

brands you trust.



Krombach[®]KFO 9136
Metal Seated Ball Valves



Heritage of Innovation & Quality

Crane Co. is a diversified manufacturer of highly engineered industrial products, founded in 1855. Crane has approximately 11,000 employees in the Americas, Europe, Asia and Australia, and is traded on the New York Stock Exchange (NYSE:CR).

Since its foundation in 1855, Crane has been a symbol of manufacturing excellence, expanding alongside the global industrial revolution and shaping the growth of industry worldwide. Crane ChemPharma & Energy, within Crane's Fluid Handling segment, is proud to be a part of the company's illustrious history, delivering solutions to the fluid handling challenges faced by the industry's most demanding applications.

From the industrial revolution to the modern age, Crane has anticipated the challenges of the market and developed progressive solutions to address them.

A comprehensive product portfolio backed by a robust global infrastructure enables Crane CP&E to deliver localized solutions to the chemical processing, biotechnology, pharmaceutical, oil & gas, refining, and power generation industries worldwide. Crane CP&E's highly-engineered offering includes check valves, sleeved plug valves, lined valves, process ball valves, high-performance butterfly valves, bellows sealed globe valves, aseptic and industrial diaphragm valves, multi/quarter-turn valves, actuation, sight glasses, lined pipe, fittings and hoses, and air operated diaphragm and peristaltic pumps.

With offices, manufacturing plants, distribution networks, and sales & service centers that span the globe, Crane CP&E is a worldwide leader in fluid handling products and solutions.

Crane Fluid Handling: Global Presence, Local Support.



Traceability

A stainless steel, tag is attached to all manufactured and modified valves. It includes standard ASME information.

Fully Tested

All valves manufactured by Crane® are tested in accordance with Crane® strict manufacturing procedures and industry regulations.

Field Repair Services

Crane® technicians are available for field repair and emergency service at your site.

Consistent Quality

The high Crane® quality is supported by our extensive practical experience, state-of-the-art manufacturing, and quality assurance certified by international inspections authorities. Please visit our website for details.

About Krombach

Krombach® Company Profile

The company started its production activities in 1948 in Hilchenbach with 8 employees and initially focused on machined parts for the textile industry. After relocating to its present site in Kreuztal, the focus shifted to the design and production of offset valves and ball valves. The company soon became one of the leading suppliers of high-quality valves for the chemical and petrochemical markets as well as the energy sector, but also for the oil and gas industry.



Krombach® production site in Kreuztal

The product portfolio now comprises soft and metal seal ball valves, gate valves, strainers, sight glasses and shut-off valves.

Krombach® Metal Seated Ball Valves

Krombach® Metal Seated Ball Valve's ball and seat are machined to such precise tolerances that ball and seat lapping does not have to be performed individually for each valve – making both the ball and seat freely interchangeable (if equal in nominal size). Its trunnion-mounted ball design offers a polygon stem-to-ball connection, which reduces stress and ensures optimal torque transmission. An additional feature is its self-cleaning system which removes excess particles, minimizes leakage, and extends product life. Other key options include a fire-safe design body gasket.

