PROVIDING COMPLETE CONTROL SOLUTIONS
FOR INDUSTRIAL PIPELINES

METAL TO METAL BALL VALVE

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FANGZHENG VALVE GROUP CO., LTD

Distributors/Agents

Local Strategic FZV Partner

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INDUSTRIAL PIPELINE CONTROL EXPERT

FANGZHENG VALVE GROUP

We (FZV) commit ourselves to manufacturing excellent valves and achieving our customer satisfaction based on the principles of quality assurance and continual improvement.

We specialize in supplying a wide range of API 6D, API 609, API 600, API 594, API 6A, and API 16C products and wellhead equipment.

FZV was formally established in 1992, and so far, FZV has been approved by well-known international and domestic End-users and EPC companies.

FZV has set up three factories based in Shanghai and Wenzhou city with total area 76000 m^2 and maximum production capacity up to 32000 tons.

To enhance engineering designs and manufacture high-end products, FZV has in-house laboratory equipped with various facilities and test equipment to check and verify the product quality. The following tests are conducted in-house:

- Chemical analysis
- Mechanical test, Hardness, and impact test
- Non-destructive examination
- Salt spray test
- Fugitive emission test(ISO 15848-1 & 2)
- Deign validation testing (DVT) as per SHELL(MESC SPE 77/300)
- High temperature (Up to 550°C) and Cryogenic test (Up to -196°C)

FZV is certified by ISO 9001, ISO 14001, OHSAS 18001, API6D, API600, API609, API594, API607, API6A, API6A-PR2, API Spec.Q1, ABS, CCS, DNV, ATEX, and CE/PED, etc.

FZV Main Products Range:

Product types: Ball Valve, Gate Valve, Globe Valve, Check Valve, Butterfly Valve, Slab Gate Valve, Pipe Fitting, Cryogenic Valve, API6A Valve, Wellhead Equipment, Manifold & Christmas tree, etc.

Implemented Standards: ISO, API, BS, etc.

Casting material: WCB, LCB, WC6, WC9, C5, C12, CF3, CF3M, CF8, CF8M, C95500, 4A, 5A, Monel 400/500, Inconel 825/625, Titanium Alloy, etc.

Forging material: A105, LF2, F11, F12, F304, F321, F347, F316, 304L, 316L, C61900, F51, F53, F55, Inconel, Titanium Alloy, etc.

Nominal diameter: NPS 1/2"-68"(DN 15-DN 1,700)

Nominal pressure: API600 & API6D: CLASS 150~CLASS 2,500 (PN16~PN420) API 6A: 2,000PSI~15,000PSI

Temperature range: -196°C-550°C

Applications: Onshore oil and gas exploitation and transportation, offshore oil and gas platform and FPSO / FLNG / FSRU, natural gas purification and liquefaction unit, LNG receiving station and vaporization unit, refining, chemical industry and chemistry, coal to gas (oil) and coal chemical industry, air separation, power station, aerospace, military industry and new energy (solar power generation, hydrogen energy, etc.) etc.

The Business purpose of FZV: Providing Complete Control Solutions For Industrial Pipelines.

Our Advantages:

1. Strict quality management system to ensure excellent product quality;
2. Excellent production management system to ensure the shortest delivery;
3. Competitive price;
4. Reponsive after-sales service.

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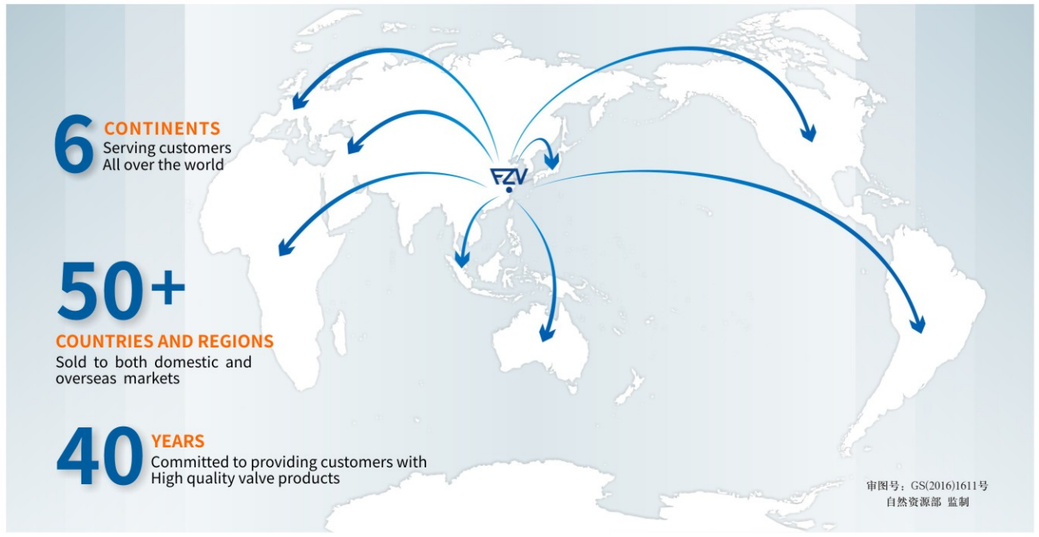
METAL SEATED BALL VALVE OVERVIEW

FZVPRODUCT ADVANTAGES: FZV has been committed to improve the design, manufacturing and research of metal seated ball valves for a long time with more than 10 years of rich experience of supplying the metal-seated ball valve to more than 20 countries around the world, FZV has acquired the satisfaction of more than 100 customers by continuously adopting advanced technologies from both domesic and overasea breakthroughs. FZV cooperates with universities and professional research institutions to continuously deal with core technology of metal-seated ball valves and develop advanced technology for metal-seated valves.

Furthermore, FZV’ s strong technical research and development team, sophisticated processing equipment, rigorous and meticulous quality control, comprehensive testing and inspection methods, and thoughtful after-sales service will ensure the safety and reliability of FZV metal seated ball valve.



FZV METAL SEATED BALL VALVE CLASSIFICATION

Metal seated ball valve is divided into temperature range according to the use: Low temperature metal seated ball valve\Normal temperature metal seated ball valve\High temperature metal seated ball valve; Divided by the ball positioning into the valve body as Floating ball\ trunnion mounted ball According to the valve body asembly, the ball valve is classified into three types: Side Entry Two-Piece Ball Valve, Side Entry Three-Piece Ball Valve, and Top Entry Ball Valve; metal-seated valve body is fabricated through either casting or forging process; According to the use of medium can be divided into general service metal seated ball valve and special service metal seated ball valve (such as lock valve, oxygen valve, low temperature valve, etc.)



