RISING STEM BALL VALVES CATALOGUE

TOP ENTRY RISING STEM FCA BR MODEL

FLOW CONTROL APPLICATIONS

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FCA - WORKING CLOSELY WITH YOU TO ACHIEVE EXCELLENCE

Even with the most careful and meticulous planning, the success of a project can only be assured with good execution after the contract is signed. **FCA** team of engineering designers, production specialists, logistics experts and process engineers, plays its role to ensure quality products, timely delivery, smooth start-up and plant optimization.

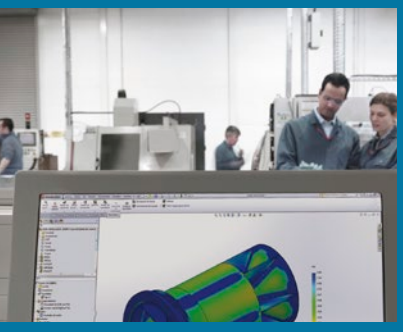
More and more customers trust our DNV certified solutions. **FCA** innovation-driven valves find solutions to any customer challenge or toughest application.

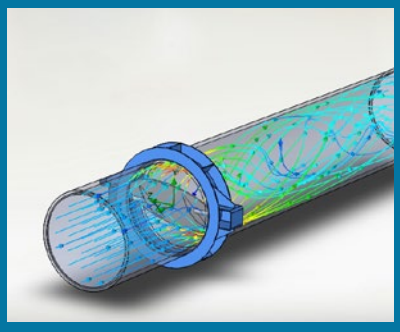
Our target-oriented dynamic team provides **FCA** with enough expertise to efficiently handle highly customized orders. Knowledge of how to manage our resources and capabilities ensures **FCA** to bring customers' expectations further.

Advanced software applications including Finite Element Analysis (FEA), computational fluid dynamics and three-dimensional solid modeling, and our proven know-how, help **FCA** designing high specification valves that meet the most demanding working requirements.

FCA aims partnering with major EPCs and End Users to develop innovative solutions for their valving needs. **FCA** specific capabilities include valve design; stress and finite element analysis; flow analysis; MAST and torque calculation; actuator sizing; testing and test data analysis; and validation of retrofit changes.

FCA offers a wide range of solutions for the toughest industry applications to meet each customer's requirements. This target is only achievable having a flexible multidisciplinary team focused on each customer's particular needs. **FCA** puts effort and makes sure that offers the most complete package assuring the highest quality.





WORLDWIDE

THERE WHERE OUR CUSTOMER IS

From a global vision of the sector and development dynamics of each country, **FCA** offers revolutionary supply alternatives to the customer, preserving the quality from its full design in Ibarra (Spain). Thanks to innovative applications, a professional team and its experience, **FCA** ensures quick response and results tailored to the needs of the customers anywhere in the world.

Its international service network is geared towards local attention in order provide flexible, close and customized solutions; getting so successful responses to new market needs and continuing to expand the activity at a geographical and sectorial level.

FCA valves are used in a wide range of applications such as Hydro Power plants and dams, mineral processing, Oil and Gas, Chemical and Petrochemical plants, Pulp and Paper, Steel industry, Thermal Power plants, Water treatment, Water distribution and Water pump stations as principal applications. Oriented according to main **OIL & GAS, MINERALS**, **POWER** and **WATER** sectors.

FCA® OIL&GAS FCA® MINERALS FCA® POWER FCA® WATER

QUALITY

Due to the applications where our products are installed, our standards are highly demanding. **FCA** valves are engineered to meet most industry's or key player's requirements, providing full code compliance solutions.

FCA comply with ISO 9001-2000 quality standard, guaranteed and certified by DNV. Additionally, international certifications are met such as CE for Pressure Equipment Directive (97/23/EC), Directive 2006/42/EC for machinery, ATEX Directive 94/9/EC, GOST TR/CU, etc...

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SPECIFICATIONS AND STANDARDS

FCA Rising stem ball valves are specially engineered for heavy duty applications outstanding at high pressure working conditions, up to ASME Class 2500# and sizes up to 24''. The **BR** model valve solution ensures a perfect performance at primary and secondary sealing due to an accurate design concept at any size condisering soft and metal seated configurations. Ideal for applications where no leakage, energized seated and frequent operation valves are demanded, principally for the oil&gas industry.