Krombach® Metal Seated Ball Valves - Product Range

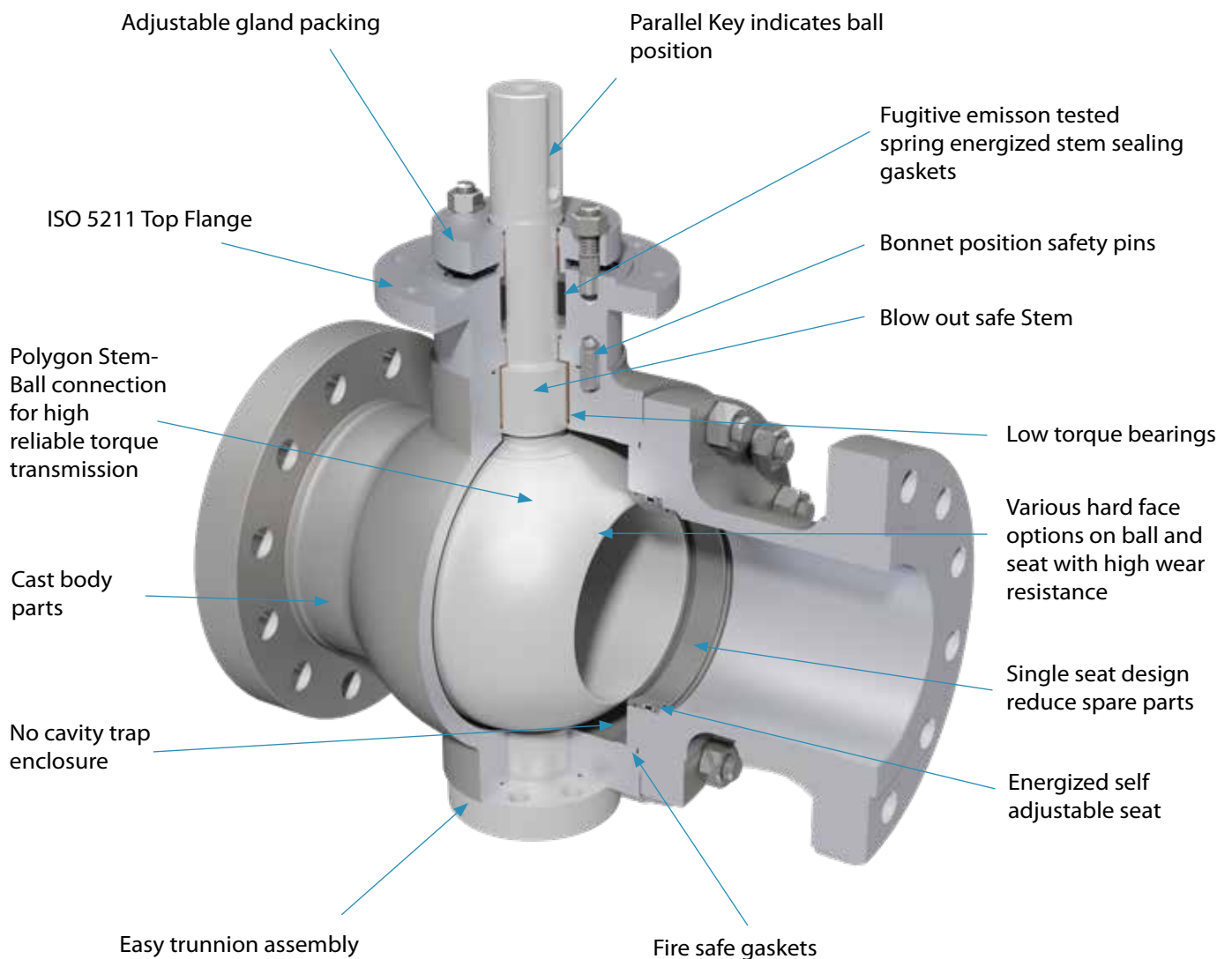
	Ball Valve Types			
	KFO 1136	KFO 5136	KFO 7136	KFO 9136
Design	Floating ball	Floating ball	Trunnion mounted ball	Trunnion mounted ball
Body Material	Cast	Forged	Forged	Cast
Pressure Rate	PN 10 - PN 40 Class 150 - 300	PN 10 - PN 600 Class 150 - 4500	PN 10 - PN 600 Class 150 - 4500	Class 300 - 600
Size	DN 15 - DN 200 NPS ½" - 8"	DN 15 - DN 400 NPS ½" - 16"	DN 15 - DN 400 NPS ½" - 16"	NPS 2" - 16"
Standard Designs	DIN ASME	DIN ASME	DIN ASME	ASME

Krombach® KFO 9136 Features and Benefits

Features and Benefits

- 1 **Uni-Directional Single Seat** permits tight shut-off operation and enables **CAVITY FREE PERFORMANCE**
- 2 **Lower Cost of Ownership** due to the energized seat and low friction bearing design **REDUCES OPERATING TORQUES** by over 20%
- 3 Robust Stem Seal Design permits superior **Fugitive Emissions Control*** to **REDUCE POTENTIAL DOWN TIME**

*Certified standards per EPA Method-21, ISO-15848, and TA-Luft in accordance with VDI 2440.



Product Overview

Features

- Hard facing on ball and seat
- High wear resistance
- Unique lapping procedure for high quality seat / ball roundness of hard-faced surface
- Stem-ball connection uses a polygon profile to ensure the most effective torque transmission
- Optimized trunnion ball valve design permits smaller actuators due to lower torque
- Uni-Directional single seat design

Materials of Construction

- Standard: A216 Gr. WCB, A351 Gr. CF8M
- Special (upon request): Duplex, Hastelloy®

Size Range

- 2" up to 16", in two piece cast body design

DN (mm)	NPS (inch)	Flanged			
		Class 150	Class 300	Class 600	Class 900
50	2	-	●	●	-
80	3	-	●	●	-
100	4	-	●	●	-
150	6	-	●	●	-
200	8	-	●	●	-
250	10	-	●	●	-
300	12	-	●	●	-
350	14	-	●	●	-
400	16	-	●	●	-
450	18	-	-	-	-
500	20	-	-	-	-
600	24	-	-	-	-

Pressure Ratings

- ASME Class 300, Class 600

Temperature Range

- Standard: -29°C up to 260°C, -20°F up to 500°F
- Special (upon request): up to 700°C, 1300°F

Body Configurations

- Cast body, 2-piece design
- Flanged
- Trunnion mounted

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Face to Face

- According to ASME B16.10

Flanges

- According to ASME B16.5

Compliance

- API 608
- API 607, 6th Edition / ISO 10497
- EPA Method 21, API 641 and ISO 15848-1 (Fugitive Emissions Compliance)
- Quality certification as per ISO 9001

