


ACCUSEAL[®] CSV

MINING & SLURRY TRANSPORT VALVES

 +1 281 637 2000

 f-e-t.com/accuseal

 ForumVS.Sales@f-e-t.com



MANUFACTURER OF QUALITY VALVE PRODUCTS AROUND THE GLOBE

Forum Energy Technologies (FET) is committed to improving our clients' operational and financial performance by supplying the most comprehensive range of valve products in the industry through our family of trusted valve brands.



ABOUT FET

Engineering Expertise

FET uses the latest state-of-the-art engineering software to provide custom design services for any application. Finite element analysis is one of many Design Verification Tools FET uses to design valves for specific customer requirements.

CAD & NC Capabilities

With FET's fast and efficient workflow, CAD drawings are releasable to the network for manufacturing and purchasing. Computer-generated machine programs can be quickly changed for weld overlays or other processes, resulting in faster deliveries.

Accurate Inventories

Daily cycle counting & order picking using wireless barcode guns and automated part delivery systems results in more accurate inventories and faster product delivery.

Quality Control

All FET Companies manufacture quality products designed and tested to meet the standards of Qualifying Authorities worldwide. Advanced engineering and our Quality Management System ensure that our valve products continue to exceed your expectations for performance.

Customer Service

FET staffs its Customer Service Department with trained representatives who are ready to help you with ordering information, technical specifications, and logistics.



Mining & Slurry Transport

FET provides a broad range of isolation valves for most applications, from basic manual operations to fully automated systems. As the industry increases technology demands, operators select FET to obtain best-in-class service, performance, and value. We are ISO-9001 certified, thus assuring the design and manufacturing of the highest quality products available in the market.

Why Accuseal Valves?

There is a difference!	4
Optimized Ball Valve Design	4
Engineering Software	4
Superior Valve Coatings	5
Omni-Lap 360°™	5
Vacuum Seal Testing	5

Applications

Slurry Pipelines	6
Mining, Minerals, and Oil Sands	6
Onsite Case Study	7

Accuseal CSV

CSV Parts	8
Unidirectional & Bidirectional Flow	9
Dual Spring	9
Size & Pressure Class	9
Cutaway Image with Labels	10
End Connections	10
Features & Benefits	10
Bill of Materials	10
Testing Procedures	11

Accuseal Valves Quality

Accuseal Valves Certifications	11
Actuation	11
Accuseal Valves Product Warranty	11
Accuseal Valves Product Test Procedures	11

Due to upgrades in industry standards, material innovations, and FET's commitment to product advancement, data and dimensions presented in this brochure are subject to change. Please contact your FET sales representative for updated and/or current drawings and material compliance.

Note: Data contained in this document is for informational purposes and shall not be used for design purposes.

WHY ACCUSEAL VALVES?

Why make Accuseal your severe service metal-seated ball valve of choice?

Slurry transport is a complicated engineered process. Optimizing the transport of solids via a carrying medium from remote, often arid locations to distant beneficiation destinations is a science. Valve failure can cause dewatering and other serious delays. Reliable isolation from the mine through choke and pump stations to distant destinations is crucial.

In slurry transport, time is money — and so is water. Unscheduled downtime equals big money lost. When it comes to pipeline transport of slurry and other materials — viscous liquids, reagents, or concentrates — the longer a valve can isolate without maintenance or failure, the better.



There is a difference!

Many valves claim to be the best. All have a ball, seat, and stem. But which valve most consistently provides isolation under the most challenging conditions? You choose severe service valves with care because the consequences of failure are severe. COOPER® Valves deliver many advantages in power generation applications.

Accuseal Valves deliver predictable reliability and performance.

