.

A key innovation in this field is the **Delta trim**, a custom-designed component optimized to minimize noise while maintaining the capacity and control necessary for antisurge and compressor recycle applications. This specialized **labyrinth trim** features a variable number of stages (turns) up to a defined valve stroke, transitioning into a single-stage, large-opening cage trim at higher openings to ensure maximum flow efficiency when it is needed most.



In the most demanding industrial sectors, standard solutions are often insufficient to address the extreme chemical and physical challenges of the process. PetrolValves excels in the design and manufacture of **Specialty Valves**, providing custom-engineered solutions for highly specific and niche applications. Our expertise in VSI specialty technology allows us to push the boundaries of materials and mechanics, delivering reliability where others cannot.

Our specialized portfolio includes **ultra high-pressure solutions** for **LDPE production**, **jacketed valves** for thermal consistency, subsea Control Valves and the use of exotic materials such as **full titanium** for maximum corrosion resistance.

We also provide **dedicated technology for high-temperature** molten lead applications, and the emerging frontiers of the energy transition such as **CO_2 battery plants**, including high-performance Control Valves for **H_2 Fueling stations**.

Whether managing extreme toxicity, high temperatures, extreme pressure, or innovative fuels, PetrolValves remains committed to safety and performance through bespoke engineering.

ENGINEERING BEYOND THE STANDARD: VSI SPECIALTY VALVES

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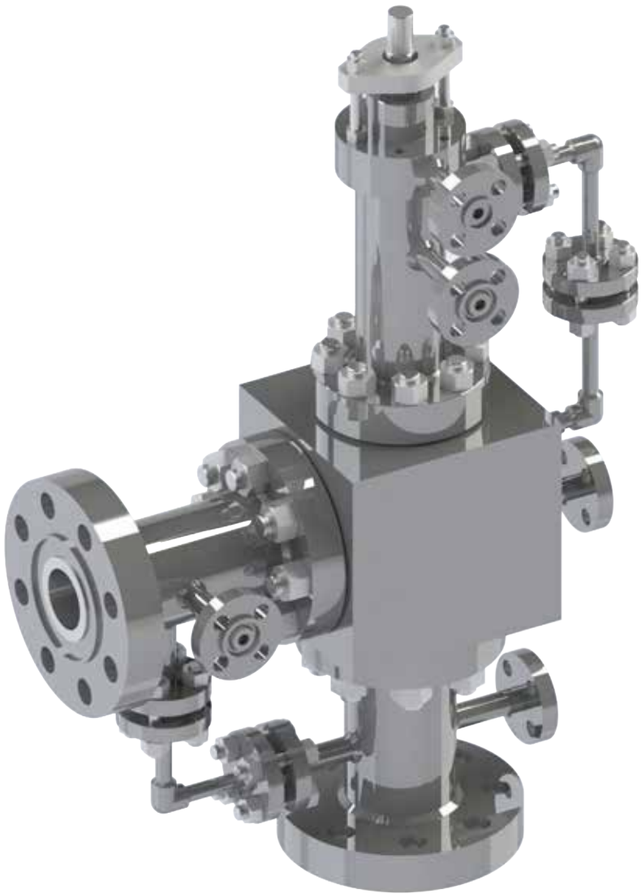
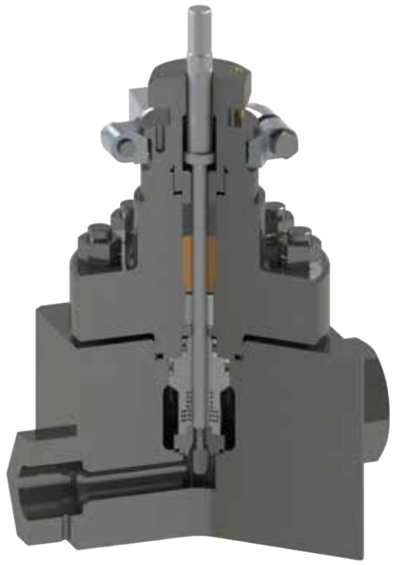
20 VSI SPECIALTY AND BESPOKE SOLUTIONS

As an integral part of the **PetrolValves** Group, VSI is defined by a deep-rooted vocation for the design and manufacturing of highly engineered and specialty products. Over the decades, we have developed a diverse array of valve technologies for critical and experimental applications, working in seamless collaboration with our customers' engineering departments. At VSI, we position ourselves as the strategic partner capable of developing **"the valve that has yet to be invented"**, transforming complex theoretical challenges into reliable industrial realities.

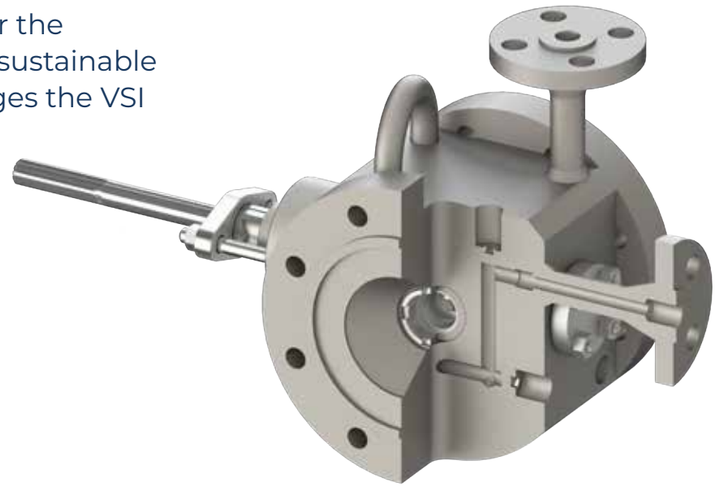




Our commitment to innovation is reflected in our ability to master extreme materials and unprecedented pressure levels through a specialized portfolio:

- **Full Titanium Control Valves:** Specifically engineered for the most aggressive chemical environments where standard alloys fail, ensuring maximum corrosion resistance and structural longevity.
- **Molten Lead Control Valves:** Designed to withstand the extremely erosive and high-temperature nature of molten metal service, maintaining precise control under the harshest mechanical stress.
- **Ultra high-pressure LDPE Solutions:** Pushing the boundaries of mechanical limits with control valves designed for pressures up to 60,000 PSI (4,137 bar), essential for the demanding conditions of Low-Density Polyethylene production.
- **Hydrogen (H_2) Fueling Station Technology:** Supporting the energy transition with high-pressure control valves for the automotive sector, designed for the ultra-precise management of pure Hydrogen.
- **Subsea Control Valves:** Leveraging the extensive know-how of PetrolValves, a market leader in subsea valves since the 1970s, VSI has developed a series of linear and rotary control valves for subsea applications, fully equipped with PetrolValves subsea actuators.

Whether addressing the needs of traditional heavy industry or the emerging requirements of sustainable energy, PetrolValves leverages the VSI specialty range to ensure that no process is too challenging and no specification is too demanding to be met.



PETROLVALVES GROUP GRANTS DIRECT ACCESS TO THE RECIPROCAL GLOBAL NETWORK OF HIGHLY QUALIFIED SISTER COMPANIES AND SELECTED PARTNERS WITH A WORLDWIDE PRESENCE.

MANUFACTURING PLANT

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