SCOPE OF APPLICATION

FZV metal seated ball valve can meet the high temperature, high pressure, strong corrosion and granular media and other harsh conditions, can be used in:

Oil and gas exploitation, refining, petrochemical fields:
Including oil and gas exploitation, oil and gas transmission, catalytic cracking, hydrorefining, delayed coking, offshore oil and gas extraction
Coal chemical industry:
Direct coal liquefaction, indirect coal liquefaction, coal to methanol, coal to olefin, synthesis of ammonia, synthesis of urea, etc

Power domain:
Steam transport, pipeline drainage, boiler blowdown, desulfurization, etc
Papermaking, chemical industry:
Pulp, ethylene, propylene, butene, polysilicon and other municipal sewageProcessing, air separation device, etc

APPLICABLE STANDARDS

Design and manufacturing standard: API 6D、API 608、ISO 17292、GB/T12237 JB/T7745
Pressure and temperature standard: ASME B16.34
Face to face Dimension: ASME B16.10
Flange connection size: ASME B16.5、ASME B16.47(A or B series)
Butt welded connection: ASME B16.25
Socket welding connection: ASME B16.11
Threaded end connection: ASME B16.1.20
Inspection and testing: API 598、ISO 5208、ANSI B16.104
Fire test: API 6FA、API 607
Sulfur resistant requirement: NACE MR 0175

RANGE OF PRODUCTION

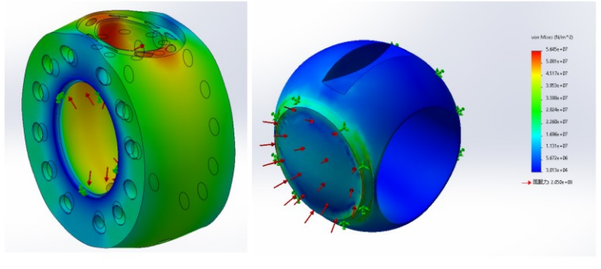
Floating ball valve
Pressure rating: CLASS 150 300 600 900 1500 2500
Nominal diameter: NPS1/2～6″（floating ball valve）
Nominal diameter: NPS2～36″（trunnion mounted ball valve）
Body material: carbon steel, stainless steel, duplex steel, alloy steel, etc
Operation methods: manual, gear, electric, hydraulic, pneumatic-hydraulic linkage, etc

TECHNICAL CAPABILITIES

Our Engineering team is always studying the new updates of these standards to incorporate any changes that may affect the design, develop and form our product characteristics.

FZV has in-house laboratory equipped with high-low temperature test facilities which is able to perform DESIGN VALIDATION TESTING OF INDUSTRIAL VALVES such as SHELL TAT.

Design is made using the most advance technology and equipment, using finite elements and CAD system programs to ensure the proper assembly and performance of products from the concept, calculation and detailed drawings for manufacturing. FZV is a high-tech enterprise in the development of products according to the needs of these days in the valve product market.



FZV METAL SEATED BALL VALVE QUALITY ASSURANCE

FZV is a supplier to high-end customers such as Shell, Wolseley in the United States, and Cameroon. FZV quality assurance system is determined and operates continuously in an effective manner to ensure product quality.

FZV metal-seated ball valves are pressure tested as per API598, ISO5208, API6D, ISO17292, JB/T7749 and other performance tests, and the sealing performance can reach zero leakage.

Further more, it can simulate high and low temperature tests according to customer requirements, including escape tests. FZV has completed more than 30 valve specifications high temperature performance tests, conducted tens of thousands of cycles, and obtained valuable test data for improved valves.

METAL SEATED FLOATING BALL VALVE FEATURES

HVOF (HIGH VELOCITY OXY-FUEL) SPRAY PROCESS

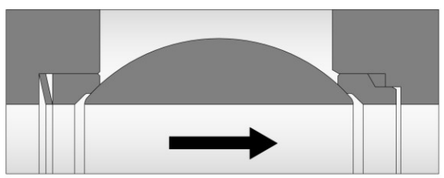
HVOF (High Velocity Oxy-Fuel) spray process is a thermal spray coating process which is used to hard face the ball and seat sealing surfaces by hard facing materials like tungsten carbide or chromium carbide. The maximum surface hardness of supersonic spraying is HRC7, the coating thickness can reach 0.3mm, and the binding strength is more than 10000PSI;The surface hardness of metallurgical melt spraying is about HRC58, the coating thickness is up to 1mm, and the binding strength is up to 15000PSI. The sealing surface material section is resistant to high temperature up to 650°C, and has resistance against erosion, wear, and corrosion.

EXCELLENT SEALING PERFORMANCE

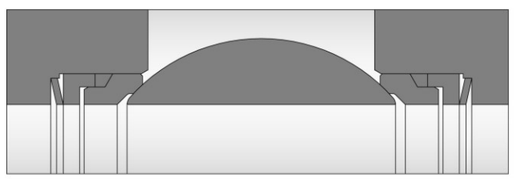
To "mate" a ball and seat in a metal seated ball valve, the ball is properly aligned and carefully rotate it into full contact with the seat, applying a slight pressure to achieve a tight seal, while ensuring the center of the ball is precisely aligned with the center of the seat for optimal sealing; this process often requires careful machining and lapping of both the ball and seat surfaces to achieve the necessary precision for tight shut-off connection.

UNIDIRECTIONAL OR BIDIRECTIONAL METAL-SEATED BALL VALVE

Floating metal-seated ball valve is generally manufactured as uni-directional, and the flow direction is clearly marked on the valve body. However bi-directional floating metal-seated ball valve can also be manufactured in case of the customer's requirement.



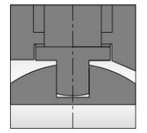
Unidirectional seal construction



Bidirectional seal construction

ANTI-BLOW OUT STEM FEATURE

Stem retention design ensures that the stem does not eject under any internal pressure condition or if the packing gland components and/or valve operator mounting components are removed while the valve is under pressure, without the stem being pushed out (blown out).



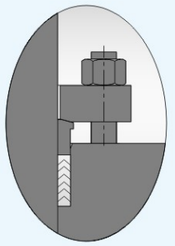
Blow-out stem design structure

RELIABLE PACKING SEAL

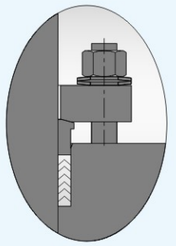
The valve stem adopts V-type packing seal structure. V-type packing can effectively transform the pressing force of the packing gland into the sealing force of the valve stem.

The traditional packing gland is changed to the two-piece structural design of the gland flange and gland ring. The gland flange and gland ring adopt spherical contact to ensure that the gland ring is always vertical, and the guide bushing is set inside the gland ring, which avoids the abrasion and wear of the gland ring, and reduces the operating torque of the valve.

According to the needs of working conditions, the packing pressing mechanism loaded by spring lock washer can be used to make the sealing of the valve stem packing more reliable. The valve can still ensure the sealing performance of the valve stem packing after a long time of use.