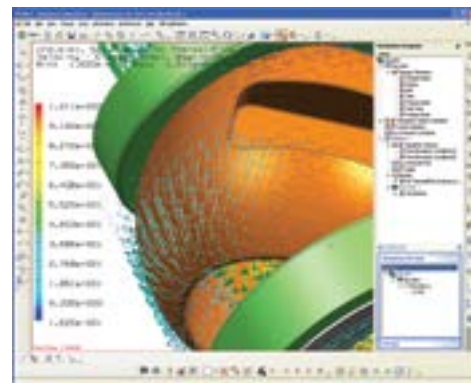
- Optimized Ball Valve Design and Engineering Software Proprietary Advance 3D software and CFD Analysis provide optimal valve engineering.
- Superior Valve Coatings specific for the current application.
- Accuseal uses only state-of-the-art HP-HVOF (high-pressure – high-velocity oxygen fuel) coatings to provide maximum protection for longer valve life.
- Exclusive Accuseal Fused and thermally stabilized coatings are metallurgically bonded to the base material to handle even the most severe thermal stresses.
- Omni-Lap 360°
The proprietary Accuseal mate-lapping process laps the entire spherical surface of the ball and seat surface, not just the sealing band areas.
- Vacuum Seal Test
Accuseal ball and seat sealing is tested before valve assembly, ensuring seal integrity.

Optimized Ball Valve Design and Engineering Software

We combine extensive severe service ball-valve engineering experience with proprietary valve optimization CAD/CAM/CAE software and fast-track optimized valve design. We simulate service conditions and provide feedback through engineering analysis, FEA (Finite Element Analysis), and CFD (Computational Fluid Dynamics).

Advantages include:

- Optimized ball/seat sealing engagement
- Line of sight bore for totally unobstructed media flow
- Optimized ball/stem tang interface
- Thermally stabilized seat geometry allows for rapid sealing



Computational Fluid Dynamics fast-tracks optimized design

Superior Valve Coatings

Not all HVOF coatings are the same. Accuseal’s HVOF coating formulas stand out because they are:

- **Consistent:** They maintain uniform quality.
- **Low Porosity:** They have fewer tiny openings.
- **Matched to Ball/Seat Material:** Customized for specific components.
- **Applied with State-of-the-Art Technology:** Ensuring reliability in various service conditions.

Accuseal also offers a fused carbide coating that is:

- **Thermally Stabilized:** Can handle high cycles and thermal stress.
- **Superior Under Stress:** Performs well even when exposed to heat and media bombardment.
- **Extends Valve Life:** The smooth surface integrity contributes to longevity.
- **Leak-Proof:** No pathways for leaks to develop.
- **Operates with Reduced Torque:** It is easier to turn the valve.

Omni-Lap 360°

Proprietary mate-lapping produces the tightest, most reliable seal available. All metal-seated ball valves rely on continuous, unbroken contact between the metal ball and seat to create an isolating seal. Omni-Lap 360° mate-laps the entire ball and seat for optimal roundness, producing 100% ball-to-seat contact, regardless of positioning.

Traditional cup-lapping methods mate only with the ball’s sealing band to seat surfaces, creating ridges that distort the ball’s roundness and compromise the coating thickness. If even slightly misaligned, the sealing “sweet spot” originates a leak path, reducing valve life, more maintenance, and higher actuation costs.



Omni-Lap 360°	Traditional Lapping
<ul style="list-style-type: none"> • Automated lapping of the entire spherical surface • Consistent 100% roundness • Uniform coating thickness • 100% ball-to-seat contact • Smooth surfaces reduce friction for lower torques 	<ul style="list-style-type: none"> • Laps only a sealing band • Distorts roundness • Compromises coating thickness; Seals in any position • Creates ridges around “sweet spot” • Surface irregularities cause higher torques

Vacuum-Seal Testing

Accuseal Valves performs vacuum testing on every ball and seat before assembly. This verification ensures a 100% seal between the ball and seat, ensuring Class VI shut-off (which means minimal leakage).

Benefits:

- **Cost Efficiency:** The early detection of any issues through vacuum-seal testing significantly enhances manufacturing efficiency, directly contributing to cost reduction.
- **Easy Assembly:** Assembling valves is easier in the factory or field due to the pre-tested seals.

APPLICATIONS

Slurry Pipelines

- **Operating and Standby Pump Stations**

Severe service ball valves prevent slurry leakage (zero leakage and full differential pressure) from reaching an idle pump. They serve as isolation valves on both the suction and discharge sides.