Certificates

- CE
- ATEX
- Fire-Safe
- SIL 2
- TA LUFT

Typical Applications

- Coal Gasification
- Silicon Powder
- Refining
- Chemical and Petrochemical Processing

Special Options

- Optional design with two seats and bi-directional sealing for demanding applications
- Stem extensions
- Emission monitoring ports
- Heating jacket
- Cladding on flow through body parts passage
- Single seat with Bi-Directional sealing

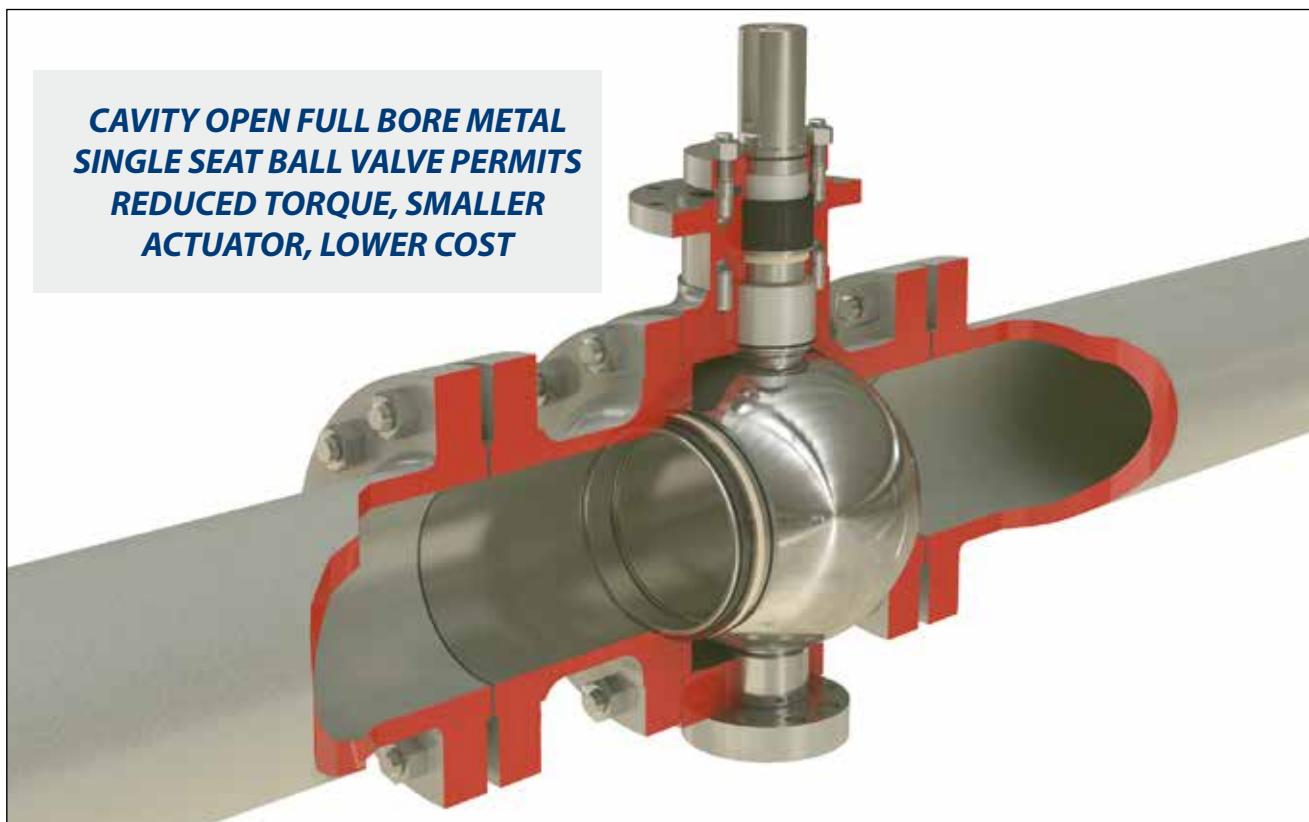


Crane ChemPharma & Energy

Design Versions

What is a Metal Seat Ball Valve with one Seat?

- As the name implies, there is only one seat designed into the valve. This seat is located in the cover body part and is energized to tighten by metal to metal contact onto the trunnion mounted ball.
- The one seat design open the so called "cavity" of a double seated ball valve into the downstream direction of connected pipe. No body cavity in one seat design!
- The surface of seat and ball are hardface coated to minimize galling and wear between the metal contact parts.
- The optimized seat force supports the self adjusting seat and reduce valve operating torque.
- The precision machined metal seat and precise ball shape enables reliable and zero leakage* sealing, even at elevated temperatures and high cycles.
- The excellent fitting of exchangeable seat and ball help to get self cleaning effects, e.g. removes slurry sedimentation on ball at actuation.



Why use a Metal Seat Ball Valve with one Seat?