BR model valve is designed to provide a frictionless sealing structure where the ball is detached from the seat by a linear movement before the rotation takes place. This unique and long life design significantly reduces valve wear and minimizes maintenance frequency. In addition, top entry design allows maintenance and visual inspection inside the valve without removing it from the pipeline.

Due to its linear operation, backseat is provided for the stem to prevent possible blowout and to allow packing replacement while the valve is under pressure at fully open position. For metal to metal seating designs, lapping technique is applied to Stellite seating surfaces to achieve a zero leakage characteristic.

FCA Ball valves come with a variety of end connections: Flanged type, as standard, comes with Raised Face (RF) according to ASME Class 150#, 300# and 600#, and with Ring-Type-Joint flanges (RTJ) for Class ratings of 900#, 1500# and 2500#. Buttwelded ends can also be supplied, with schedule according to customer specifications.

COVERING STANDARDS

FCA Ball Valves are mainly designed and manufactured according to API 6D "Specification for pipeline valves" and considering standards such as ASME BPVC "Boiler and Pressure Vesel Code", ASME B16.34 "Valves Flanged, Threaded and Welding Ends", ASME B16.10 "Face to Face dimensions of Flanged valves", ANSI B16.5 "Pipe Flanges and Flanged Fittings", ANSI B16.25 "Buttwelding Ends".

Other applied standards related to other requirements and testing are ANSI/API 607 "Fire Test for Soft-Seated Quarter Turn Valves", API 6FA "Specification for Fire Test for Valves", API 598 "Valve Inspection and Testing"...

GENERAL FEATURES

SECTORS

· Oil & Gas.
· Petrochemical plants.
· etc...

APPLICATIONS

· Molecular Sieve dehydratation switches.
· Meter isolation.
· Block and bypass.
· Steam and Gas.
· Product segregation.
· Dryer switching.
· etc...

FRICTION-FREE

Common ball valve sealing mechanism is based upon axial movement only. BR model rising stem design ensures a friction-free open and close as operating mechanism is based on a tilt-and-turn action which minimizes wear and reduces torque.

TOP ENTRY DESIGN

Maintenance and visual inspection inside the valve is allowed without removing it from the pipeline. If reparation is required, it can be done by removing the bonnet without any special tool.

SELF CLEANING OPERATION

The tilting operation movement before rotation causes high velocity flows around the sealing surface that flush away every foreign materials from the seat.

SINGLE SEAT

The single seated design avoids thermal expansion problems inside body cavity.

LONG LIFE

BR model ball valves are manufactured with high quality materials that reduce wear and corrosion to extend product life. Minimized maintenance and friction-free design favors the long life performance.

ZERO LEAKAGE

Seat tightness up to ANSI FCA-70-2 Class VI for metal seated valves is achieved with lapping technique over sealing surfaces of the ball and seat ring to ensure no seating leakage.

BACKSEAT

Backseat is provided for the stem to prevent possible blowout and to allow packing replacement while the valve is under pressure at fully open position.

MANUFACTURING PROGRAM

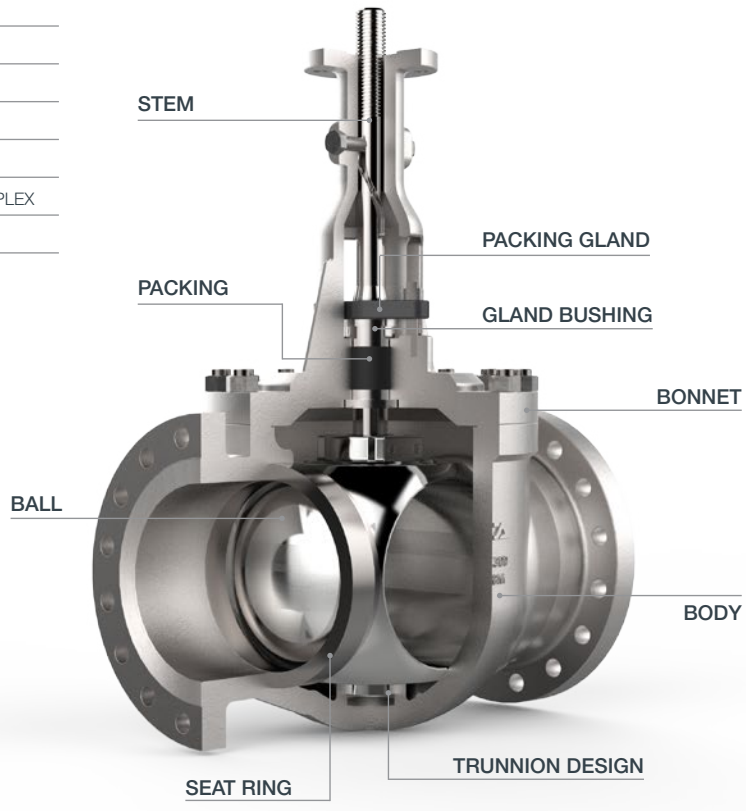
	CLASS	2''	3''	4''	6''	8''	10''	12''	14''	16''	18''	20''	24''
FCA BR Mod.	150#	●	●	●	●	●	●	●	●	●	●	●	●
	300#	●	●	●	●	●	●	●	●	●	●	●	●
	600#	●	●	●	●	●	●	●	●	●	●	●	●
	900#	●	●	●	●	●	●	●	●	●	●	●	●
	1500#	●	●	●	●	●	●	●	●				
	2500#	●	●	●	●	●							

