

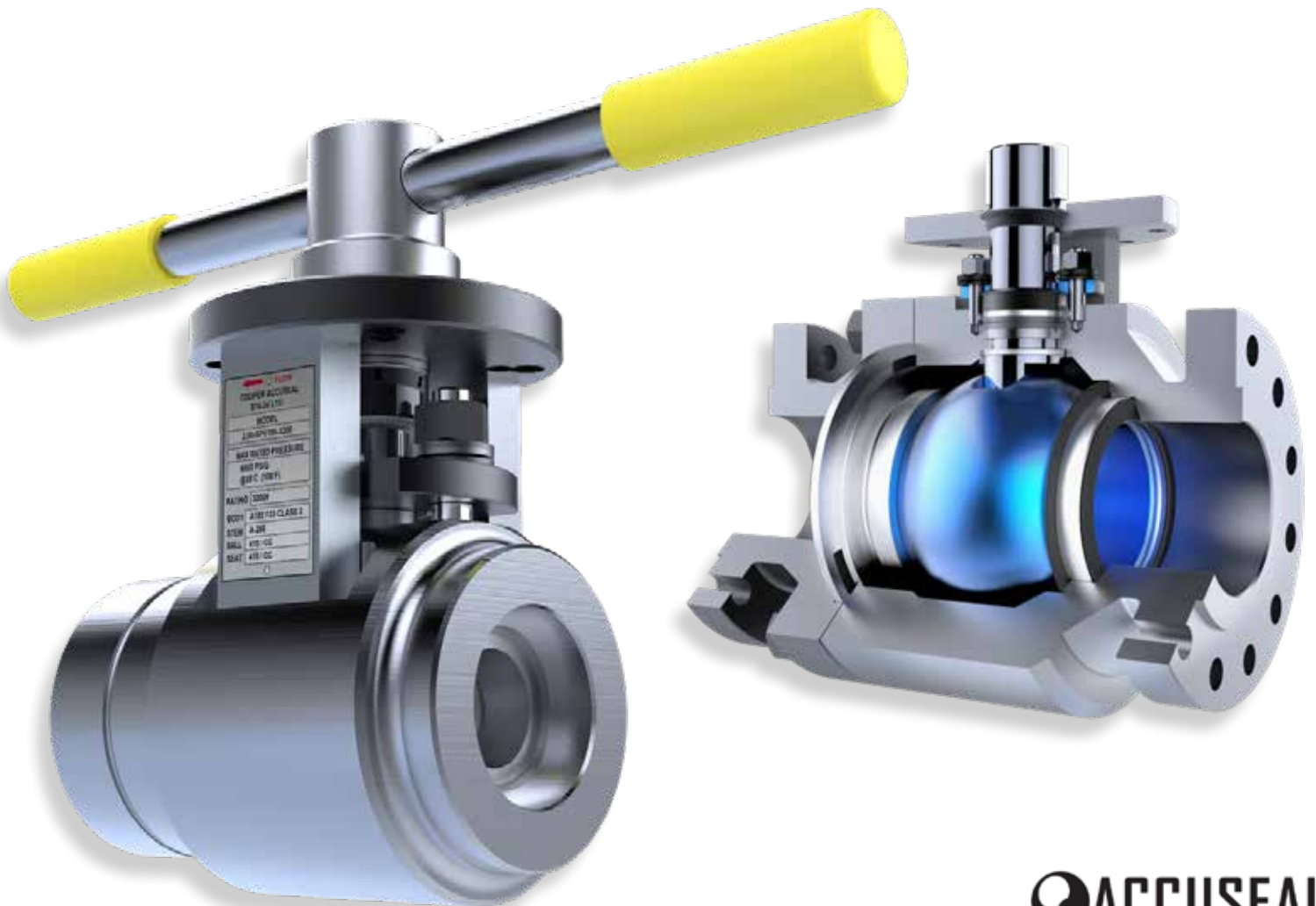
# ACCUSEAL<sup>®</sup> SPV | CR2 | CSV | SP2

## POWER GENERATION VALVES

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## 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 just one of many Design Verification Tools FET uses to design valves to 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 ready to help you with ordering information, technical specifications, and logistics.



## Power Generation

FET provides a broad range of valves to meet most applications, from manual operation 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.

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*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.

## About Accuseal

### Why make Accuseal your Severe Service metal-seated ball valve of choice?

Demands on power generation plants are unprecedented. In combined cycle plants, nearly every unit requires performance as a flexible generating plant, swinging load in response to fluctuations in energy demand. As coal-fired plants age, they experience more frequent outages and more starts. Mechanical equipment, including valves, must meet the ever-increasing cycling and thermal transience challenges. Reliable, repeatable isolation has never been more critical.



### There is a difference!

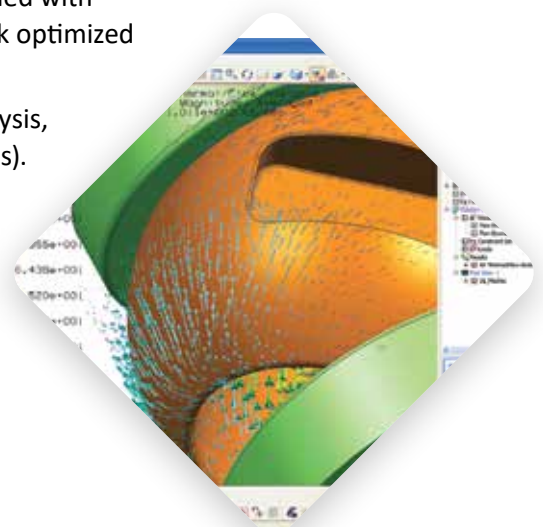
Many valves claim to be the best. All have a ball, seat, and stem. But which valve most consistently provides tight shutoff under the most challenging conditions? You choose severe service valves with care because the consequences of failure are severe. Accuseal Valves provide many advantages in power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

### Accuseal Valves deliver predictable reliability and performance.

- Optimized Ball Valve Design and Engineering Software
  - Proprietary software fast-tracks optimal valve engineering.
- Superior Valve Coatings
- Accuseal’s state-of-the-art HP-HVOF (high-pressure – high-velocity oxygen fuel) coatings 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
  - The Accuseal ball-and-seat sealing is tested before valve assembly to ensure seal integrity.

### Optimized ball valve design and engineering software.

- Extensive, severe service ball-valve engineering experience is combined with proprietary valve optimization CAD/CAM/CAE software and fast-track optimized valve design.
- Simulated service conditions provide feedback with engineering analysis, FEA (Finite Element Analysis), and CFD (Computational Fluid Dynamics).
- The most current Product Life-Cycle Management (PLM) software is used from beginning to end.



Computational Fluid Dynamics  
Fast-tracks optimized designs

### 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

### Superior valve coatings

Not all HVOF coatings are equal.

- Accuseal's HVOF coating formulas are the most consistent and least porous, matched to the ball/seat material. State-of-the-art technology applies the coating at the highest velocity for the greatest density coverage, superior bond strength, and surface hardness. Ongoing research ensures the most reliable coating matches service conditions.
- Accuseal's Fused carbide coating is thermally stabilized to handle high-cycle and high-thermal-cycle applications.
- Superior coating performance under thermal stress and media bombardment.
- Longer valve life with smooth surface integrity.
- No place for leak paths to develop.
- Reduced torque values to operate 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 sealing band of the ball to seat surfaces, creating ridges that distort the ball's roundness and compromise the coating thickness. The sealing "sweet spot" originates a leak path, if even slightly misaligned, resulting in reduced valve life, more maintenance, and higher actuation costs.



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

### Vacuum-seal testing

Accuseal Valves vacuum testing of every ball and seat before assembly verifies 100% ball-to-seat seal to Class VI shutoff.