- For the harsh conditions of critical process applications, fluids isolation and temperature extremes Krombach® KFO 9136 provide unmatched performance reliability, and quality.
- Low torque, from quarter-turn action and Single seat design, permits smaller actuators and lower cost
- The Uni-directional or optional Bi-directional ZERO LEAKAGE* closure with a metal seat, even after extensive cycling, provides sealing integrity formerly associated only with soft-seated valves
- Low torque, from quarter-turn action and Single seat design, permits smaller actuators and lower cost
- Fire tested per API 607, 6th Edition / ISO 10497-5
- Replaceable seat and ball allows a quick and easy repair

*Zero Leakage means "bubble tight" in accordance with the following standards: API 598 (Soft Seat) & API 6D (Soft Seat)

Applications

Extreme Temperature and Wear Resistant Metal Seated Ball Valve for Use in Coal Gasification, Refining, Petrochemical and Pulp Slurry Severe Service.

Krombach® KFO 9136 - Performance Chart

FUNCTION		MEDIA TYPES								APPLICATION REQUIREMENTS											
On / Off	Throttling	Clean Liquids & Gases	Dirty Liquids & Gases	Corrosive Liquids & Gases	Hazardous Liquids	Viscous Liquids	Abrasive Slurries	Extreme Temperatures	Vacuum Service	Extended Service Life	Full Port / High Cv	Low Torque	Fugitive Emissions Control	Reduced Maintenance	Uni-Directional	Bi-directional (Option)	Sizes	Pressure Range	Temperature Range	High Temperature (Option)	Low Temperature (Option)
●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	2" -16"	Class 300/600	-29°C up to 260°C, -20°F up to 500°F	1300°F / 700°C	-256°F / -160°C

● Well Suited ● Limited Application

Industries

- Oil & Gas Processing
- Refineries
- Hydrocarbons Services
- Chemical & Petrochemical Plants
- Offshore Platforms
- Pulp & Paper
- Steel Mills
- Slurry Severe Service
- Mining

Processes

- Catalytic Reforming
- Hydrogen Generation
- Vacuum Distillation
- Atmospheric Distillation
- Fluidized Catalytic Cracking
- Hydrocracking
- Delayed Coking
- Sulfur Recovery
- Visbreaking
- Gasification
- Crude Oil

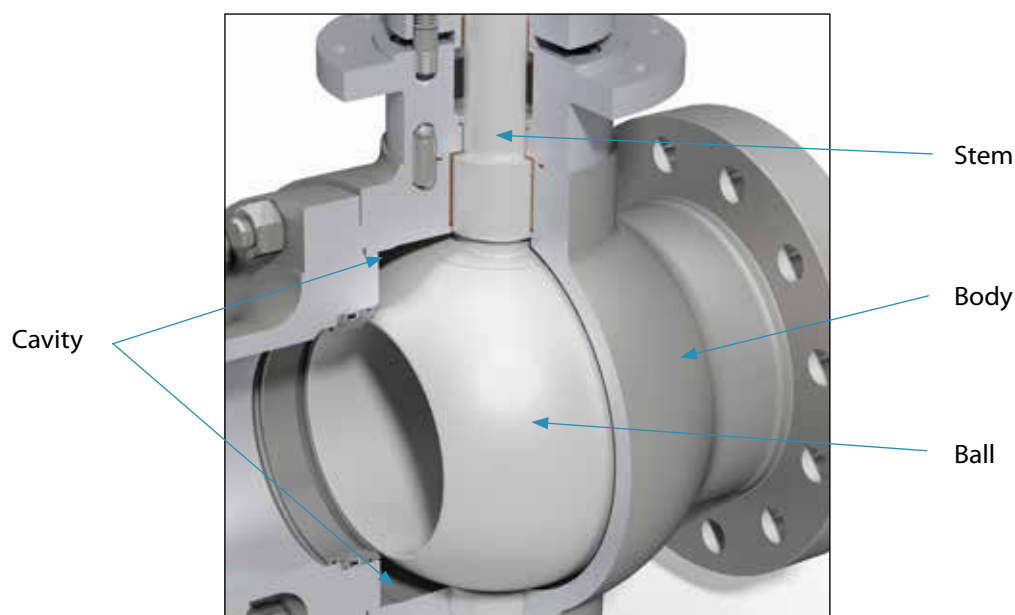
Media

- Hydrocarbons
- Hydrogen
- Oxygen
- Hot Gases
- Sulphur (Tail Gas)
- Chlorinated Solvents
- Flare Gas
- Chemical Solvents
- Coal Powder / Slurry
- Syngas
- Flyash