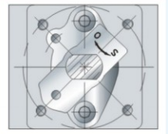
V-shaped packing



Spring lock washer loading

The FZV floating ball valves are designed with flange ISO 5211 flange in the top of the valve,

which is provided to install the worm gear or electric and pneumatic actuators.



VALVE SEAT SPRING STRUCTURE AND DUST PROTECTION

Under high temperature conditions, thermal deformation will cause expansion between the valve body and the seat, which may cause the valve to fail to open.FZV uses a spring-loaded design to provide the initial sealing force for the sealing surface, and can absorb thermal expansion caused by temperature changes to ensure the adaptability of the valve at high temperatures.

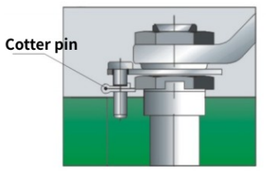
The spring chamber is protected by graphite retainer to prevent granular medium from entering the spring chamber, prevent spring failure and ensure reliable sealing.

FIRE SAFE AND ANTI-STATIC DESIGN

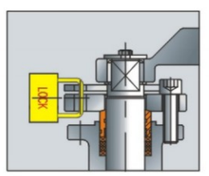
The metal-seated ball valve basically meets anti-static feature as the sealing is provided by metal-to-metal contact area between ball and the seats, the stem housing is sealed by a set of packing, and the body-cover joint is sealed by spiral wound gasket which has high melting point about 1000°C. The metal-seated ball valve has basically anti-static feature. The reason behind is that due to having metal contact between the valve parts (Ball-Seat, Stem-Body), static electricity is never generated.

POSITION STOP/INDICATOR

A mechanical feature with a keyhole that limits the rotation of the valve handle, ensuring it can only turn 90 degrees to fully open when the handle is parallel to the pipeline, or close the valve when the handle is perpendicular to the pipeline, preventing over-rotation and potential damage to the valve mechanism.



Locking and limiting position device (forged steel)



Locking and limiting position device (cast steel)

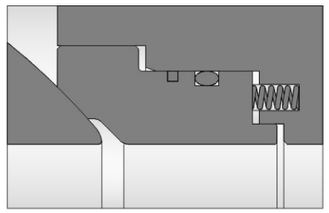
METAL SEATED TRUNNION MOUNTED BALL VALVE FEATURES

HVOF (HIGH VELOCITY OXY-FUEL) SPRAY PROCESS

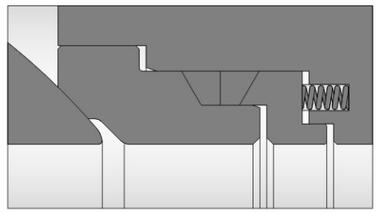
The metal-seated ball valve basically meets anti-static feature as the sealing is provided by metal-to-metal contact area between ball and the seats, the stem housing is sealed by a set of packing, and the body-cover joint is sealed by spiral wound gasket which has high melting point about 1000°C. The maximum surface hardness of supersonic spraying is HRC70, the coating thickness can reach 0.3mm, and the binding strength is more than 10000PSI;The surface hardness of metallurgical melt spraying is about HRC58, the coating thickness is up to 1mm, and the binding strength is up to 15000PSI.Sealing surface materials can withstand high temperatures up to 650°C, and has resistance against erosion, wear, and corrosion.

SEAT SEALING STRUCTURE

Under the condition of ⩽200°C, the seat sealing is provided by O-ring; Under conditions of > 200°C, the seat sealing is provided by flexible graphite.



⩽200°C valve seat structure



>200°C valve seat structure

EXCELLENT SEALING PERFORMANCE

To "mate" a ball and seat in a metal seated ball valve, the ball is properly aligned and carefully rotate it into full contact with the seat, applying a slight pressure to achieve a tight seal, while ensuring the center of the ball is precisely aligned with the center of the seat for optimal sealing; this process often requires careful machining and lapping of both the ball and seat surfaces to achieve the necessary precision for tight shut-off connection.

DOUBLE-BLOCK- AND-BLEED FEATURE

The trunnion mounted ball valve provides a seal against pressure from both ends of the valve thereby isolating the cavity between the ball and the valve body. The cavity can now be manually relieved of any liquid to test for leakage.

PRESSURE RELIEF FEATURE

To provide a safety system to ensure that the cavity doesn't become over pressured, the valve seat is designed to relieve automatically the extra cavity pressure to the downstream side.
In addition to this, an automatic relief valve is mounted on the body to relieve extra pressure from the cavity.

STEM RETENTION DESIGN

This feature ensures that the stem does not eject under any internal pressure condition or if the packing gland components and/or valve operator mounting components are removed while the valve is under pressure, without the stem being pushed out (blown out).

PROTECTIVE VALVE STEM DESIGN

A thrust force on a ball valve referes to the force exerted on the valve stem due to the pressure differential across the valve. The ball positioning is supported by the upper/lower cover, due to this design, the thrust force will not affect the valve stem. In addition to this, the valve stem is made of hight strength corrosion-resistant steel to ensure the stem reliability under extreme working conditions. To imporve abrasion resistance, the contact surface between the ball and the upper/lower covers are hardfaced with tungestan carbide (TC).

VALVE SEAT SPRING STRUCTURE

Under high temperature conditions, thermal deformation will cause expansion between the valve body and the seat, which may cause the valve to fail to open.The FZV uses a spring-loaded design to provide the initial sealing force for the sealing surface, and can absorb thermal expansion caused by temperature changes to ensure the adaptability of the valve at high temperatures.

SPRING DUST PROTECTION FUNCTION

The spring chamber is protected by graphite retainer to prevent granular medium from entering the spring chamber, prevent spring failure and ensure reliable sealing.

FIRE SAFE AND ANTI-STATIC FEATURE

The metal-seated ball valve basically meets fire safe feature as the sealing is provided by metal-to-metal contact area between ball and the seats, the stem housing is sealed by a set of packing, and the body-cover joint is sealed by the spiral wound gasket which has high melting point about 1000°C. The metal-seated ball valve has basically anti-static feature. The reason behind is that due to having metal contact between the valve parts (Ball-Seat, Stem-Body), static electricity is never generated.

RELIABLE PACKING SEAL STRUCTURE

The valve stem adopts V-type packing seal structure. V-type packing can effectively transform the pressing force of the packing gland into the sealing force of the valve stem.
The traditional packing gland is changed to the two-piece structural design of the gland flange and the gland ring.The gland flange and the gland ring adopt spherical contact to ensure that the gland ring is always vertical, and the guide bushing is set inside the gland ring, which avoids the abrasion and wear of the gland ring, and reduces the operating torque of the valve.
According to the needs of working conditions, the spring lock washer loaded packing mechanism can be used to ensure that the valve can still ensure the sealing performance of the valve stem packing after a long time of use.