- Seal reliability is ensured
- Greater manufacturing efficiency means lower cost
- Easier valve assembly — in the factory and the field



# Combined-Cycle Power Plant Applications

## A. Feedwater System

- Deaerator Vent
- Isolation valves on Bypass Lines
- Extraction Steam Drain

## B. HRSG

- Boiler Feed Pump Isolation
- Boiler Feed Pump Shell Drain
- Control Valve Isolation
- Boiler Feed Pump Warm-Up Line Drain
- Reheat / Superheat Spray Isolation
- Drum Blowdown Root Valve / Isolation Vents
- Drum Instrument Isolation
- Automatic Relief Valve
- Sight-Glass Block / Drain
- Tandem Blowdown
- Boiler Blowdown
- Primary Superheat Drain / Vent / Instrument Isolation
- Secondary Superheat Drain / Vent / Instrument Isolation
- Reheat Drain / Vent / Instrument Isolation

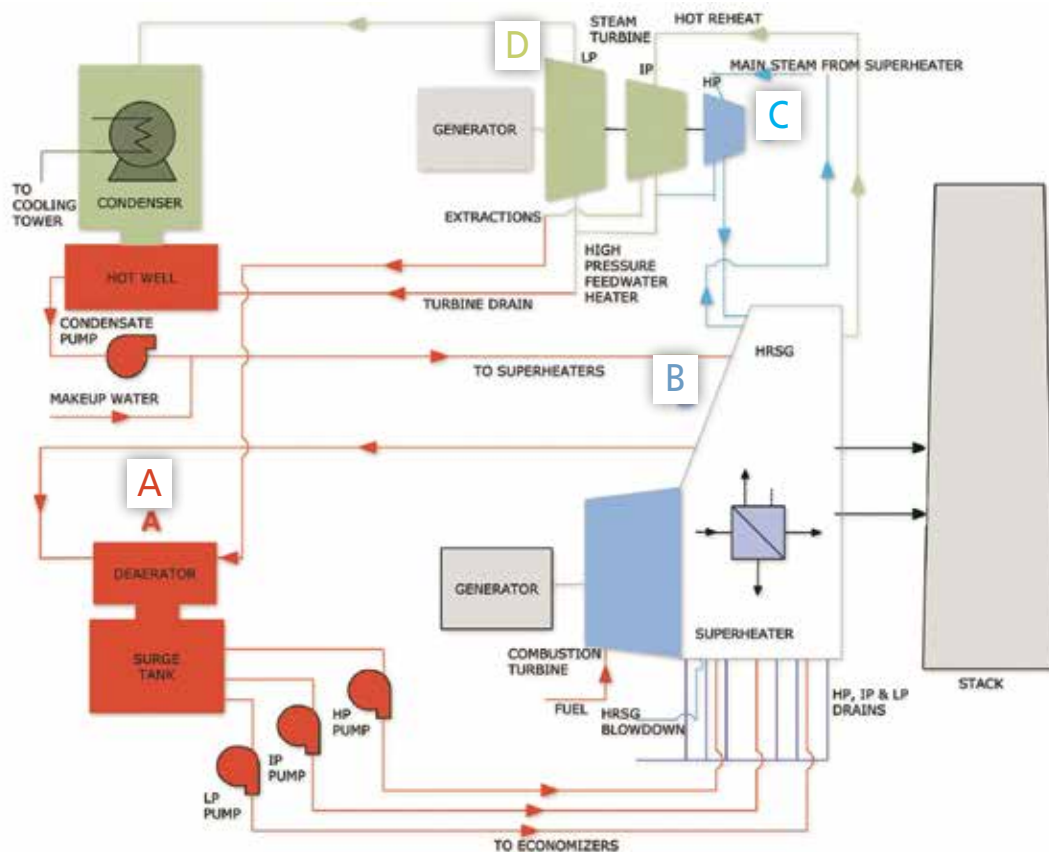
- Superheat Spray Block
- Reheat Spray Isolation Blocking
- LP Section HRSG Tube Drains
- IP Section HRSG Tube Drains
- HP Section HRSG Tube Drains
- Automated Bottom Blowdown

## C. HP Turbine Steam Supply & Extraction Systems

- Main Steam Drain
- Main Steam Before and After Seat Drain
- Cold Reheat Drain
- Turbine Bypass Isolation
- Bypass Valves

## D. IP and LP Turbine Steam Supply and Extraction Systems

- Supply Extraction Systems
- Hot Reheat Drain
- Hot Reheat at the CRV Drain
- IP and LP Turbine Extraction Drain



## Coal-Fired Power Plant Applications

### A. Condensate System

#### Deaerator Vent

- Isolation Valves on Bypass lines
- Extraction Steam Drain
- Feedwater Heater Drain / Vent
- Shell Side Instrument Isolation

### B. HP Feedwater

- Boiler Feed Pump
- Discharge Isolation
- Boiler Feed Pump Shell or
- Case Drain
- Boiler Feed Pump Minimum
- Flow Isolation
- Boiler Feed Pump Warming Line Isolation / Drain
- Reheat / Superheat Spray Isolation
- Feedwater Heater Isolation
- Bypass Valves
- Economizer Drain

### C. Boiler System

- Drum Blowdown Root Valve
- Drum Instrument Isolation
- Sight-Glass Isolation
- Water Wall Drain / Vent
- Tandem Blowdown
- Mass Boiler Blowdown
- Primary Superheat Drain / Vent
- Secondary Superheat Drain / Vent
- Reheat Drain / Vent
- Superheat Spray Isolation
- Superheater Spray
- Automated Block
- Reheater Spray Isolation

### D. HP Turbine Steam Supply and Extraction Systems

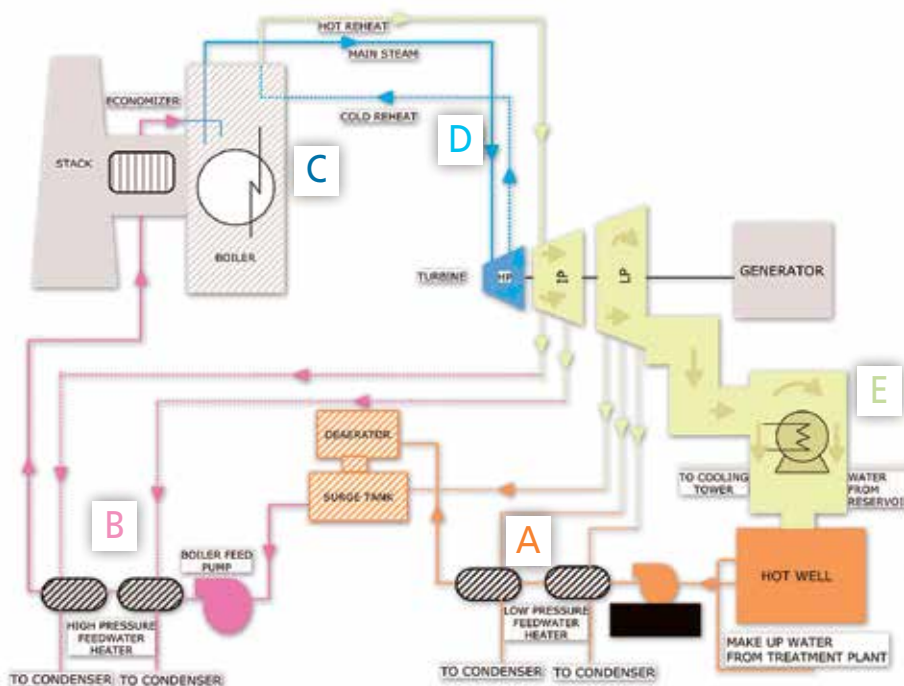
- Supply and Extraction Systems
- Main Steam Drain
- Main Steam Before and
- After Seat Drain
- Main Steam Lead Drain
- Turbine Bypass Isolation
- Bypass Valves

### E. IP and LP Turbine Steam Supply and Extraction Systems

- Supply Extraction Systems
- Hot Reheat Drain
- IP and LP Turbine Extraction Drain

### Auxiliary Systems

- Sootblower Piping System
- Sootblowing Header Isolation
- Sootblower Regulator Isolation
- Sootblower Control Valve Block
- Sootblower System Crossover Header Isolation
- Sootblower Bank Isolation
- Individual Sootblower Isolation
- Air Heater Sootblower Steam Supply Line Shutoff
- Sootblower Thermal Drains / Bypass
- HP and LP Steam Supply System to the BFP Turbine
- Main Steam Supply Isolation Valve
- HP BFP Steam Supply Drain
- HP BFP Below and Above Seat Drain
- Bypass Lines
- Extraction Steam Supply to LP BFP Turbine Drains
- LP BFP Below and Above Seat Drain
- Inerting Steam System
- Inert Steam Inlet to Pulverizer Blocking / Automated Isolation
- Steam Supply to Inerting System Pressure Regulator Isolation
- Extraction Steam Supply line to the Inerting Steam Header Drain
- Isolation Valves on the Bypass Lines
- Inerting System Steam Header Thermal Drain



## Accuseal Features & Benefits

### 1. Body / End Connection

- Machined from forgings for the highest material integrity.
- Wide variety of end connections.