- **Choke Stations**

Choke stations are essential for maintaining safe pipeline operations. They help reduce or eliminate pressure buildup and provide back pressure to maintain constant flow. Severe service ball valves divert flow to the choke station. These ball valves must provide zero leakage, even at full differential pressure, when closed.

- **Isolation Stations**

Strategically placed severe service ball valves can isolate pipeline sections in a significant pipeline rupture. Typically, operators install two valves in series (Cut and Seal), with one serving as the flowing valve (Cut) and the other as the isolation valve (Seal). These valves, including Accuseals's full-ported valves designed for pig launching and receiving stations, are crucial in maintaining the pipeline's integrity.

- **Instrument Isolation**

Control and measurement systems throughout the pipeline rely on small, severe service valves. These valves isolate instruments for repair, calibration, or replacement during normal pipeline operations.

- **High-Pressure Dewatering**

This process involves pumping high-pressure water from underground mining applications to the surface.



Mining, Minerals, and Oil Sands

- **Autoclaves**

Accuseal provides severe service valves designed explicitly for leaching processes, such as High-Pressure Acid Leaching (HPAL). These valves excel in environments with high pressure and temperature. They are also suitable for erosive and corrosive applications, including autoclave discharge, vent, isolation, and feed.

- **Roasters**

Roasting is a dry process that involves a gas-solid reaction at extremely high temperatures to purify metal components. Severe service valves are crucial in isolation and drainage during this process.

- **Tailings**

Tailings refer to the waste slurry produced from fine minerals and water after extraction from unusable ore during milling operations.

- **Flotation Cells / Column Thickeners**

Flotation cells and column thickeners separate minerals by attaching them to air bubbles and carrying them to the surface.

- **High-Pressure Leaching**

Cyanide is added to precious metals (e.g., gold) in high-pressure leaching to dissolve the mineral.

- **Oil Sands**

Various oil sands processes utilize severe service valves for froth treatment, slurry production, and steam injection within Steam-Assisted Gravity Drain (SAGD) systems.

ACCUSEAL CRITICAL SERVICE BALL VALVE (CSV)

Upgrade your expectations and enjoy longer run times.

These photos testify to the durability of FET Accuseal’s critical service ball valve, which has withstood the harsh conditions of copper-concentrate slurry transport service in Chile. This 8-inch, 1500 ASME Class valve, operating at a working pressure of 2700 psig for approximately 1500 cycles, was removed from the choke station pipeline. A thorough examination of the primary sealing side of the ball demonstrates the enduring integrity of the HP-HVOF coating on the Omni-Lap 360° ball and seat sealing components.



Accuseal 8-inch, 1500 ASME Class critical service ball valve in choke station pipeline for copper concentrate in Chile.



Valve removal for inspection.



View through downstream bore, open position.



Close-up view of primary sealing surface of closed ball after approximately 1500 cycles at 2700 psig working pressure.

Choose FET Accuseal Valves on your next project.

ACCUSEAL CSV

1. Body / End Connection

- Machined from forgings for material structural integrity.
- End Connections: RFF-raised face flange – Standard.
- Options available on request: BW-Butt Weld, SW-Socket Weld, RTJ, Hub Connectors, Threaded, Lens Joint, Wafer, etc.
- Weld overlay of wetted surfaces to protect from corrosion and erosion – available upon request.

2 & 3. Ball + Seats = The Sealing Assembly

- Omni-Lap 360° optimizes the matched roundness of the ball and seat for 100% seal, regardless of positioning. The maximized sealing surface provides the widest metal-to-metal seal possible, making the seal consistently reliable.
- Corrosion-resistant materials with matched thermal expansion rates are used on the sealing components to maintain seal integrity and reliability.
- Coatings are robotically applied with HP-HVOF (high-velocity oxygen fueled) or spray-and-fuse processes to achieve uniform surface thickness, coating density, and maximum metallurgical bond to withstand extreme service conditions.
- Self-cleaning: The seats remove all debris from the ball with every on/off cycle, extending valve life.
- Field repair is more straightforward and faster when required. The ball and seat assembly is vacuum seal verified at the factory and easily replaced on site.