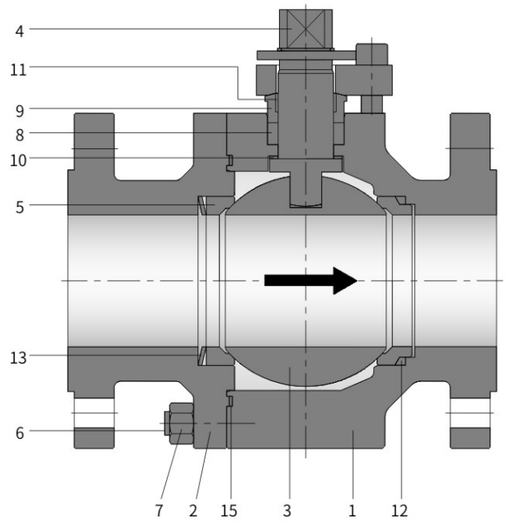
FLANGE ISO 5211

The manual valve is designed with flange ISO5211 in the top of the valve, which is provided to install the worm gear or electric and pneumatic actuators.

STEM LIMIT POSITION

The trunnion mounted ball valve operates by the lever, gearbox or actuator. In addition to any method of operation has a mechanism to limit the stem positioning, the valve stem itself is designed with a feature of limit positioning and preventing over-rotation even after removing an operator device.

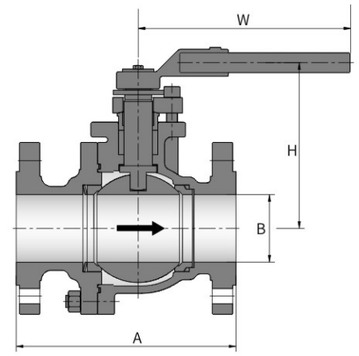
METAL SEAL FLOATING BALL VALVE STRUCTURE EXAMPLE

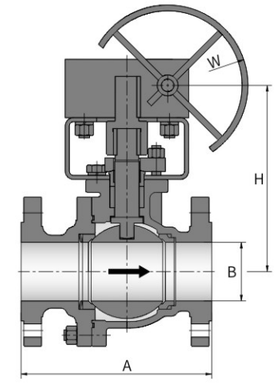


MATERIAL SELECTION

SERIAL	NAME	MATERIAL		
		STAINLESS STEEL	CARBON STEEL	CHROME-MOLYBDENUM STEEL
1	Body	ASTM A182 F316/F51	ASTM A105	ASTM A182 F22
2	Bonnet	ASTM A182 F316/F51	ASTM A105	ASTM A182 F22
3	Ball	ASTM A182 F316, F51+Ni60\Tungsten carbide\Chromium carbide\STL		
4	Stem	ASTM A564 17-4PH/ASTM A182 F53/ASTM A479 XM-19		
5	Seat	ASTM A182 F316, F51+Ni55\Tungsten carbide\Chromium carbide\STL		
6	Stud	ASTM A193 Cr.B8M	ASTM A193 Gr.B7	ASTM A193 Gr.B16
7	Nut	ASTM A194 Cr.8M	ASTM A194 Gr.2H	ASTM A194 Gr.4
8	Packing	Flexible graphite		
9	Packing bushing	Stainless steel	Carbon steel	Chrome-molybdenum steel
10	Thrust gasket	Stainless steel + hard surface		
11	Stem bearing	Stainless steel + hard surface		
12	Valve seat sealed ring	Flexible graphite	Flexible graphite	Flexible graphite
12a	Spring support ring	ASTM A182 F316/F51		
13	Spring	Inconel X-750		
14	Lower cover	ASTM A182 F316/F51	ASTM A105	ASTM A182 F22
15	Gasket	316+Flexible graphite		

CASTING STEEL METAL SEATED FLOATING BALL VALVE MAIN DIMENSIONS AND WEIGHT





Class 150						Class 300					
NPS inch	A mm	B mm	W mm	H mm	WT kg	NPS inch	A mm	B mm	W mm	H mm	WT kg
1/2	108	13	150	80	2.5	1/2	140	13	260	106	3.5
3/4	117	19	230	85	3.2	3/4	152	19	300	108	4.5
1	127	25	250	100	5.6	1	165	25	300	129	7
1-1/2	165	38	330	110	7.2	1-1/2	191	38	380	163	11
2	178	49	350	130	9.8	2	216	49	430	165	16
3	203	74	400	180	20	*3	283	74	460	312	36
*4	229	100	460	315	35	*4	305	100	460	322	60
*6	394	150	460	395	96	*6	403	150	600	513	118

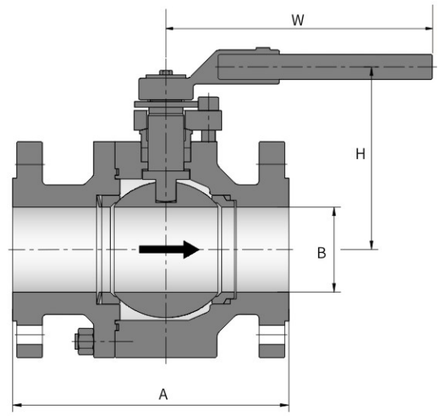
*Gear device

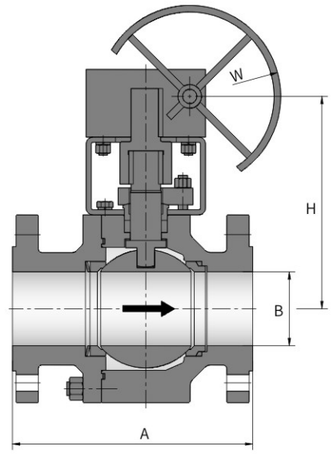
Class 600						Class 900					
NPS inch	A mm	B mm	W mm	H mm	WT kg	NPS inch	A mm	B mm	W mm	H mm	WT kg
1/2	165	13	320	106	5	1/2	216	13	350	110	7
3/4	191	19	320	110	7	3/4	229	19	450	140	11
1	216	25	430	160	11	1	254	25	500	165	20
1-1/2	241	38	350	180	20	1-1/2	305	38	460	250	28
*2	292	49	350	277	33	2	368	49	460	285	38
*3	356	74	460	335	45						
*4	432	100	600	345	76						
*6	559	150									

*Gear device

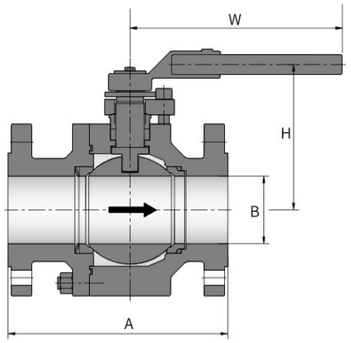
Class 1500						Class 2500					
NPS inch	A mm	B mm	W mm	H mm	WT kg	NPS inch	A mm	B mm	W mm	H mm	WT kg
1/2	216	13	350	110	7	1/2	264	13	450	138	10
3/4	229	19	450	140	11	*3/4	273	19	460	225	21
1	254	25	500	165	20	*1	308	25	460	240	32
*1-1/2	305	38	460	250	28						
*2	368	49	460	285	38						