### 2. Ball + Seat – The Sealing Assembly

- Omni-Lap 360° optimizes the matched roundness of the ball and seat for 100% seal, regardless of positioning. The wide sealing surface provides a low-stress metal-to-metal seal. The seal is consistently reliable.
- Corrosion-resistant materials with matched thermal expansion rates are used on the sealing components to maintain seal integrity and reliability throughout the operating temperature range.
- Robotically coated parts for uniform surface thickness, coating density, and excellent metallurgical bond to withstand severe thermal shocks.
- The seats are self-cleaning, removing all debris from the ball with every cycle, extending valve life.
- Proprietary Thermal Stabilization of the ball and thermally stabilized and optimized seat geometry maintains maximum seal, even during thermal transience.

### 3. Wave Spring

- Superior performance to Belleville springs in small sizes.
- There is more predictable force on ball to seat seal, even at low pressure.
- Longer spring life means longer valve life.

### 4. Stem

- One piece with surface hardening.
- Minimizes hysteresis between actuator and ball.
- Eliminates galling potential between rotating parts.
- Stem standard ASME keyed for reliable adaption.

### 5. Dual Inconel 718 Pins

- Oversized pins contained in thrust collars.
- Blow-out proof stem to ASME B16.34

### 6. Mounting Flange

- Precision machined to ISO 5 211.
- External mounting flange provides rigid mounting for ease of actuation.
- Direct mounting option reduces hysteresis and stem deflection.

### 7. Lockout Standard

- Fulfills Open/Closed lockout requirements.

### 8. Articulating Gland Flange

- Spherically engages with packing follower.
- Prevents stem binding and galling during adjustments.

### 9. Live Loaded Packing

- Standard with Belleville spring washers.
- Eliminates routine gland adjustments.
- Reduces maintenance.
- Guarantees zero stem emissions.

### 10. Open/Closed Indicator

- Scribed lines on stem and articulating gland flange.
- Ensures proper ball-to-seat alignment.
- Positive Open/Closed indicator.

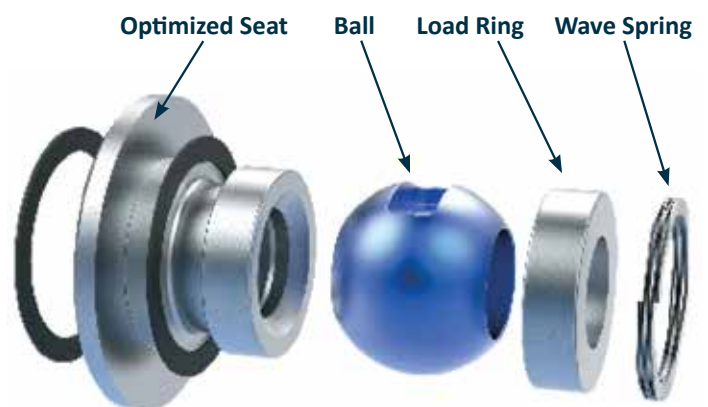
## CR2 Field Repair Kit

### Ball & Seat Assembly

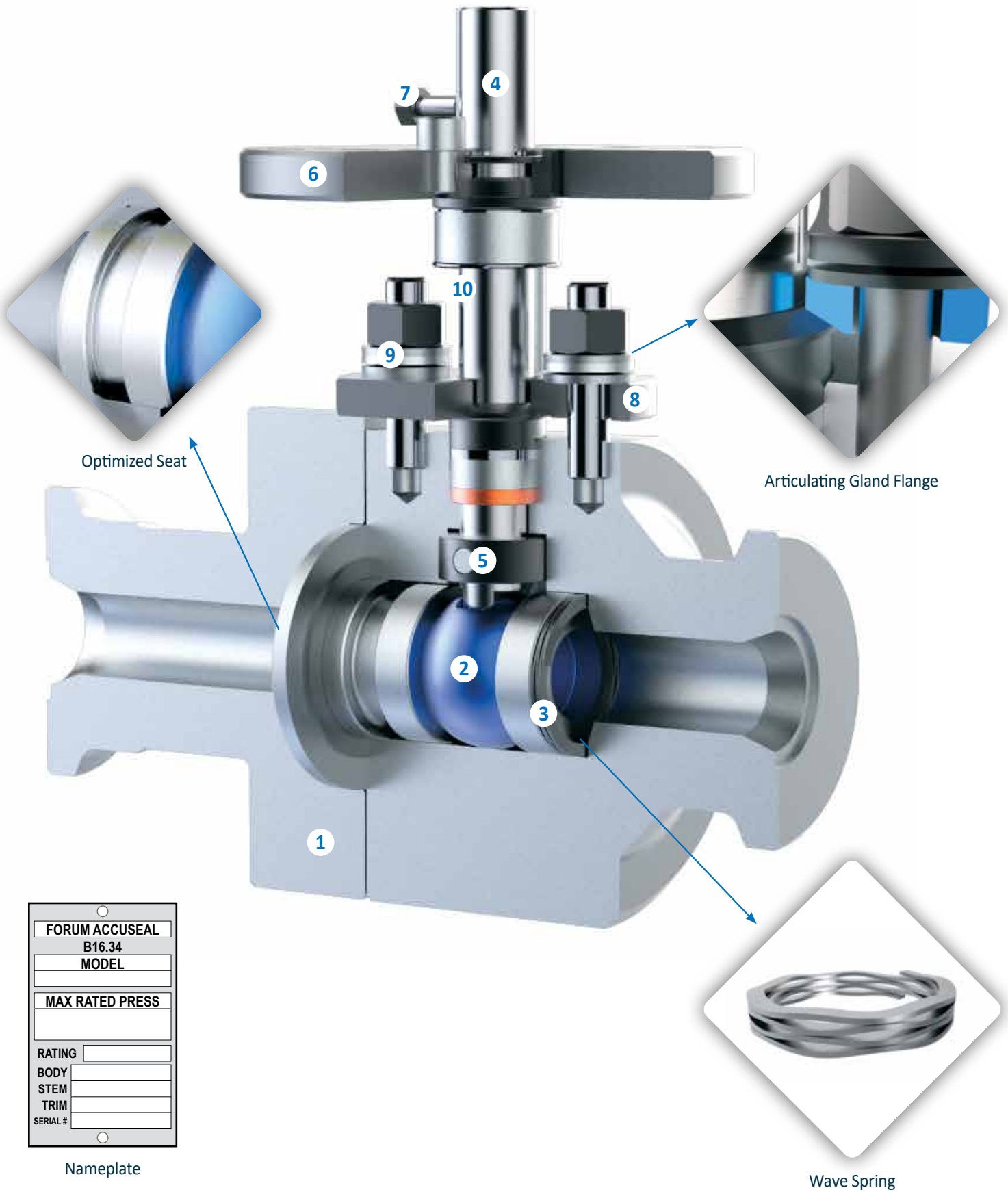
### Wave Spring

### Packing & Gaskets

- All field repair kits are vacuumed-tested to ensure Class VI shut-off.