4. Dual Belleville Springs

- Provides resilient loading of the ball to the seat.
- Provides effective particulate exclusion.

5. Stem

- Surface modification eliminates galling with rotation.
- Blow-out proof per ASME B16.34.

6. Inner Stem Seal

- Provides primary metal-to-metal stem seal.

7. Packing Bushing

- Prevents stem packing intrusion into the body.
- Works with stem bearing to prevent lateral stem motion.

8. Packing Rings

- Reinforced graphite.

9. Anti-extrusion Rings

- Prevents packing extrusion.

10. Packing Follower

- Thermally matched to stem material.
- Prevents galling and contains upper packing.

11. Articulating Gland Flange

- Spherically engages the packing follower to prevent stem binding and galling during adjustments.

12. Belleville Springs

- Live load on the bolted joint eliminates routine gland adjustments.
- Reduces maintenance.

13. Stem Retaining Ring

- Prevents stem misalignment during actuator installation.
- Stem cannot be forced into ball stem slot.

14. Mounting Flange

- Precision machined to ISO 5211.
- External mounting flange provides rigid mounting for ease of adjustment.
- Direct mounting option reduces hysteresis and stem deflection.

15. Body Gasket

Spiral Wound Gaskets

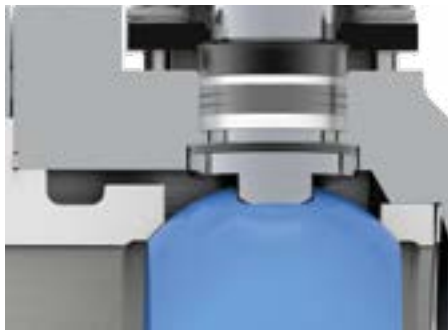
- Grafoil filled.
- 1500 pressure class and below.

Engineered Body Seal

- 2500 pressure class and above.
- Gold-plated Inconel 718.
- Pressure-assisted seal.

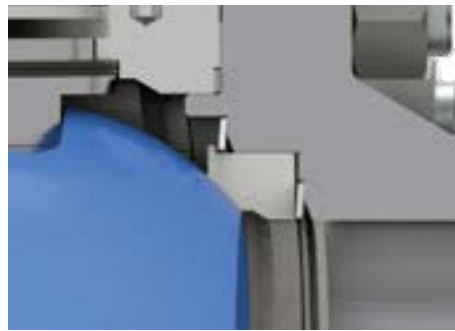
Flexible Graphite

VARIOUS SEATING OPTIONS AVAILABLE PER APPLICATION



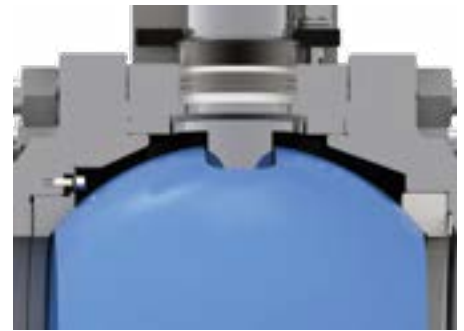
Unidirectional Flow

- Flanged seat design.
- Sharp leading edges of the seat scrape the ball clean each time the valve opens.
- Fully field serviceable.
- Vacuum tested to Class VI shutoff.