Design Features

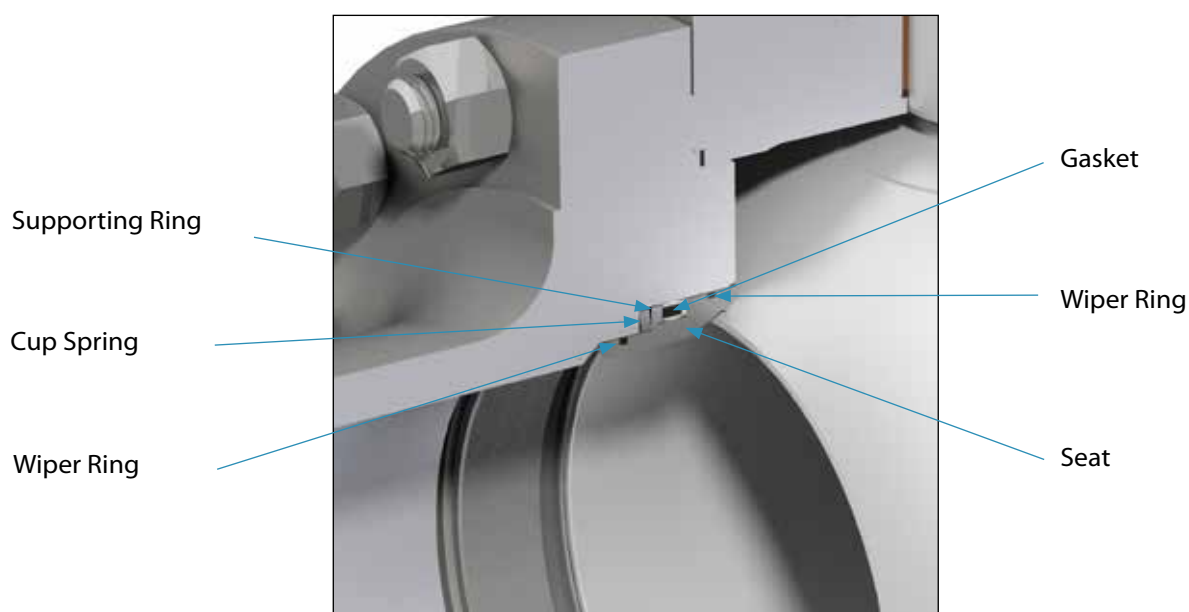
Uni-Directional Single Seat Design

- Permits tight shut-off operation and ensures cavity-free performance.
- Reduced number of components; only one seat.



Metal to Metal Sealing

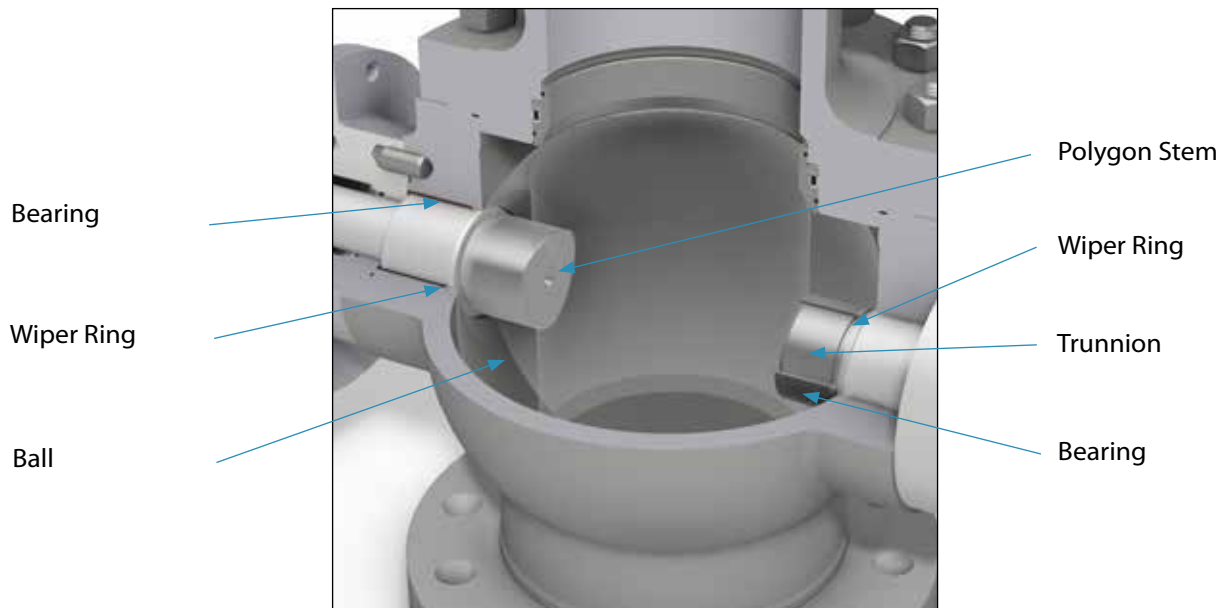
- Metal-to-metal sealing between seat and ball allows application with high temperature, high pressure, and severe service handling, while still achieving zero-leakage* sealing performance.
- The optimised energizing self adjusting seat facilitates a permanent seat and ball contact under recurrent thermal cycling.
- Braided Graphite wiper rings keeps solids away from springs and seals preventing blockade of seat.