# Accuseal — Steam Power Valve (SPV)

## Applications

- Boiler Drains and Vents
- Turbine Drains and Vents
- Control Valve Isolation
- Equipment Isolation
- Longer lasting alternative to gate and globe valves

## Size

½ in. – 2½ in. (various bore sizes available)

## ASME Pressure Class

1500 – 4500 Limited Class

## End Connections

SW – ASME B16.11 (Standard)  
Per customer specifications



Alternative to globe and gate valves

## Features and Benefits

- Omni-Lap 360° optimized roundedness and matched ball and seat assemblies ensure 100% seal
- 410 HVOF trim for boiler drains and vents
- 718 Fused Carbide trim for HP drains, HRH drains, turbine drains and any high cycle or high thermal stress applications
- Withstands severe thermal shocks
- Tight shutoff to API 598/MSS SP-61
- Wave spring maximizes thermal cycling strength for longer life
- ISO 5211 Mounting Patterns

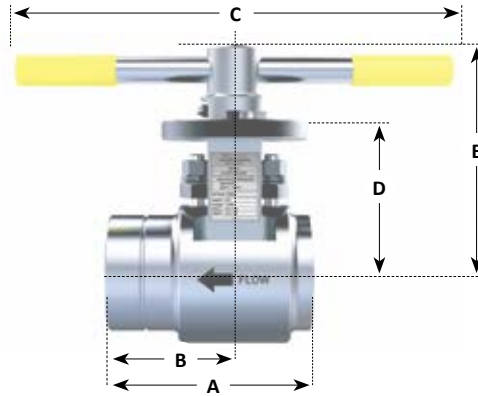
**5-Year Limited Warranty standard for all steam and feedwater services**

Bill of Materials - Accuseal SPV		
ITEM	DESCRIPTION	MATERIAL
1	Body	A105 A182 F22 Cl.3 A182 F91 F92
2	Ball	410 HVOF / CC Coating (Std. 600-3200 Cl.) Inconel 718 / Spray & Fuse (Std. 3200 – 4500 Cl.)
3	Seat	410 HVOF / CC Coating (Std. 600-3200 Cl.) Inconel 718 / Spray & Fuse (Std. 3200 – 4500 Cl.)
4	Wave Spring	A-286
5	Stem	Inconel 718 / A-286 Hardfaced
6	Packing Bushing	316 SS Hardfaced
7	Packing Rings	Grafoil
8	Anti-Extrusion Ring	Inconel Wire Reinforced Grafoil
9	Packing Follower	316 SS Hardfaced
10	Articulating Gland Flange	4130 Hardfaced
11	Live Loading Belleville Springs	Stainless Steel
12	Retaining Pins	Inconel 718
13	Guide Bearing	Ni-Al-Brz
14	Stem Retaining Ring	Stainless Steel
15	Mounting Flange	Carbon Steel
16	Transition Piece	410 SS
17	Load Ring/Retaining Ring	A-286



Socketweld ends per ASME B16.11

Special alloys & coatings available upon request      CC= Chrome Carbide coating



Dimension – ASME 600, 900, 1500 Limited Class (MAX dp = 2500)																		
Model	Bore	Class	SW End	A		B		C		D		E		Weight		Cv		
				in	mm	in	mm	in	mm	in	mm	in	mm	lb	kg	Sch 80	Sch 160	XXS
Accuseal SPV055	0.55	1500	0.50	7.51	190.75	4.00	101.60	15.00	381.00	4.45	113.03	7.15	181.61	19	8.61	6	7	-
	0.55	1500	0.75	6.00	152.40	4.00	101.60	15.00	381.00	4.45	113.03	7.15	181.61	19	8.61	-	-	-
	0.55	1500	1.00	6.00	152.40	4.00	101.60	15.00	381.00	4.45	113.03	7.15	181.61	20	9.07	-	-	-
Accuseal SPV072	0.72	1500	1.00	6.00	152.40	3.63	92.08	15.00	381.00	4.45	113.03	7.15	181.61	19	8.61	24	23	-
	0.72	1500	1.50	6.00	152.40	3.63	92.08	15.00	381.00	4.45	113.03	7.15	181.61	20	9.07	21	22	-
Accuseal SPV106	1.06	1500	1.50	7.25	184.15	4.63	117.48	18.00	457.20	5.24	133.10	7.94	201.68	31	14.06	51	69	-
	1.06	1500	2.00	7.25	184.15	4.63	117.48	18.00	457.20	5.24	133.10	7.94	201.68	34	15.42	45	56	-
Accuseal SPV134	1.34	1500	2.00	8.25	209.55	5.13	130.18	18.00	457.20	5.63	143.00	8.73	221.74	45	20.41	100	121	-
	1.34	1500	2.50	8.25	209.55	5.13	130.18	18.00	457.20	5.63	143.00	8.73	221.74	47	21.31	82	91	-
Accuseal SPV169	1.69	1500	2.00	11.50	292.10	6.25	158.75	N/A	N/A	7.08	179.80	N/A	N/A	70	31.80	175	347	-
	1.69	1500	2.50	9.50	241.30	6.25	158.75	N/A	N/A	7.08	179.80	N/A	N/A	70	31.80	119	139	-

Dimension – ASME 3200 Limited Class (MAX dp = 4500)																		
Model	Bore	Class	SW End	A		B		C		D		E		Weight		Cv		
				in	mm	in	mm	in	mm	in	mm	in	mm	lb	kg	Sch 80	Sch 160	XXS
Accuseal SPV055	0.55	3200	0.50	7.51	190.75	4.00	101.60	15.00	381.00	4.45	113.03	7.15	181.61	19	8.61	-	-	1
	0.55	3200	0.75	6.00	152.40	4.00	101.60	15.00	381.00	4.45	113.03	7.15	181.61	19	8.61	-	16	6
	0.55	3200	1.00	6.00	152.40	4.00	101.60	15.00	381.00	4.45	113.03	7.15	181.61	20	9.07	-	-	-
Accuseal SPV072	0.72	3200	1.00	6.00	152.40	3.62	91.94	15.00	381.00	4.54	115.31	7.24	183.89	21	9.52	-	23	10
	0.72	3200	1.50	6.00	152.40	3.62	91.94	15.00	381.00	4.54	115.31	7.24	183.89	24	10.88	-	26	34
Accuseal SPV106	1.06	3200	1.50	7.25	184.15	4.63	117.60	18.00	457.20	5.27	133.85	8.27	210.05	36	16.32	-	69	56
	1.06	3200	2.00	7.25	184.15	4.63	117.60	18.00	457.20	5.27	133.85	8.27	210.05	40	14.51	-	59	66
Accuseal SPV134	1.34	3200	2.00	8.25	209.55	5.13	130.30	18.00	457.20	6.25	158.75	9.25	234.95	56	25.40	-	144	103
	1.34	3200	2.50	8.25	209.55	5.13	130.30	18.00	457.20	6.25	158.75	9.25	234.95	61	27.66	-	90	95
Accuseal SPV169	1.69	3200	2.00	11.75	298.45	6.00	152.40	N/A	N/A	8.00	203.20	N/A	N/A	100	45.35	-	347	271
	1.69	3200	2.50	9.50	241.30	6.00	152.40	N/A	N/A	8.00	203.20	N/A	N/A	99	44.90	-	139	225

Dimension – ASME 4500 Limited Class (MAX dp = 6500)																		
Model	Bore	Class	SW End	A		B		C		D		E		Weight		Cv		
				in	mm	in	mm	in	mm	in	mm	in	mm	lb	kg	Sch 80	Sch 160	XXS
Accuseal SPV066	0.66	4500	0.75	8.5	215.9	4.75	120.65	18	457.20	5.09	129.28	7.79	197.86	31	14.06	-	12	5
	0.66	4500	1.00	7.25	184.15	4.75	120.65	18	457.20	5.09	129.28	7.79	197.86	30	13.60	-	21	14
	0.66	4500	1.50	7.25	184.15	4.75	120.65	18	457.20	5.09	129.28	7.79	197.86	35	15.87	-	21	21
	0.66	4500	2.00	8.00	203.20	4.75	120.65	18	457.20	5.09	129.28	7.79	197.86	41	18.59	-	15	16
Accuseal SPV106	1.00	4500	1.50	8.25	209.55	5.38	136.65	18	457.20	6.25	158.75	9.35	237.49	54	24.49	-	49	50
	1.00	4500	2.00	8.25	209.55	5.38	136.65	18	457.20	6.25	158.75	9.35	237.49	60	27.21	-	48	54
	1.00	4500	2.50	8.25	209.55	5.38	136.65	18	457.20	6.25	158.75	9.35	237.49	63	28.57	-	44	48

- (1) Not recommended for prolonged use above 800°F / 427°C
- (2) Not recommended for prolonged use above 1100°F / 593°C

Contact FET – Accuseal for pressure classes not listed. Reduced ratings shown above are limited by material design considerations.