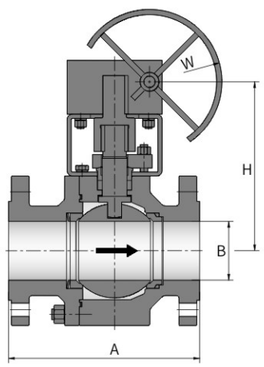
*Gear device





FORGING STEEL METAL SEATED FLOATING BALL VALVE MAIN DIMENSIONS AND WEIGHT





Class 150						Class 300					
NPS inch	A mm	B mm	W mm	H mm	WT kg	NPS inch	A mm	B mm	W mm	H mm	WT kg
1/2	108	13	150	98	2.7	1/2	140	13	260	110	4
3/4	117	19	230	100	3.2	3/4	152	19	300	103	6
1	127	25	245	138	6	1	165	25	300	103	10
1-1/2	165	38	300	160	12	1-1/2	191	38	380	127	18
2	178	49	350	165	15	2	216	49	400	145	22
3	203	74	400	193	22	*3	283	74	350	252	38
*4	229	100	460	305	46	*4	305	100	460	302	78
*6	394	150	460	360	110	*6	403	150	600	500	150

*Gear device

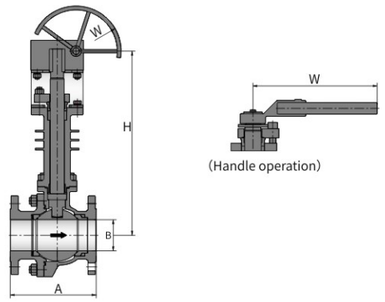
Class 600						Class 900					
NPS inch	A mm	B mm	W mm	H mm	WT kg	NPS inch	A mm	B mm	W mm	H mm	WT kg
1/2	165	13	320	97	7.5	1/2	216	13	350	110	10
3/4	191	19	320	103	11	3/4	229	19	450	140	16
1	216	25	430	160	16	1	254	25	500	165	22
1-1/2	241	38	466	170	25	1-1/2	305	38	350	260	32
*2	292	49	350	250	30	2	368	49	460	265	42
*3	356	74	460	315	52						
*4	432	100	600	325	82						
*6	559	150									

*Gear device

Class 1500						Class 2500					
NPS inch	A mm	B mm	W mm	H mm	WT kg	NPS inch	A mm	B mm	W mm	H mm	WT kg
1/2	216	13	350	110	10	1/2	264	13	450	138	13
3/4	229	19	450	140	16	*3/4	273	19	460	225	27
1	254	25	500	165	22	*1	308	25	460	240	42
*1-1/2	305	38	350	260	32						
*2	368	49	460	265	42						

*Gear device

HIGH TEMPERATURE METAL SEATED FLOATING BALL VALVE MAIN DIMENSIONS AND WEIGHT



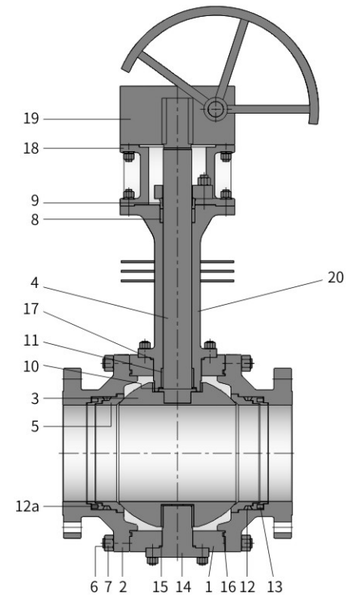
Class 150						Class 300					
NPS inch	A mm	B mm	W mm	H mm	WT kg	NPS inch	A mm	B mm	W mm	H mm	WT kg
1/2	108	13	150	310	7.5	1/2	140	13	260	310	8.5
3/4	117	19	230	360	8.5	3/4	152	19	300	360	9.5
1	127	25	250	382	11	1	165	25	300	382	12
1-1/2	165	38	330	430	13	1-1/2	191	38	380	430	16
2	178	49	350	460	15	2	216	49	430	460	22
*3	203	74	350	523	26	*3	283	74	460	567	42
*4	229	100	460	575	43	*4	305	100	460	585	67
*6	394	150	460	600	104	*6	403	150	600	610	126

Class 600						Class 900					
NPS inch	A mm	B mm	W mm	H mm	WT kg	NPS inch	A mm	B mm	W mm	H mm	WT kg
1/2	165	13	320	315	12.5	1/2	216	13	350	320	15
3/4	191	19	320	365	16	3/4	229	19	450	370	21
1	216	25	430	385	21	1	254	25	500	385	27
1-1/2	241	38	466	440	31	*1-1/2	305	38	350	510	41
*2	292	49	350	530	38	*2	368	49	460	540	50
*3	356	74	460	620	58						
*4	432	100	600	635	90						
*6	559	150									

Class 1500						Class 2500					
NPS inch	A mm	B mm	W mm	H mm	WT kg	NPS inch	A mm	B mm	W mm	H mm	WT kg
1/2	216	13	350	320	15	1/2	264	13	450	340	18
3/4	229	19	450	370	21	*3/4	273	19	460	440	37
1	254	25	500	385	27	*1	308	25	460	460	49
*1-1/2	305	38	350	510	41						
*2	368	49	460	540	50						

*Gear device

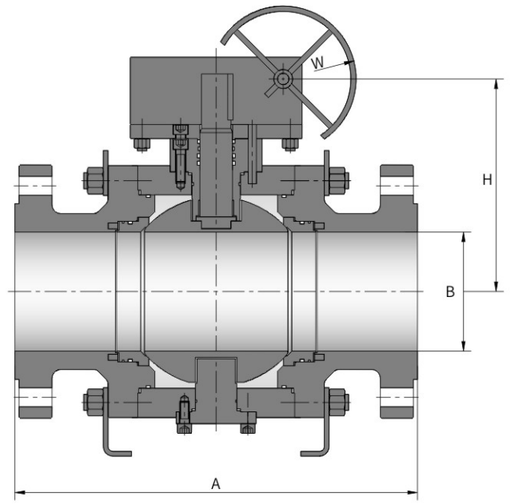
METAL SEATED TRUNNION MOUNTED BALL VALVE STRUCTURE EXAMPLE