Dual Spring

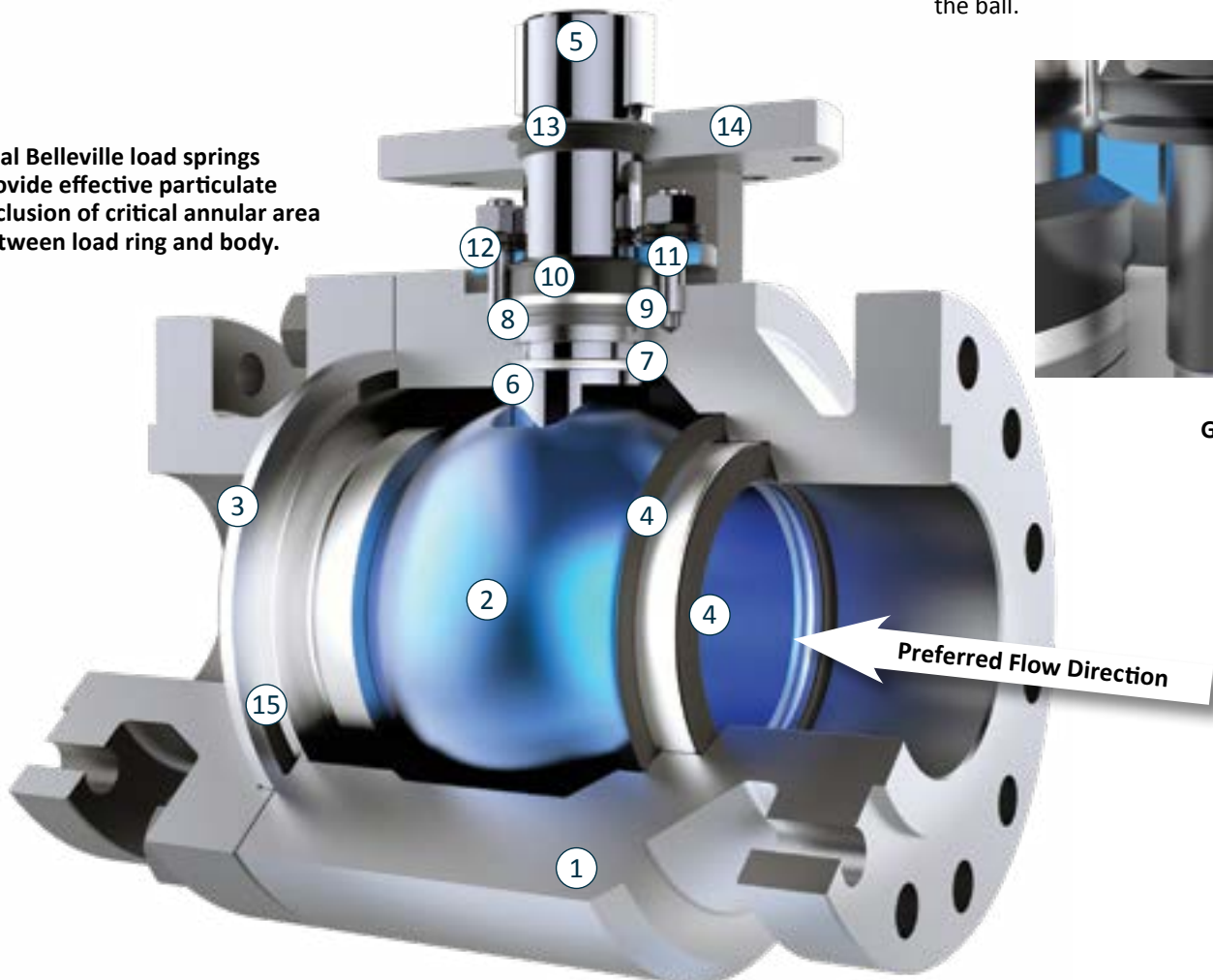
- Upstream Seat Landing is mated to upstream landing for the bidirectional seat.
- Line contact at the O.D. and I.D. provides a particulate barrier protecting the landing.



Bidirectional

- Locked-in downstream seat.
- Fully bidirectional — completely independent of flow direction.
- Redundant isolating seats — upstream and downstream seats are in continuous sealing engagement with the ball.

Dual Belleville load springs provide effective particulate exclusion of critical annular area between load ring and body.