The valve body is designed in accordance with ASME B16.34 Limited Class pressure rating requirements for the designated pressure class.

## Accuseal CR2

### Applications

- Boiler Drains and Vents
- Turbine Drains and Vents
- Control Valve Isolation
- Equipment Isolation
- Longer lasting alternative to gate and globe valves

### Size

1 in. – 3 in. (various bore sizes available)

### ASME Pressure Class

600 – 4500 Limited Class

### Socket weld, Buttweld & Hub Connections

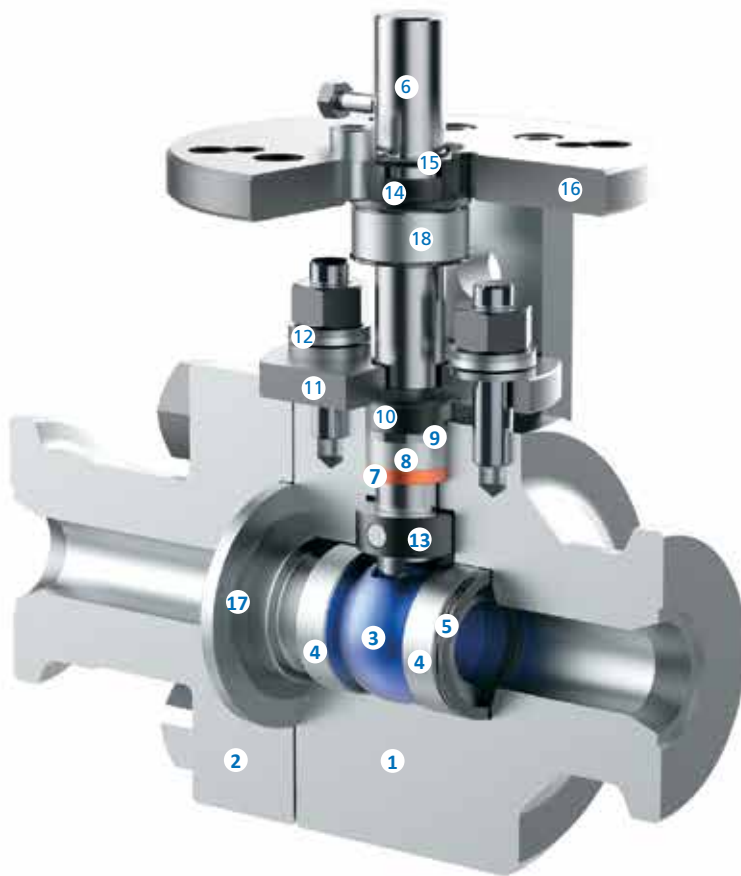
Complies with the ASME Section VIII Div. 1, 2 and 3 Boiler and Pressure Vessel codes

ASME Certificates of Authorization for ASME Section VIII Div. 1 (“U”), 2 (“U2”) and 3 (“U3”) are currently maintained

### Features and Benefits

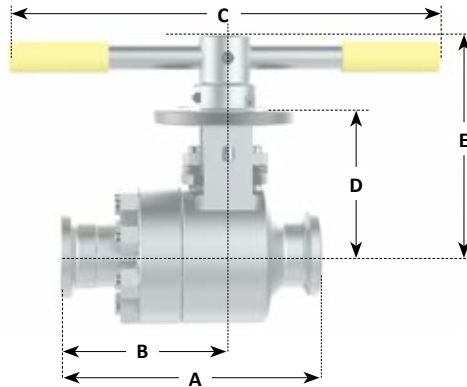
- Provides reduced total cost of ownership for operator
- Hub eliminates welding and PWHT requirements after installation
- Designed for extended lifespan with easy disassembly, maintenance, and complete repairability in the field
- Omni-Lap 360° optimized roundness and matched ball and seat assemblies ensure 100% seal
- Tight shut-off to API 598/MSS SP-61
- Withstands severe thermal shocks
- Field repairable

Bill of Materials - Accuseal CR2			
ITEM	DESCRIPTION	MATERIAL	
1	Body	A105 A182 F22 Cl.3	A182 F91 A182 F92
2	End Connect	A105 A182 F22 Cl.3	A182 F91 A182 F92
3	Ball	410 / CC Inconel 718 / Spray & Fuse	
4	Seat	410 / CC Inconel 718 / Spray & Fuse	
5	Wave Spring	A-286	
6	Stem	Inconel 718 / A-286 Hardfaced	
7	Packing Bushing	316 SS Hardfaced	
8	Packing Rings	Grafoil	
9	Anti-Extrusion Ring	Inconel Wire Reinforced Grafoil	
10	Packing Follower	316 SS Hardfaced	
11	Articulating Gland Flange	4130 Hardfaced	
12	Live Loading Belleville Springs	Stainless Steel	
13	Retaining Pins	Inconel 718	
14	Guide Bearing	Ni-Al-Brz	
15	Stem Retaining Ring	Stainless Steel	
16	Mounting Flange	Carbon Steel	
17	Gasket	Graphite	
18	Retaining Sleeve	304 SS	



Bi-directional sealings use CSV.  
Special alloys and coatings available upon request.

The Accuseal Hub-End CR2 allows repair or replacement with no welding or hot work permit. A field repair kit and two new hub gaskets are all that is required.



Cv – ASME 600, 900, 1500 Limited Class										
Bore (inches)	Pipe Size (inches) / Schedule									
	0.75 SCH 80	0.75 SCH 160	1.00 SCH 80	1.00 SCH 160	1.50 SCH 80	1.50 SCH 160	2.00 SCH 80	2.00 SCH 160	2.50 SCH 80	2.50 SCH 160
0.72	47	40	24	23	21	22	-	-	-	-
1.06	-	-	104	73	51	69	45	56	-	-
1.34	-	-	-	-	137	212	100	121	82	91
1.69	-	-	-	-	-	-	175	347	119	139

Dimension – ASME 1500, 3100, 4500 Limited Class														
Model	Bore	Class	A		B		C		D		E		Weight	
			in	mm	in	mm	in	mm	in	mm	in	mm	lb	kg
Accuseal CR2072	0.72	1500	8.50	215.90	5.52	140.21	15.00	381.00	4.54	115.31	7.24	183.89	26	11.79
	0.72	3100	9.50	241.30	6.15	156.21	15.00	381.00	5.13	130.30	7.83	198.88	32	14.51
Accuseal CR2106	1.06	1500	9.00	228.60	5.71	145.03	18.00	457.20	5.56	141.22	8.56	217.42	42	19.05
	1.06	3100	11.00	279.40	6.99	177.54	18.00	457.20	5.86	148.84	8.56	217.42	62	28.12
Accuseal CR2134	1.34	1500	10.50	266.70	6.81	172.97	18.00	457.20	6.25	158.75	9.25	234.95	66	29.93
	1.34	3100	12.50	317.50	7.66	194.56	18.00	457.20	6.82	173.99	9.82	249.42	92	41.73
Accuseal CR2169	1.69	1500	11.75	298.45	7.22	183.38	-	-	7.73	196.34	-	-	107	48.53
	1.69	3100	14.00	355.60	8.70	220.98	-	-	8.40	213.36	-	-	147	66.67
Accuseal CR2066	0.66	4500	11.75	298.45	7.68	195.07	18.00	457.20	5.46	138.68	8.16	207.26	61	27.66
Accuseal CR2100	1.00	4500	13.75	349.25	8.81	223.77	18.00	457.20	6.93	176.02	9.93	252.22	115	52.16

Maximum Operating Pressure Rating vs. Temperature																	
	Temp (°F)	-20° to 100°	200°	300°	400°	500°	600°	650°	700°	750°	800°	850°	900°	950°	1000°	1050°	1100°
	Temp (°C)	-29° to 38°	93°	149°	204°	260°	316°	343°	371°	399°	427°	454°	482°	510°	538°	566°	593°
ASME 1500 LTD	A 105 (1)	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	-	-	-	-	-	-
	A 182 Gr. F22 Cl.3 (2)	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2411	1784	1170	732
	A 182 Gr. F91	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	2411	2249	2249	2014
ASME 3100 LTD	A 105 (1)	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	-	-	-	-	-	-
	A 182 Gr. F22 Cl.3 (2)	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4131	2703	1693
	A 182 Gr. F91	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4495
ASME 4500 LTD	A 105 (1)	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	-	-	-	-	-	-
	A 182 Gr. F22 Cl.3 (2)	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	4063	2546
	A 182 Gr. F91	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000

(1) Not recommended for prolonged use above 800°F / 427°C (2) Not recommended for prolonged use above 1100°F / 593°C

**NOTE: MAXIMUM differential pressure across valve = 6000 psig**

Reduced ratings shown above are limited by material design considerations.