Design Features

Less Friction Bearing Design with Polygon Stem

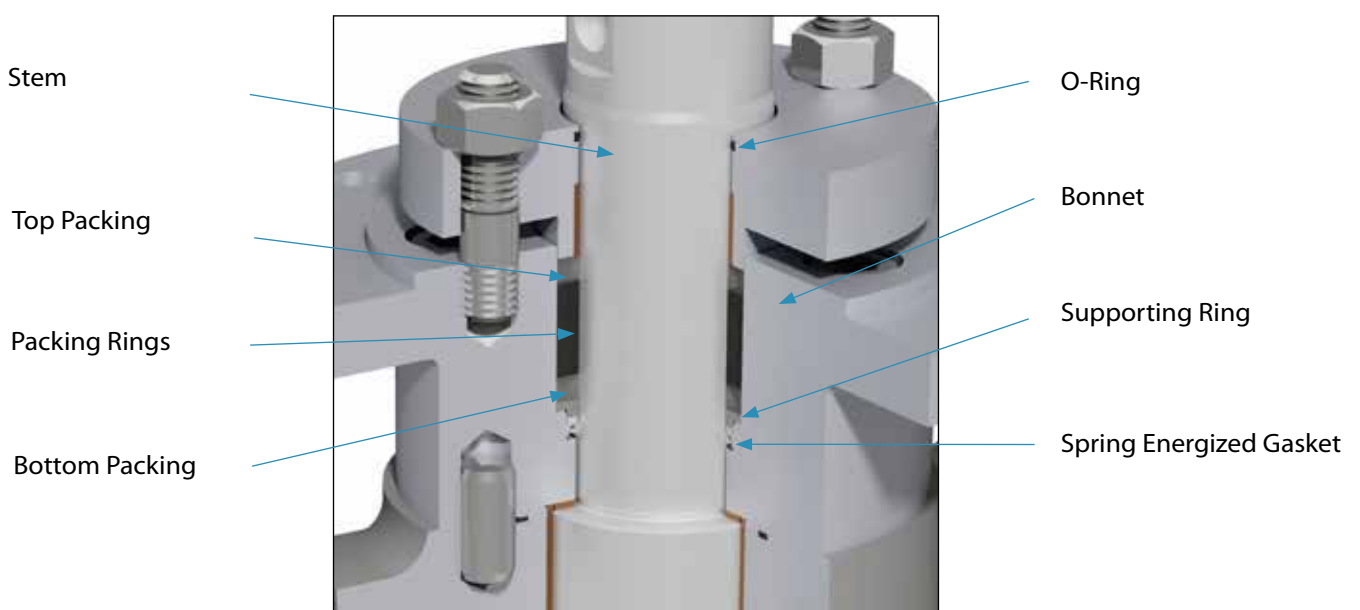
- The optimized trunnion ball valve reduces operating torques and permits smaller actuators.
- The polygon profile safely enables the most effective torque transmission.
 - Higher safety against stem deformation
 - Less stress load into ball



Robust Stem Seal

- Design permits superior fugitive emissions control* to reduce potential down time
- Stem packing:
 - Compliance with additional standards: EPA Method 21; API 641; TA-Luft and ISO 15848-1

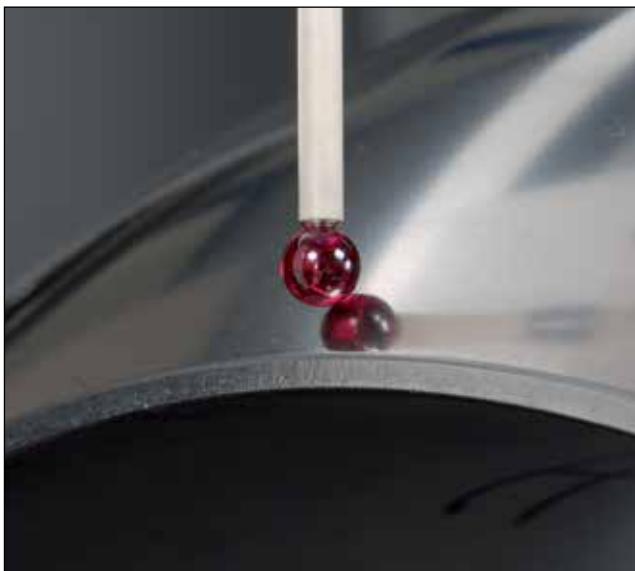
**Certified standards per EPA Method-21, API 641; ISO-15848, and TA-Luft in accordance with VDI 2440*