GENERAL MATERIALS

BODY	CARBON STEEL / STAINLESS STEEL / ALLOY STEEL / DUPLEX
BALL	CARBON STEEL / STAINLESS STEEL / ALLOY STEEL / DUPLEX
SEAT RING	STAINLESS STEEL / ALLOY STEEL / DUPLEX
SEAT	TEFLON / METAL-METAL (STELLITE)
STEM	STAINLESS STEEL / ALLOW STEEL
PACKING	GRAPHITE / PTFE
O-RING	VITON / NBR
BUSHING	PTFE / METAL+PTFE / BRAIDED GRAPHITE
BONNET	CARBON STEEL / STAINLESS STEEL / ALLOY STEEL / DUPLEX
BOLTING	B7 / B7M / B8 / B8M / L7

ENP Overlay for internal surfaces.

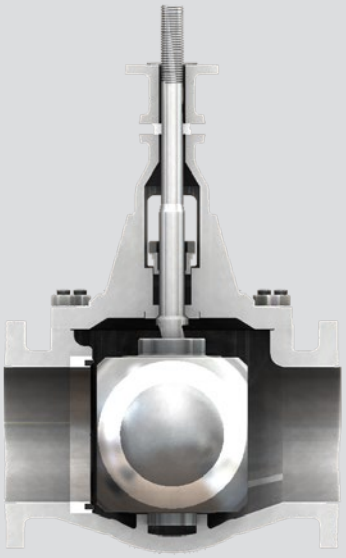
Special applications available under request.



OPERATING PRINCIPLE

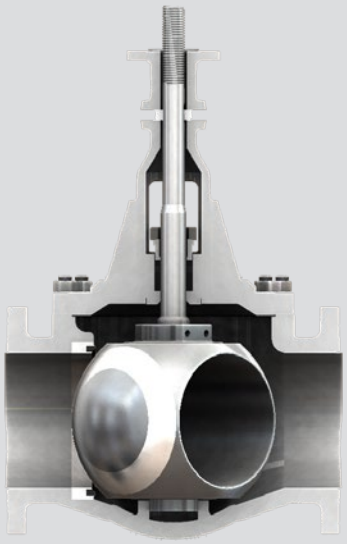
FCA BR rising steam ball valve performs a tilt-and-turn operation mechanism that eliminates sealing friction during open and close. In addition, torques are minimized and valve life is increased while maintenance is reduced.

This design also provides an energized seating action to asures a zero leakage tight sealing of the valve.



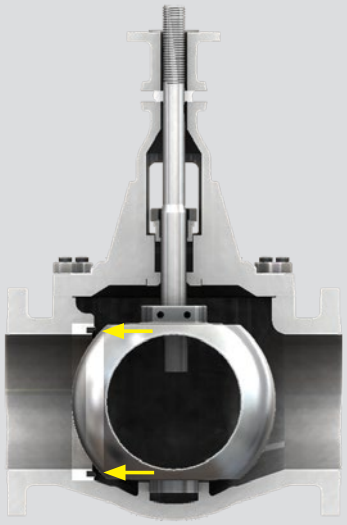
OPEN POSITION

In the fully open position, valve provides a clear through conduit. At this position the stem is raised to its maximum limit and there is no contact between ball and seat. At this point backseat can be reached to repack the valve even if it's under pressure.