The valve body is designed in accordance with ASME B16.34 Limited Class pressure rating requirements for the designated pressure class.

Weld end valves are rated to ASME Limited Class.

Hub end valves are rated to ASME Standard Class.



# Accuseal Critical Service Ball Valve (CSV)

## Applications

- Critical Isolation
- Custom designed to solve problem applications

## Size

½ in. – 30 in. (larger sizes available)

## ASME Pressure Class

150 – 4500 Standard, limited and special classes

## Sealing Options

- Uni-directional - Standard
- Bi-directional - Optional

## End Connections

Per customer specifications

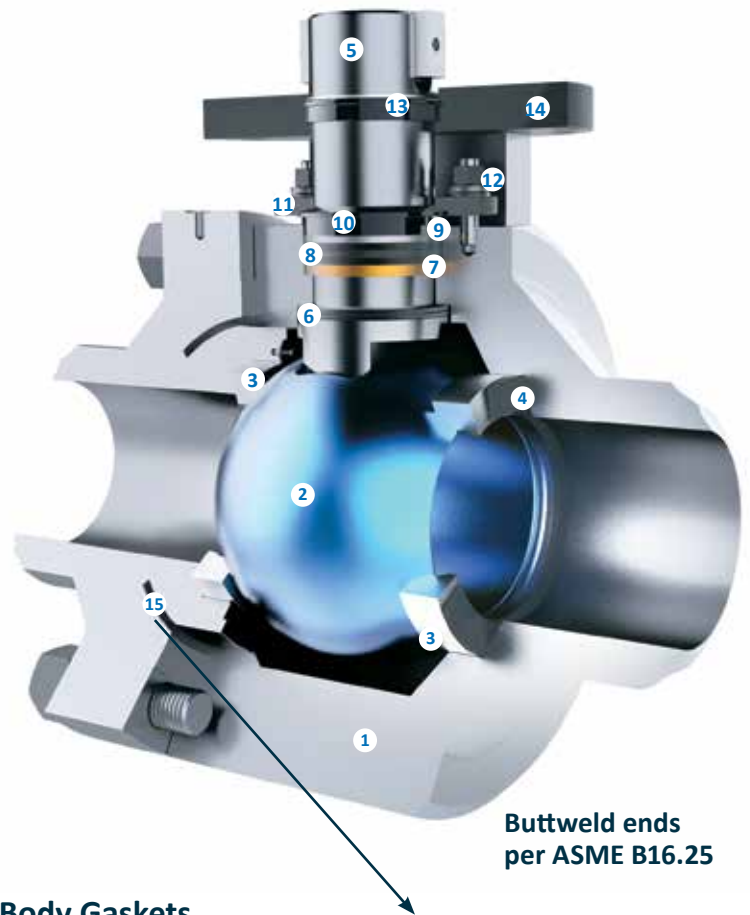


Engineered Body Seal  
2500 pressure class and above

## Features and Benefits

- Omni-Lap 360° ball and seat
- Application-specific coatings
- Coating matched to ball and seat materials to withstand thermal shocks
- Articulating gland flange prevents stem binding and galling during adjustments
- External and internal guide bearings ensure proper alignment preventing lateral motion of the stem, even during side-loading
- Replaceable balls and seats provide field reparability

**1-Year Limited Warranty on standard service**  
(Contact Accuseal Valves for details)



Buttweld ends  
per ASME B16.25

Bill of Materials - Accuseal CSV		
ITEM	DESCRIPTION	MATERIAL
1	Body	Common Materials: A105 • F22 • F91 • Stainless Steel Duplex SS • Titanium ASME B16.34 Table 1 Referred Materials
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	Bellville 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 & coatings available upon request

CC= Chrome Carbide coating

## Body Gaskets

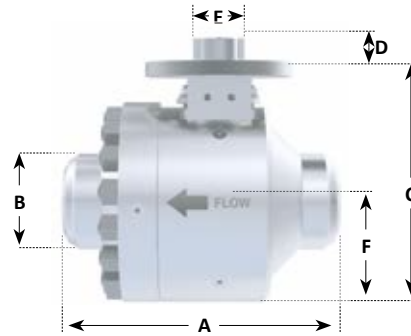
### Spiral Wound Gaskets

- Grafoil filled
- 1500 pressure class and below

### Engineered Body Seal

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

## Graphite Gaskets



Accuseal CSV – Bore							
NPS (inches)	150	300	600	900	1500	2500	4500
0.5	0.55	0.55	0.55	0.55	0.55	0.55	Note 1
0.75	0.72	0.72	0.72	0.72	0.72	0.72	Note 1
1	1.06	1.06	1.06	1.06	1.06	1.06	Note 1
1.5	1.50	1.50	1.50	1.50	1.50	1.06	Note 1
2	2.00	2.00	2.00	2.00	2.00	1.50	Note 1
2.5	2.50	2.50	2.50	2.13	2.13	1.77	Note 1
3	3.00	3.00	3.00	3.00	2.62	2.30	Note 1
4	4.00	4.00	4.00	3.62	3.44	3.15	Note 1
6	6.00	6.00	6.00	5.50	5.19	4.90	Note 1
8	8.00	8.00	7.87	7.19	6.81	6.81	Note 1
10	10.00	10.00	9.75	9.06	8.50	8.50	Note 1
12	12.00	12.00	11.75	10.75	10.13	10.13	Note 1

Accuseal CSV Cv – Full Bore							
Valve Size (inches)	150	300	600	900	1500	2500	4500
0.5	25	22	21	18	18	16	Note 1
0.75	54	48	43	39	39	36	Note 1
1	144	126	110	102	102	92	Note 1
1.5	270	251	223	198	198	83	Note 1
2	549	498	429	382	382	163	Note 1
2.5	948	842	720	421	421	236	Note 1
3	1474	1250	1114	1076	682	438	Note 1
4	2932	2539	2134	1600	1283	919	Note 1
6	6393	6316	5366	4101	3281	2482	Note 1
8	12497	11931	9966	7468	6106	5508	Note 1
10	20612	19966	15889	12737	9933	8772	Note 1
12	30897	29974	24953	18475	14641	13051	Note 1