MATERIAL SELECTION

SERIAL	NAME	MATERIAL		
		STAINLESS STEEL	CARBON STEEL	CHROME-MOLYBDENUM STEEL
1	Body	ASTM A182 F316/F51	ASTM A105	ASTM A182 F22
2	Bonnet	ASTM A182 F316/F51	ASTM A105	ASTM A182 F22
3	Ball	ASTM A182 F316, F51+Ni60\Tungsten carbide\Chromium carbide\STL		
4	Stem	ASTM A564 17-4PH/ASTM A182 F53/ASTM A479 XM-19		
5	Seat	ASTM A182 F316、F51+Ni55\Tungsten carbide\Chromium carbideSTL		
6	Stud	ASTM A193 Cr.B8M	ASTM A193 Gr.B7	ASTM A193 Gr.B16
7	Nut	ASTM A194 Cr.8M	ASTM A194 Gr.2H	ASTM A194 Gr.4
8	Packing	Flexible graphite		
9	Packing bushing	Stainless steel	Carbon steel	Chrome-molybdenum steel
10	Thrust gasket	Stainless steel + hard surface		
11	Stem bearing	Stainless steel + hard surface		
12	Valve seat sealed ring	Flexible graphite	Flexible graphite	Flexible graphite
12a	Spring support ring	ASTM A182 F316/F51		
13	Spring	Inconel X-750		
14	Lower cover	ASTM A182 F316/F51	ASTM A105	ASTM A182 F22
15	Gasket	316+Flexible graphite		
16	Gasket	316+Flexible graphite		
17	Gasket	316+Flexible graphite		
18	Unityoke	WCB/A36		
19	Gear	Assembling		
20	Upper cover	ASTM A182 F316/F51	ASTM A105	ASTM A182 F22

FORGING STEEL METAL SEATED TRUNNION MOUNTED BALL VALVE MAIN DIMENSIONS AND WEIGHT

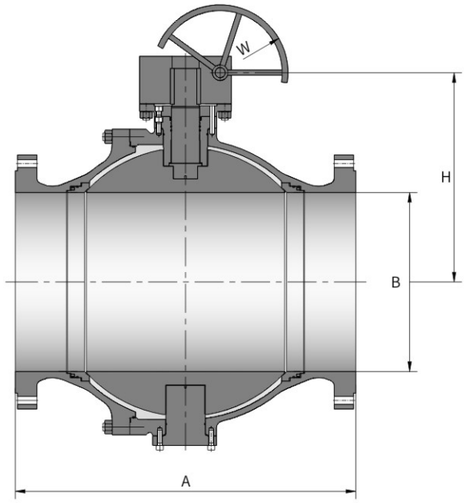


Class 150						Class 300					
NPS inch	A mm	B mm	H mm	W mm	WT kg	NPS inch	A mm	B mm	H mm	W mm	WT kg
2	178	49	170	300	20	2	216	49	170	300	25
3	203	74	193	300	40	3	283	74	193	300	48
4	229	100	203	350	58	4	305	100	203	350	73
6	394	150	260	460	154	6	403	150	266	460	175
8	457	201	315	460	270	8	502	201	315	460	327
10	533	252	360	600	462	10	568	252	360	600	408
12	610	303	420	600	646	12	648	303	386	600	735
14	686	334	460	600	958	14	762	334	460	600	1162
16	762	385	500	600	1248	16	838	385	500	600	1492
18	864	436	550	600	1440	18	914	436	550	600	1752
20	914	487	600	750	1960	20	991	487	600	750	2695
24	1067	589	680	750	2810	24	1143	589	705	750	3210
28	1245	684	750	750	4045	28	1346	684	820	750	4975
30	1295	735	790	750	4850	30	1397	735	870	750	5590
32	1372	779	870	750	5490	32	1524	779	930	750	6240
36	1524	874	1170	750	8950	36	1727	874	1240	750	10280

Class 600						Class 900					
NPS inch	A mm	B mm	H mm	W mm	WT kg	NPS inch	A mm	B mm	H mm	W mm	WT kg
2	292	49	165	350	36	2	368	49	165	350	53
3	356	74	225	350	60	3	381	74	235	350	88
4	432	100	230	460	110	4	457	100	261	460	132
6	559	150	273	460	260	6	610	150	302	460	305
8	660	201	334	460	465	8	737	201	420	600	560
10	787	252	450	600	750	10	838	252	467	600	858
12	838	303	512	600	1090	12	965	303	495	600	1343
14	889	334	546	600	1335	14	1029	322	506	600	1610
16	991	385	580	600	1810	16	1130	373	573	750	2525
18	1092	436	605	750	2500	18	1219	423	658	750	2870
20	1194	487	664	750	3000	20	1321	471	710	750	3480
24	1397	589	800	750	5000	24	1549	570	850	750	7030
28	1549	684	850	750	6100	28	1753	665	930	750	10200
30	1651	735	910	750	7800	30	1880	712	980	750	12400
32	1778	779	970	750	9940	32	2032	760	1040	750	14200
36	2083	874	1300	750	13530	36	2286	855	1120	750	18100

Class 1500						Class 2500					
NPS inch	A mm	B mm	H mm	W mm	WT kg	NPS inch	A mm	B mm	H mm	W mm	WT kg
2	368	49	170	350	67	2	451	42	240	460	132
3	470	74	240	460	140	3	578	62	265	600	235
4	546	100	280	460	200	4	673	87	300	600	385
6	705	144	340	600	461	6	914	131	530	750	780
8	832	192	413	600	640	8	1022	179	560	750	1970
10	991	239	481	750	1210	10	1270	223	630	750	3140
12	1130	287	563	750	1592	12	1422	265	720	750	4260
14	1257	315	645	750	2260						
16	1384	360	690	750	3760						
18	1537	406	750	750	6400						
20	1664	454	820	750	8060						
24	1943	546	980	750	14550						

CASTING STEEL METAL SEATED TRUNNION MOUNTED BALL VALVE MAIN DIMENSIONS AND WEIGHT

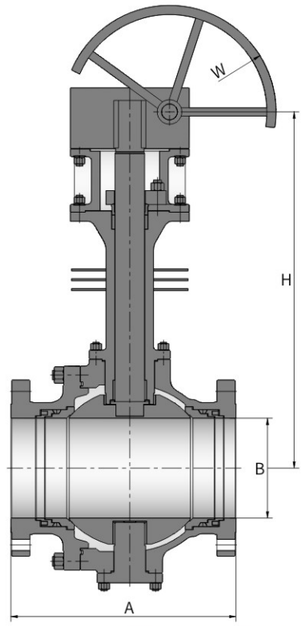


Class 150						Class 300					
NPS inch	A mm	B mm	H mm	W mm	WT kg	NPS inch	A mm	B mm	H mm	W mm	WT kg
2	178	49	185	300	23	2	216	49	185	300	27
3	203	74	195	300	40	3	283	74	200	300	43
4	229	100	215	350	57	4	305	100	216	350	102
6	394	150	280	460	100	6	403	150	278	460	200
8	457	201	330	460	172	8	502	201	410	460	246
10	533	252	385	600	284	10	568	252	445	600	308
12	610	303	425	600	494	12	648	303	485	600	515
14	686	334	460	600	592	14	762	334	517	600	612
16	762	385	567	600	805	16	838	385	585	600	1018
18	864	436	585	600	954	18	914	436	665	600	1181
20	914	487	675	750	1308	20	991	487	700	750	1352
24	1067	589	685	750	1656	24	1143	589	720	750	1906
28	1245	684	788	750	2409	28	1346	684	830	750	2890
30	1295	735	810	750	2686	30	1397	735	860	750	3230
32	1372	779	890	750	3096	32	1524	779	970	750	3800
36	1524	874	1170	750	4310	36	1727	874	1240	750	5080