Design Features

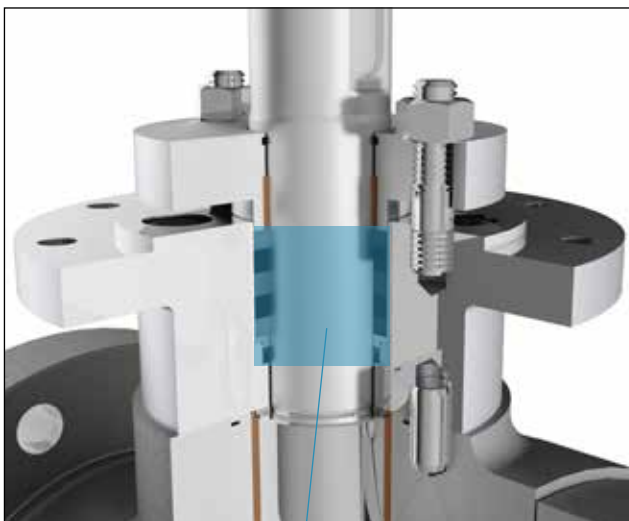
Unique lapping procedure for high quality seat and ball roundness of hard-faced surface

- Self cleaning sealing system design
- Modular interchangeable balls and seats
- Vacuum tightness
- Leakage rate class VI acc. to test API 598
- Excellent use for slurries and suspensions
- Minimum cost and time for maintenance and repair of ball and seat
- Less spare parts
- Superior process safety
- Ball and seat is mechanically lapped and requires no hand lapping



Stem in packing area with super fine roller burnished surface

- Fugitive emission safe (API 641, EPA 21, EN ISO15848-1, TA-Luft)
- Vacuum tightness
- Less wear of on packing gaskets
- Reduced friction at actuation
- Less torque
- Less expensive Automation
- Minimum cost and time for maintenance
- Less spare parts
- Superior process safety



Packing Area

Surface roughness Quality
 Rz < 1µm ; AARH < 30µin

Metal Sealing

Selection of Sealing System (Table 1)

Selection Table			Code of Sealing System					
			H2	H3	H4	H5	H6	H7
Substance Property	Phase	Slurry, suspensions	+	+	+	+	+	+
		Liquid fluids	+	+	+	+	+	+
		Steam/Vapour	•	+	+	+	+	+
		Gas	•	+	+	+	+	+
		With traces of particles	•	+	+	+	+	+
		With solid parts	-	•	+	+	+	+
	pH Value	0-9	+	-	-	•	+	+
		6-8	+	+	+	+	+	+
		4-14	-	•	•	+	•	-
		7-14	-	+	+	•	-	-
Operating Conditions	Temperature	up to 600°F	+	+	+	+	+	+
		up to 800°F	•	+	+	+	+	•
		up to 1050°F	•	•	+	+	+	-
		up to 1500°F	-	-	-	-	+	-
	Pressure	up to Class 300	+	+	+	+	+	+
		up to Class 600	•	•	+	+	+	+
		up to Class 900	-	•	+	+	+	•
		up to Class 2500	-	•	+	+	•	•

+ suitable
 - not suitable
 • Consult Krombach®

Characteristic of Coating (Table 2)

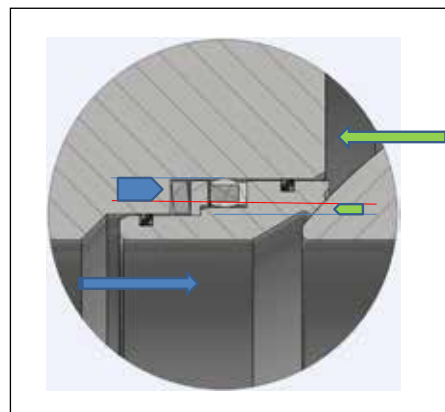
Code	Based On	Coating Procedure	Thickness	Hardness HRC Approx.
H2	Chromium	Electro galvanic	0.003 inch	70
H3	Nickel alloy	Plasma spray and fused	0.032 inch	56-58
H4	Nickel alloy and carbides	Plasma spray and fused	0.032 inch	60-62
H5	Cobalt alloy	Plasma spray and fused	0.032 inch	62-65
H6	Chrom-carbides	High speed spraying	0.012 inch	65-70
H7	Ceramic chromoxide	Spraying	0.012 inch	>70

Double-Seated Ball Valves

Bi-directional tightness achieved through upstream pressure support and independent spring sealing force with cavity release effect through pressure balancing.

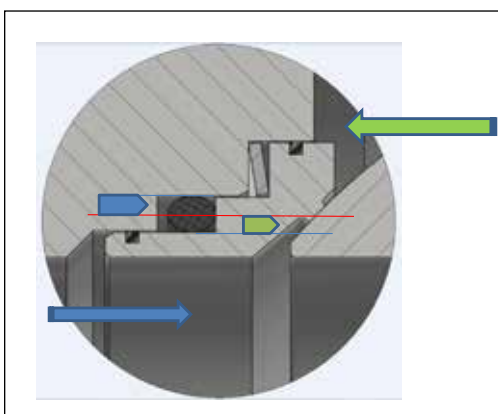


- In the preferred-flow case (blue arrow), ball and seat contact is energized by the force of the compressed spring. The Lip seal ring between the valve body and seat prevents leakage by sealing the gasket chamber. The pressure exerted on the gasket provides additional sealing force for the ball & seat.
- Increasing body cavity pressure (green arrow) when the ball is in closed position exerts pressure on the two seats, acting against the spring load. This action will allow the seats to relieve the body cavity pressure, until the flow pressure is balanced with the spring force. The body of the valve is herewith protected against over pressure.