Accuseal CSV 0.5" - 12" Dimensions								
	Size (inches)	Bore	A	B	C	D	E	F
ASME150	0.5	0.55	4.25	0.90	4.17	1.10	0.50	1.88
	0.75	0.72	4.62	1.18	4.87	1.10	0.50	2.09
	1	1.06	5.00	1.50	5.24	1.31	0.75	2.44
	1.5	1.50	6.50	2.09	5.64	1.63	0.88	2.75
	2	2.00	7.00	2.57	5.87	1.31	0.75	3.00
	2.5	2.50	7.50	3.00	6.12	1.66	1.19	3.50
	3	3.00	8.00	3.63	5.56	1.18	0.88	3.75
	4	4.00	9.00	4.59	7.29	2.02	1.38	5.00
	6	6.00	15.50	6.73	9.92	2.59	2.25	7.00
	8	8.00	18.00	8.68	11.51	2.03	2.50	8.13
	10	10.00	21.00	10.75	13.86	2.68	2.75	10.50
	12	12.00	24.00	12.82	15.68	2.50	3.00	12.00
ASME 300	0.5	0.55	5.50	0.94	4.36	1.10	0.50	1.88
	0.75	0.72	6.00	1.22	4.87	1.10	0.50	2.09
	1	1.06	6.50	1.56	5.24	1.31	0.75	2.44
	1.5	1.50	7.50	1.94	5.98	1.63	0.88	2.75
	2	2.00	8.50	2.63	5.97	1.66	1.06	3.25
	2.5	2.50	9.50	3.06	6.12	1.66	1.19	3.50
	3	3.00	8.00	3.63	5.56	1.18	0.88	3.75
	4	4.00	9.00	4.59	7.29	2.02	1.38	5.00
	6	6.00	15.50	6.73	9.92	2.59	2.25	7.00
	8	8.00	18.00	8.68	11.51	2.03	2.50	8.13
	10	10.00	21.00	10.75	13.86	2.68	2.75	10.50
	12	12.00	24.00	12.82	15.68	2.50	3.00	12.00
ASME 600	0.5	0.55	6.50	0.94	4.36	1.10	0.50	1.88
	0.75	0.72	7.50	1.18	5.13	1.10	0.50	2.09
	1	1.06	8.50	1.56	5.24	1.31	0.75	2.44
	1.5	1.50	9.50	2.00	5.98	1.63	0.88	2.75
	2	2.00	11.50	2.56	6.25	1.66	1.06	3.25
	2.5	2.50	13.00	3.12	6.25	1.87	1.50	3.75
	3	3.00	14.00	3.69	7.31	1.27	1.38	4.13
	4	4.00	17.00	4.82	7.83	3.00	2.06	5.75
	6	6.00	22.00	7.06	10.66	2.38	2.50	7.25
	8	7.87	26.00	9.17	13.92	2.72	3.25	8.44
	10	9.75	31.00	11.31	17.32	4.50	4.00	11.63
	12	11.75	33.00	13.63	20.40	4.00	5.00	12.75

Accuseal CSV 0.5" - 12" Dimensions								
	Size (inches)	Bore	A	B	C	D	E	F
ASME 900	0.5	0.55	8.50	4.75	4.17	0.50	1.10	2.25
	0.75	0.72	9.00	5.12	4.89	0.50	1.10	2.25
	1	1.06	10.00	5.88	5.62	0.75	1.31	2.94
	1.5	1.50	12.00	7.00	7.22	1.06	1.66	3.50
	2	2.00	14.50	8.50	6.38	1.19	1.66	3.50
	2.5	2.13	16.50	9.63	6.53	1.50	1.87	3.75
	3	3.00	15.00	3.90	8.32	2.50	1.50	4.25
	4	3.62	18.00	4.64	10.46	3.00	2.06	5.75
	6	5.50	24.00	7.00	11.13	2.25	3.00	7.50
	8	7.19	29.00	8.97	12.96	2.94	3.63	9.25
	10	9.06	33.00	11.25	14.56	4.50	4.50	10.75
	12	10.75	38.00	13.29	16.44	4.50	5.50	12.00
ASME 1500	0.5	0.55	8.50	4.75	4.17	0.50	1.10	2.25
	0.75	0.72	9.00	5.12	4.89	0.50	1.10	2.25
	1	1.06	10.00	5.88	5.62	0.75	1.31	2.94
	1.5	1.50	12.00	7.00	7.22	1.06	1.66	3.50
	2	2.00	14.50	8.50	6.38	1.19	1.66	3.50
	2.5	2.13	16.50	9.63	6.53	1.50	1.87	3.75
	3	2.62	18.50	3.92	9.28	2.50	1.75	4.50
	4	3.44	21.50	5.00	9.10	2.84	2.50	6.12
	6	5.19	27.75	7.43	13.04	3.00	3.38	7.75
	8	6.81	32.75	9.69	16.49	5.00	4.00	9.50
	10	8.50	39.00	11.94	17.40	4.50	5.50	11.50
	12	10.13	44.50	14.19	18.20	4.50	6.75	13.25
ASME 2500	0.5	0.55	10.38	1.20	5.25	1.10	0.50	2.50
	0.75	0.72	10.75	1.60	6.13	1.31	0.69	2.75
	1	1.06	12.12	2.18	6.67	1.63	0.88	3.00
	1.5	1.06	15.12	2.80	6.67	1.66	1.19	3.00
	2	1.50	17.75	3.64	6.49	2.63	1.75	3.50
	2.5	1.77	20.00	3.33	9.24	2.82	1.63	4.25
	3	2.30	22.75	4.26	10.42	1.81	1.75	4.50
	4	3.15	26.50	5.79	11.44	2.84	2.50	6.50
	6	4.90	36.00	8.58	13.21	6.80	3.38	8.50
	8	6.81	40.25	11.89	16.80	5.00	5.25	9.75
	10	8.50	50.00	14.62	17.66	6.50	7.50	11.75
	12	10.13	56.00	17.47	18.88	6.50	8.00	13.50

1. ASME 4500 pressure class bore /Cv varies according to application (values determined based on customer needs). Contact FET | Accuseal for sizes and pressure classes not listed.

## Low Pressure-Steam Power (SP2) Valve

### Features and Benefits

- Full Bore  
Straight through, smooth full bore flow path allows for the highest flowing capacity (Cv or Kv) with no flow interruptions.
- Automated Lapping  
An automated mate-lapping system laps the ball and seat in unison, creating 100% matched sealing surfaces (a mirror-like finish) that equates to gas-tight sealing.
- Field Repairable 2-Piece Flanged Seat Design
- Zero Leakage Seat Tightness  
Low-pressure gas testing on all (100%) valves to 'Zero Leakage' acceptance criteria API 598.
- Mounting Flange for Automation  
Allows users to adapt many actuators with ease.
- Repairable Valve is repairable and can be supplied with spare parts kit.

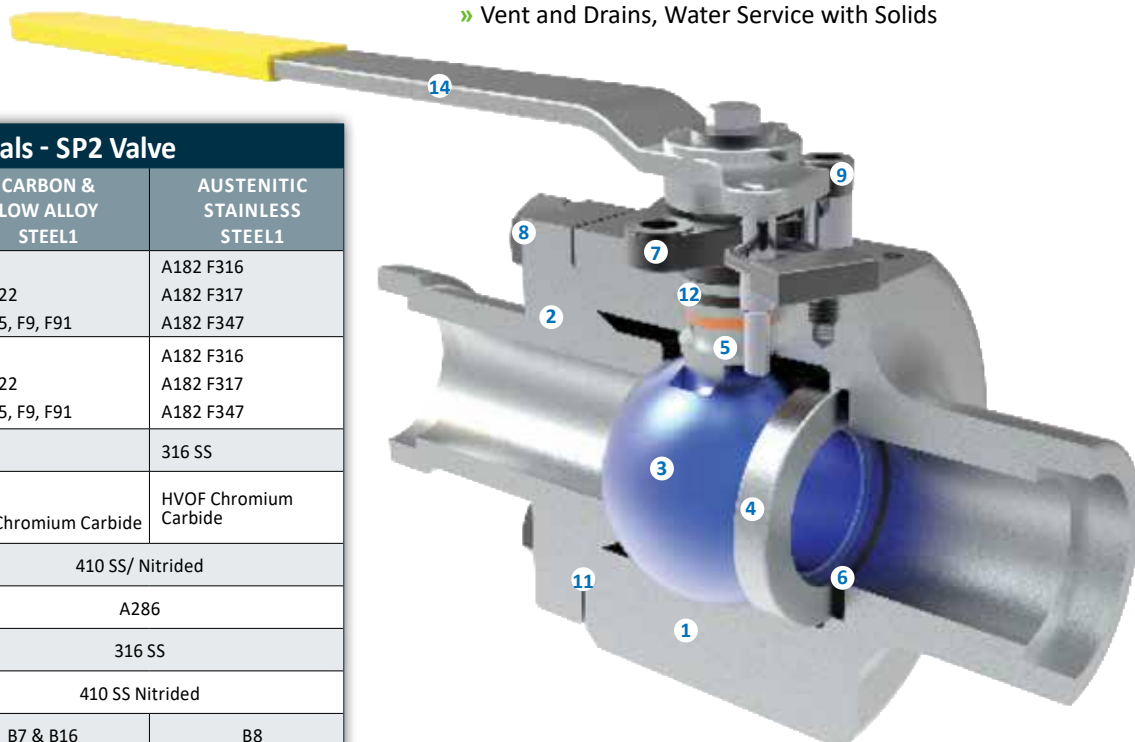
### Actuation and Controls

Accuseal Valves has access to all types of Actuation and Controls:

- Pneumatic and Hydraulic Actuators
- Spring Fail and Double-Acting
- Electric Actuators
- Volume Boosters and Tanks
- Solenoids, Filters, Positioners

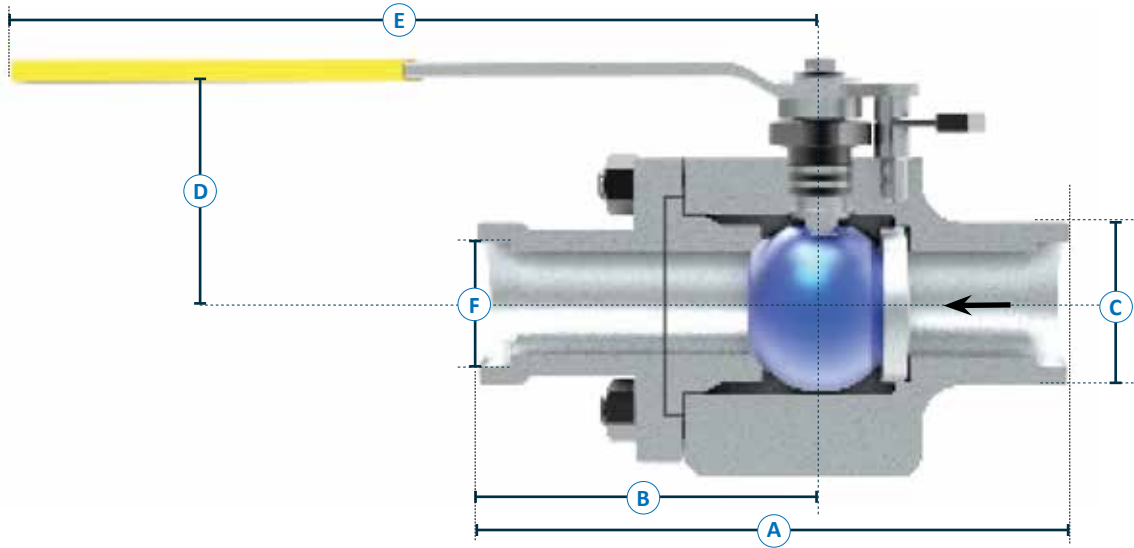
### Industries Served

- Power
  - » Condensate Isolation. LP, IP, and CRH Vents and Drains, Heater drains and vents, Instrument Isolation, Tight Shutoff to API 598/MSS SP-61
- Refining
  - » Petrochemical, Chemical, Hydrocracking and Hydro-processing
- Mining
  - » Vent and Drains, Water Service with Solids



Bill of Materials - SP2 Valve			
ITEM	DESCRIPTION	CARBON & LOW ALLOY STEEL1	AUSTENITIC STAINLESS STEEL1
1	Body	A105 A182 F22 A182 F5, F9, F91	A182 F316 A182 F317 A182 F347
2	End Connect	A105 A182 F22 A182 F5, F9, F91	A182 F316 A182 F317 A182 F347
3	Ball	410 SS	316 SS
4	Seat	410 SS HVOF Chromium Carbide	HVOF Chromium Carbide
5	Stem	410 SS/ Nitrided	
6	Spring <sup>2</sup>	A286	
7	Gland	316 SS	
8	Inner Stem Bearing <sup>2</sup>	410 SS Nitrided	
9	Body Bolting	B7 & B16	B8
10	Gland Bolting	B8	
11	Body Gasket <sup>2</sup>	Spiral Wound	
12	Packing	Graphite Per API 622	
13	Live Load Springs <sup>2</sup>	17-7 PH SS	
14	Lever	Steel with Handle Grip	

<sup>1</sup> Please consult factory for materials not listed. <sup>2</sup> Not shown.



Dimensions in/mm									
NPS (inches)	DN	A	B	C	D	E	F	Weight lb / kg	CV KV
0.5	15	6.50	3.74	1.61	3.32	7.09	0.86	13	25
		165.1	95.0	41.0	84.5	180.0	21.8	6	21.6
0.75	20	6.50	3.74	1.61	3.32	7.09	1.07	15.5	60.4
		165.1	95.0	41.0	84.5	180.0	27.1	7	52.2
1	25	8.00	4.92	1.89	3.66	8.66	1.34	20	104
		203.2	125.0	48.0	93.0	220.0	34.0	9	80.0
1.5	40	9.50	5.83	2.52	4.59	11.81	1.94	31	270
		241.3	148.0	64.0	116.5	300.0	49.2	14	233.5
2	50	11.50	6.70	3.15	4.92	15.75	2.42	57	467
		292.1	170.0	80.0	125.0	400	61.4	26	403.7

Steam Power Valve, Low Pressure – SP2		
Item	Type	Characteristics
1	Design	ASME B16.34
2	Temperature	-20 to 1,000°F (537°C)
3	ASME Class Ratings	150, 300, and 600
4	Size	1/2 to 2 (DN15 to DN50)
5	Material Type	Forgings
6	End Types	Buttwelding Ends Socketwelding Ends Threaded Ends Flanged Ends
7	Sealing	Uni - Directional
8	Testing	Zero Leakage API 598
9	Special	NACE MR0103 Non Destructive Examination (NDE) Positive Material Identification (PMI) Low-E Packing for Fugitive Emissions
10	Certifications	ISO 9001-2008 PED / CE, API 607 Canadian Registry Number (CRN)



## Grayloc Connectors

### A Grayloc Connector has three components:

#### **Metal Seal Ring**

The Grayloc seal ring achieves a self-energized and pressure-energized bore seal that will hold vacuum or external pressures. The metal Grayloc seal ring consists of a rib and two lips. During make-up, the seal ring lips deflect inward when assembling the connector. This deflection is controlled and is within the elastic limits of the seal ring material.

#### **Two Hubs**

The clamp fits over the two hubs and forces them against the seal ring rib. As the clamp assembly draws together the hubs, the seal ring lips deflect against the inner sealing surfaces of the hubs. This deflection elastically loads the lips of the seal ring against the inner sealing surface of the hub, forming a self-energized seal.

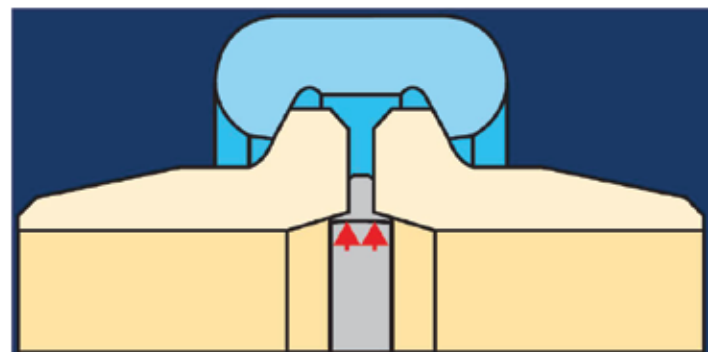
#### **Clamp Assembly**

The clamp is the primary pressure-retaining member of the Grayloc connector, not the bolting. The two-piece clamp configuration ensures equal loading around the entire connector. The clamp carries all of the internal pressure loads and axial and bending loads transmitted by the pipe. When installing the clamps around the hubs, no specific orientation is required.



#### **Service Extremes**

Vibration, heat, cold, and thermal shock often accompany service where Grayloc connectors are heavily loaded. These connectors consistently withstand severe situations without routine maintenance. Unique designs permit maintenance-free service even under the extreme conditions shown to the right.





## Accuseal Valves Quality

### Accuseal Valves manufactures to ASME B16.34

#### Certifications

- ISO 9001: 2008
- PED/CE
- CRN
- China Type Test
- IBR Certification (on request)

#### Actuation

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

#### Accuseal Product Warranty

- Contact Accuseal for additional warranty information

#### Accuseal SPV, CR2 – Steam Power Ball Valves

- Standard: 5 years
- High cycle: 1 year

#### Accuseal CSV – Critical Service Ball Valves

- Standard: 1 year

#### Accuseal SP2 – Low Pressure Steam Power Valves

- Standard: 1 year

#### 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.


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## FORUM ENERGY TECHNOLOGIES

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