Class 600						Class 900					
NPS inch	A mm	B mm	H mm	W mm	WT kg	NPS inch	A mm	B mm	H mm	W mm	WT kg
2	292	49	165	350	35	2	368	49	165	350	48
3	356	74	250	350	61	3	381	74	235	350	83
4	432	100	260	460	92	4	457	100	290	460	127
6	559	150	370	460	225	6	610	150	310	460	385
8	660	201	455	460	354	8	737	201	435	600	560
10	787	252	485	600	604	10	838	252	515	600	820
12	838	303	550	600	830	12	965	303	540	600	1025
14	889	334	565	600	1150	14	1029	322	565	600	1400
16	991	385	620	600	1550	16	1130	373	650	750	1830
18	1092	436	685	750	2145	18	1219	423	705	750	2330
20	1194	487	725	750	2864	20	1321	471	760	750	2930
24	1397	589	830	750	3696	24	1549	570	900	750	4760
28	1549	684	910	750	4060	28	1753	665	980	750	6090
30	1651	735	960	750	4530	30	1880	712	1030	750	6800
32	1778	779	1195	750	5350	32	2032	760	1090	750	8025
36	2083	874	1315	750	7110	36	2286	855	1220	750	10650

Class 1500						Class 2500					
NPS inch	A mm	B mm	H mm	W mm	WT kg	NPS inch	A mm	B mm	H mm	W mm	WT kg
2	368	49	186	350	48	2	451	42	250	460	106
3	470	74	256	460	105	3	578	62	280	600	196
4	546	100	286	460	165	4	673	87	330	600	325
6	705	144	350	600	385	6	914	131	560	750	700
8	832	192	455	600	580	8	1022	179	600	750	1770
10	991	239	525	750	950	10	1270	223	670	750	2650
12	1130	287	600	750	1340	12	1422	265	750	750	3720
14	1257	315	695	750	1750						
16	1384	360	745	750	2225						
18	1537	406	800	750	2845						
20	1664	454	880	750	4850						
24	1943	546	1045	750	7650						

HIGH TEMPERATURE METAL SEATED TRUNNION MOUNTED BALL VALVE MAIN SIZE AND WEIGHT

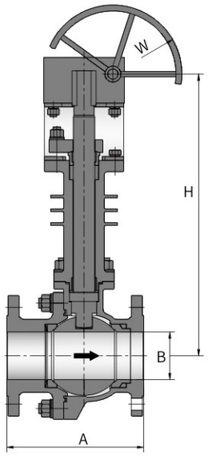


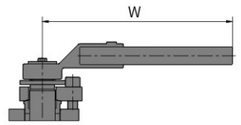
Class 150						Class 300					
NPS inch	A mm	B mm	H mm	W mm	WT kg	NPS inch	A mm	B mm	H mm	W mm	WT kg
2	178	49	450	300	40	2	216	49	450	300	42
3	203	74	490	300	55	3	283	74	490	300	58
4	229	100	530	350	70	4	305	100	530	350	137
6	394	150	650	460	120	6	403	150	650	460	240
8	457	201	816	460	197	8	502	201	820	460	290
10	533	252	920	600	314	10	568	252	925	600	355
12	610	303	1005	600	530	12	648	303	1015	600	595
14	686	334	1070	600	635	14	762	334	1090	600	705
16	762	385	1140	600	855	16	838	385	1160	600	1120
18	864	436	1220	600	1010	18	914	436	1250	600	1205
20	914	487	1300	750	1360	20	991	487	1330	750	1465
24	1067	589	1385	750	1726	24	1143	589	1425	750	2105
28	1245	684	1410	750	2480	28	1346	684	1450	750	3050
30	1295	735	1520	750	2870	30	1397	735	1570	750	3400
32	1372	779	1635	750	3180	32	1524	779	1685	750	3950
36	1524	874	1730	750	4410	36	1727	874	1780	750	5280

Class 600						Class 900					
NPS inch	A mm	B mm	H mm	W mm	WT kg	NPS inch	A mm	B mm	H mm	W mm	WT kg
2	292	49	470	350	55	2	368	49	495	350	63
3	356	74	520	350	83	3	381	74	560	350	100
4	432	100	615	460	125	4	457	100	700	460	155
6	559	150	750	460	270	6	610	150	890	460	430
8	660	201	880	460	405	8	737	201	960	600	610
10	787	252	1030	600	665	10	838	252	1100	600	880
12	838	303	1105	600	900	12	965	303	1180	600	1095
14	889	334	1180	600	1230	14	1029	322	1265	600	1480
16	991	385	1250	600	1540	16	1130	373	1350	750	1920
18	1092	436	1360	750	2245	18	1219	423	1460	750	2430
20	1194	487	1430	750	2865	20	1321	471	1530	750	3040
24	1397	589	1525	750	3810	24	1549	570	1625	750	4880
28	1549	684	1570	750	4180	28	1753	665	1670	750	6320
30	1651	735	1680	750	4650	30	1880	712	1780	750	6930
32	1778	779	1795	750	5480	32	2032	760	1895	750	8155
36	2083	874	1890	750	7250	36	2286	855	1990	750	11900

Class 1500						Class 2500					
NPS inch	A mm	B mm	H mm	W mm	WT kg	NPS inch	A mm	B mm	H mm	W mm	WT kg
2	368	49	495	350	63	2	451	42	515	460	136
3	470	74	580	460	125	3	578	62	600	600	235
4	546	100	725	460	195	4	673	87	765	600	370
6	705	144	920	600	430	6	914	131	960	750	760
8	832	192	990	600	630	8	1022	179	1040	750	1840
10	991	239	1130	750	1010	10	1270	223	1180	750	2730
12	1130	287	1220	750	1410	12	1422	265	1280	750	3820
14	1257	315	1305	750	1830						
16	1384	360	1390	750	2315						
18	1537	406	1510	750	2945						
20	1664	454	1580	750	4960						
24	1943	546	1675	750	7780						

ULTRA-HIGH TEMPERATURE METAL SEATED FLOATING BALL VALVE MAIN DIMENSIONS AND WEIGHT





(Handle operation)