Articulating Gland Flange

ACCUSEAL CSV SHOWN ABOVE: FLANGED SEAT DUAL SPRINGS

ACCUSEAL CSV

Applications

- » Critical isolation of slurry, liquids, solids, and gases
- » Custom designs to solve problematic applications

Any application with service conditions that are too hot or have abrasive/erosive for commodity valves

Bidirectional with Preferred Flow

- » Size: ½ in. - 36 in.
- » Full and reduced port valves
- » Bore to match pipe ID – available
- » ASME Pressure Class: 150 thru 4500

Materials of Construction

- » A105, stainless steel, exotic alloys, and other materials by request

End Connections

- » RFF Standard or to customer specifications (Butt Weld, Socket Weld, RTJ, Hub Connectors, Threaded)

Actuator Options

- » Factory installation of an actuator of your choice
- » Mounting kits provided to mount existing actuators

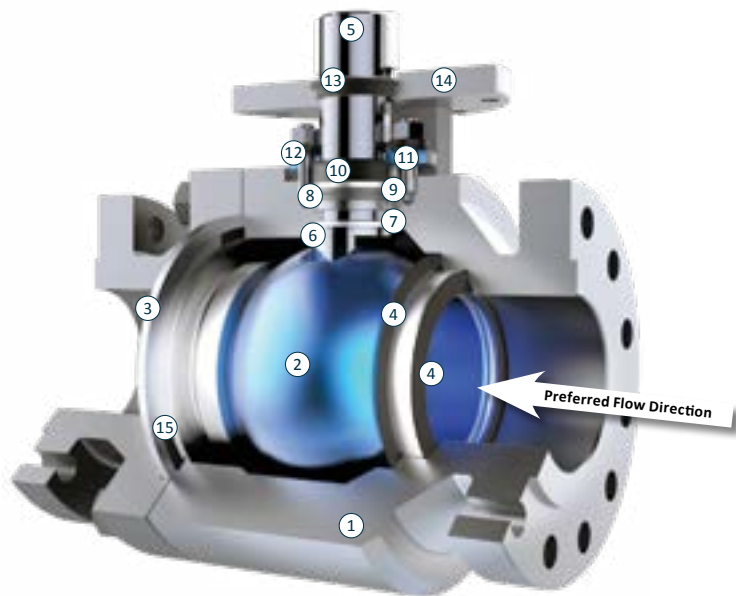
Features and Benefits

- » Directional Flow Isolation options
- » Unidirectional – Preferred flow direction is standard
- » Bidirectional – Shuts off in either directional flow
- » Positive mechanical stops prevent over-travel
- » Operator – T-handle, lever, gear, or actuated
- » Easily automated with ISO 5211 standard mounting pads
- » Self-cleaning ball and seats
- » The positive positioning feature prevents misalignment during actuation; the stem cannot force the ball out of the correct position
- » Field repairable with Omni-Lap 360° ball and seat assemblies, vacuum seal pretested at the factory

1-Year Limited Warranty standard (contact FET for details)

Bill of Materials - Accuseal CSV		
ITEM	DESCRIPTION	MATERIAL
1	Body	A105 • 316 SS Duplex SS • Titanium
2	Ball	410 SS + Carbide 17-4 PH + Carbide Inconel 718 + Carbide Duplex + Carbide
3	Seats	410 SS + Carbide 17-4 PH + Carbide Inconel 718 + Carbide Duplex + Carbide
4	Belleville Spring	Inconel 718 • 17-4 PH
5	Stem	A-286 Hardfaced • Inconel 718 17-4 PH
6	Inner Stem Seal	410 SS • CC Coating Hardfaced
7	Packing Bushing	316 SS Hardfaced
8	Packing Rings	Graphite
9	Anti-Extrusion Ring	Inconel Wire Reinforced Grafoil
10	Packing Follower	316 SS Hardfaced
11	Articulating Gland Flange	410 SS Hardfaced • 17-4 PH
12	Live Loading Belleville Springs	Stainless Steel
13	Stem Retaining Ring	Stainless Steel
14	Mounting Flange	Carbon Steel
15	Body Gasket	Spiral Wound Grafoil Filled Inconel 718 Gold Plated