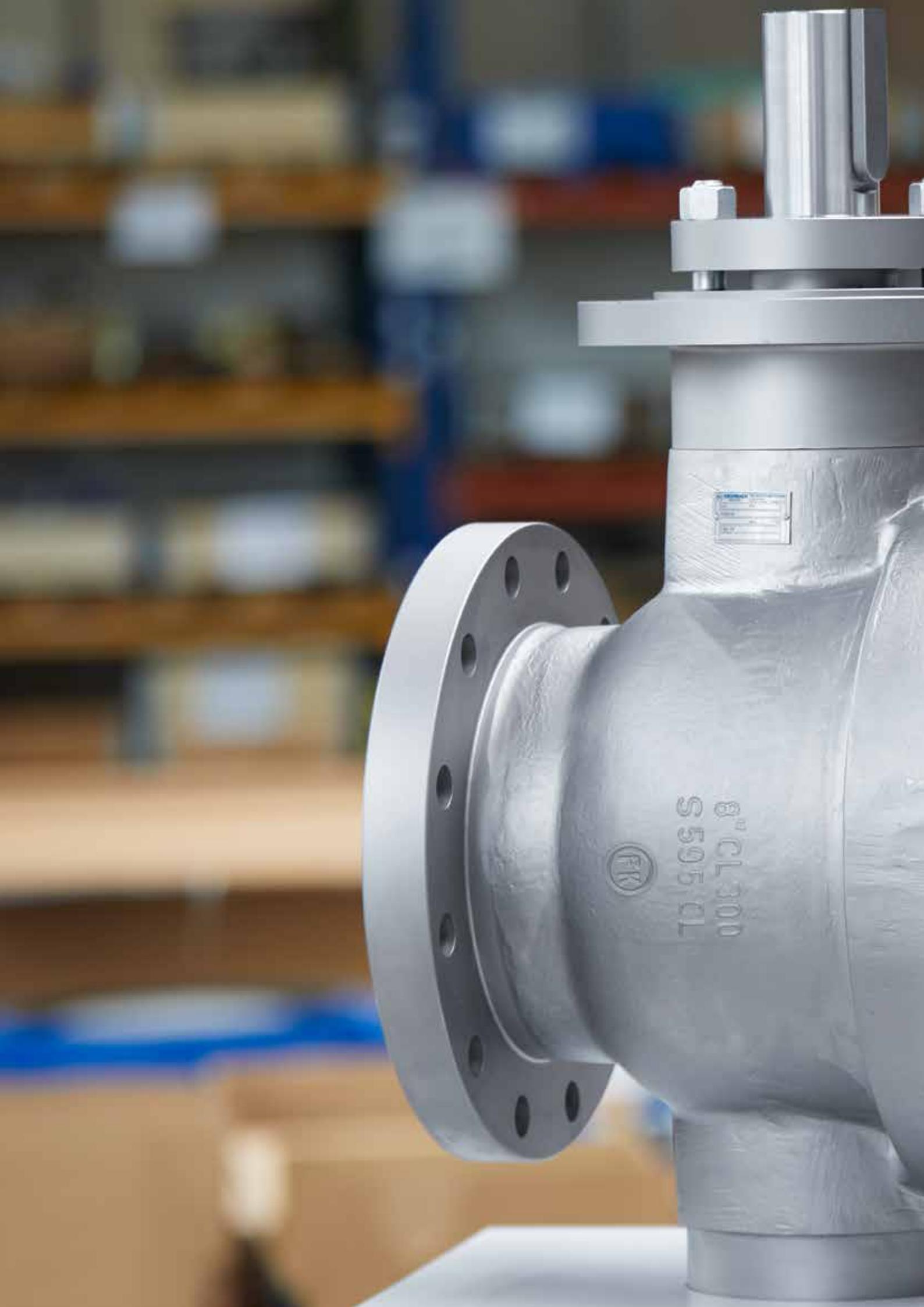


Single Seat Design

Bi-directional tightness achieved through pressure balancing and independent spring sealing force.



- In the preferred-flow case (blue arrow), ball & seat contact is energized by the force of the compressed spring. The O-Ring between the valve body and seat prevents leakage by sealing the gasket chamber. The pressure exerted on the gasket provides additional sealing force for the ball & seat.
- In the reverse-flow case (green arrow), the fluid pressure in the spring chamber assists the spring sealing force on ball & seat contact.
- With this single-seat configuration, the KFO 9136 provides the option to upgrade a unidirectional into a bi-directional tight valve with only one seat—thereby eliminating the cavities found in double-seated valves.



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8" CL 300
S 595, CL





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