Class 150						Class 300					
NPS inch	A mm	B mm	W mm	H mm	WT kg	NPS inch	A mm	B mm	W mm	H mm	WT kg
1/2	108	13	150	310	7.5	1/2	140	13	260	310	8.5
3/4	117	19	230	360	8.5	3/4	152	19	300	360	9.5
1	127	25	250	382	11	1	165	25	300	382	12
1-1/2	165	38	330	430	13	1-1/2	191	38	380	430	16
2	178	49	350	460	15	2	216	49	430	460	22
*3	203	74	350	523	26	*3	283	74	460	567	42
*4	229	100	460	575	43	*4	305	100	460	585	67
*6	394	150	460	600	104	*6	403	150	600	610	126

*Gear device

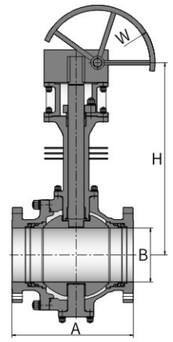
Class 600						Class 900					
NPS inch	A mm	B mm	W mm	H mm	WT kg	NPS inch	A mm	B mm	W mm	H mm	WT kg
1/2	165	13	320	315	12.5	1/2	216	13	350	320	15
3/4	191	19	320	365	16	3/4	229	19	450	370	21
1	216	25	430	385	21	1	254	25	500	385	27
1-1/2	241	38	466	440	31	*1-1/2	305	38	350	510	41
*2	292	49	350	530	38	*2	368	49	460	540	50
*3	356	74	460	620	58						
*4	432	100	600	635	90						
*6	559	150									

*Gear device

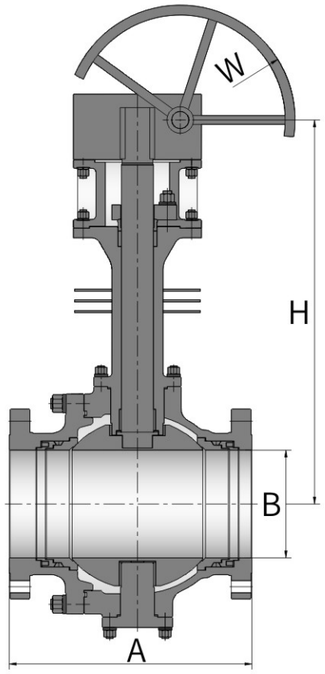
Class 1500						Class 2500					
NPS inch	A mm	B mm	W mm	H mm	WT kg	NPS inch	A mm	B mm	W mm	H mm	WT kg
1/2	216	13	350	320	15	1/2	264	13	450	340	18
3/4	229	19	450	370	21	*3/4	273	19	460	440	37
1	254	25	500	385	27	*1	308	25	460	460	49
*1-1/2	305	38	350	510	41						
*2	368	49	460	540	50						

*Gear device

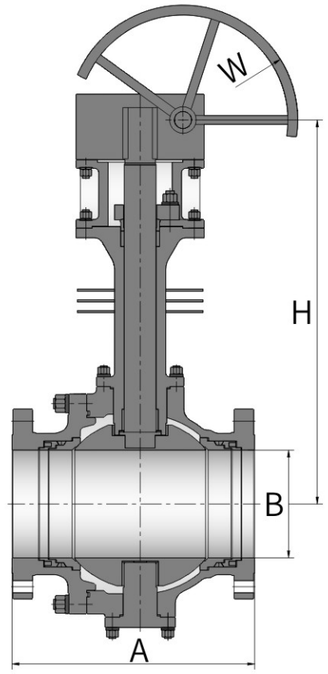
ULTRA-HIGH TEMPERATURE METAL SEATED TRUNNION MOUNTED BALL VALVE MAIN DIMENSIONS AND WEIGHT



Class 150						Class 300					
NPS inch	A mm	B mm	H mm	W mm	WT kg	NPS inch	A mm	B mm	H mm	W mm	WT kg
2	178	49	450	300	40	2	216	49	450	300	42
3	203	74	490	300	55	3	283	74	490	300	58
4	229	100	530	350	70	4	305	100	530	350	137
6	394	150	650	460	120	6	403	150	650	460	240
8	457	201	816	460	197	8	502	201	820	460	290
10	533	252	920	600	314	10	568	252	925	600	355
12	610	303	1005	600	530	12	648	303	1015	600	595
14	686	334	1070	600	635	14	762	334	1090	600	705
16	762	385	1140	600	855	16	838	385	1160	600	1120
18	864	436	1220	600	1010	18	914	436	1250	600	1205
20	914	487	1300	750	1360	20	991	487	1330	750	1465
24	1067	589	1385	750	1726	24	1143	589	1425	750	2105
28	1245	684	1410	750	2480	28	1346	684	1450	750	3050
30	1295	735	1520	750	2870	30	1397	735	1570	750	3400
32	1372	779	1635	750	3180	32	1524	779	1685	750	3950
36	1524	874	1730	750	4410	36	1727	874	1780	750	5280



Class 600						Class 900					
NPS inch	A mm	B mm	H mm	W mm	WT kg	NPS inch	A mm	B mm	H mm	W mm	WT kg
2	292	49	470	350	55	2	368	49	495	350	63
3	356	74	520	350	83	3	381	74	560	350	100
4	432	100	615	460	125	4	457	100	700	460	155
6	559	150	750	460	270	6	610	150	890	460	430
8	660	201	880	460	405	8	737	201	960	600	610
10	787	252	1030	600	665	10	838	252	1100	600	880
12	838	303	1105	600	900	12	965	303	1180	600	1095
14	889	334	1180	600	1230	14	1029	322	1265	600	1480
16	991	385	1250	600	1540	16	1130	373	1350	750	1920
18	1092	436	1360	750	2245	18	1219	423	1460	750	2430
20	1194	487	1430	750	2865	20	1321	471	1530	750	3040
24	1397	589	1525	750	3810	24	1549	570	1625	750	4880
28	1549	684	1570	750	4180	28	1753	665	1670	750	6320
30	1651	735	1680	750	4650	30	1880	712	1780	750	6930
32	1778	779	1795	750	5480	32	2032	760	1895	750	8155
36	2083	874	1890	750	7250	36	2286	855	1990	750	11900



Class 1500						Class 2500					
NPS inch	A mm	B mm	H mm	W mm	WT kg	NPS inch	A mm	B mm	H mm	W mm	WT kg
2	368	49	495	350	63	2	451	42	515	460	136
3	470	74	580	460	125	3	578	62	600	600	235
4	546	100	725	460	195	4	673	87	765	600	370
6	705	144	920	600	430	6	914	131	960	750	760
8	832	192	990	600	630	8	1022	179	1040	750	1840
10	991	239	1130	750	1010	10	1270	223	1180	750	2730
12	1130	287	1220	750	1410	12	1422	265	1280	750	3820
14	1257	315	1305	750	1830						
16	1384	360	1390	750	2315						
18	1537	406	1510	750	2945						
20	1664	454	1580	750	4960						
24	1943	546	1675	750	7780						