Special alloys and coatings available upon request. CC = Chrome Carbide coating



Body Gaskets

Spiral Wound Gaskets

- » Grafoil filled
- » 1500 pressure class and below

Engineered Body Seal

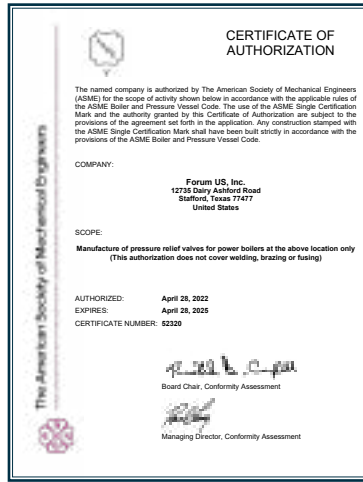
- » 2500 pressure class and above
- » Gold plated Inconel 718
- » Pressure assisted seal

ACCUSEAL VALVES QUALITY

Certifications



API



ASME



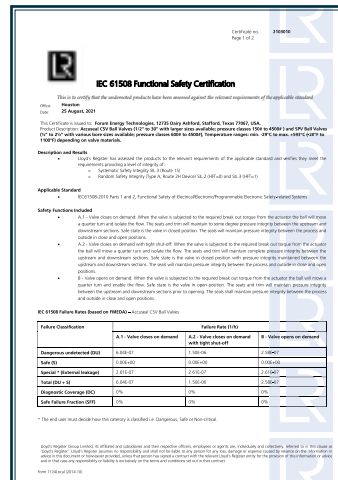
CHINA TYPE TEST



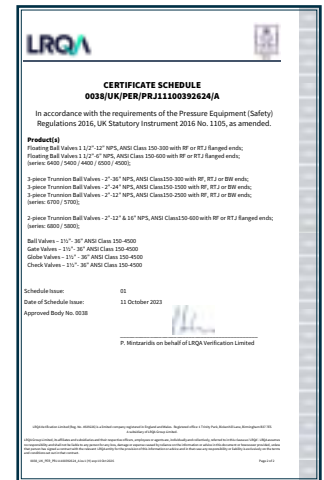
ISO 9001



PED



SIL



UKAS

Actuation

- ISO 5211 mounting patterns
- Accuseal Valves automates to customer specifications

FET Product Warranty

Accuseal CSV – Critical Service Ball Valves

- Standard: 1-Year Limited

Accuseal Product Test Procedures

- Standard valve testing to meet or exceed MSS SP-61, FCI 70-2, and API 598
- Exclusive vacuum testing of ball and seat to verify seal prior to valve assembly

OUR CORE VALUES

No One Gets Hurt

The safety of our employees and customers is our first priority, coupled with a healthy respect for the environment.

Integrity

In everything we do, in every interaction, both internally and externally, we strive to operate with the utmost integrity and mutual respect.


Customer Focused


Our products enhance our customer's performance, and we listen to their needs and work with them to solve their challenges.

Good Place To Work

We are committed to creating a workplace that fosters innovation, teamwork, and pride. Every team member is integral to our success and is treated equally and fairly.

FORUM ENERGY TECHNOLOGIES

 Accuseal Critical Service Valves
12735 Dairy Ashford Road
Stafford, TX 77477

 +1 281 637 2000 (General)
+1 281 637 2097 (Sales)

 f-e-t.com/accuseal

 ForumVS.Sales@f-e-t.com

The information provided in this brochure is intended for informational purposes only. While we strive to maintain accuracy, please know that the content may change without prior notification. We do not guarantee the information's completeness, timeliness, or reliability. Any reliance on the content is at your discretion, and we assume no responsibility for errors, omissions, or inaccuracies that may occur.

Accuseal is a registered trademark of Forum US, Inc. Omni-Lap 360° is a trademark of Forum US, Inc.

Copyright © FORUM ENERGY TECHNOLOGIES, INC. All rights reserved • Grayloc® is a registered trademark of Oceaneering International, Inc. • Grafoil® is a registered trademark of Neograft Solutions, LLC. • Inconel® is a registered trademark of Special Metals Corp., USA • ACC_Mining Slurry Transport_VLVS_06.24