OPEN TO CLOSE POSITION

To close the valve the stem should be turned in clockwise direction. The interaction between precision helical guideway and guide pin makes the stem and ball rotate synchronously up to 90º. There still no contact between the ball and seat during this movement avoiding any damage to the sealing surface.



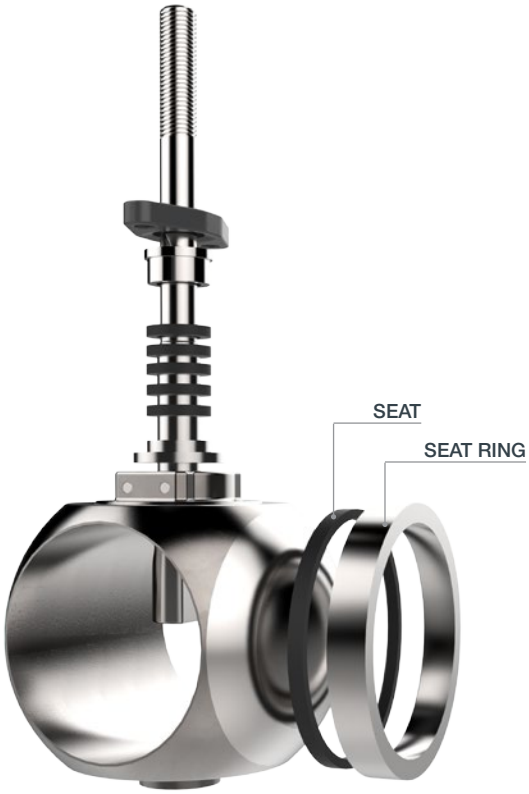
CLOSED POSITION

Once the ball has turned 90º the stem stops its rotation and continue with its linear movement, thus to make the ball and valve seat closely contacted. This last movement of the ball towards the seat achieves a positive sealing when the valve is fully closed.

SOFT AND METAL SEATED VALVES

FCA offers a wide range of seat materials to guarantee zero leakage for high pressure at different operation temperature applications.

Metal seated **FCA** valves are suitable for tough applications such as high temperature and abrasive services, corrosive fluids, slurry, etc... In these cases, Stellite 6 or Tungsten Carbide coatings may be applied on ball and seats to ensure component hardness and assure seating. This makes the seat design more durable and able to achieve Class V and Class VI leakage classes.



STEM

Valves are provided with one piece forged and threaded stems. Are accuratelly machined and finally smoothed in order to minimize friction and reduce torque. The design also allows the gate to self-align, eliminating the possibility of a bent stem jamming it. The conical raised surface design presses the seat against the bonnet backseat in the fully open position.

A special 90º helical guideway groove is machinned on the stem to provide the special tilt-and-turn operation mechanism.

LIVE LOAD PACKING AND LEAK-OFF

In services that requires frequent cycling or high pressure and temperature variations, live loading extends the service life between maintenance periods by less frequent gland packing adjustments. Belleville springs can be provided to give a constant packing gland stress.

For critical services, a lantern rign with leak-off fittings connection and double packing stack can be provided to allow collection of leakage from the lower packing set.

TOP FLANGE

The top flange standard can suit all kind of actuators such as gear box, electric, pneumatic or hidraulic cylinders, etc...

SEALANT INJECTION

Valve can be supplied with emergency sealant injectors that are located between the upper o-rings and the graphite packing gasket and in seat ring. This feature enables the injection of a viscous sealant as a security agent in case of sealing failure. This system mantains temporary valve sealing until maintenance takes place.

FIRE SAFE DESIGN

FCA BS, BT and BR ball valves are firesafe designed according to API 6FA and API 607.

In case of fire inside the valve, the nonmetal packing and soft seat will be burnt. Once the seat is melted, the ball will contact directly to the metal face of the seat ring, thus preventing medium leakage out from the burnt seat and avoiding fire spreading.

FULLY PIGGABLE

FCA through conduit gate valves are designed to be fully piggable with a circular bore design according to API 6D. Pigs, scrapers, wipers or gauges can be run through the valve without any damage to the internal structure of the valve.

ANTI-CORROSIVE TREATMENTS

As standard, iron or carbon steel components are painted with an anti-corrosive treatment, providing the necessary protection against corrosion and an excellent surface finish.

Painting consists of:

· Epoxy primer with excellent corrosive protection and adhesion on every type of metal.

· BLUE RAL-5019 painting.

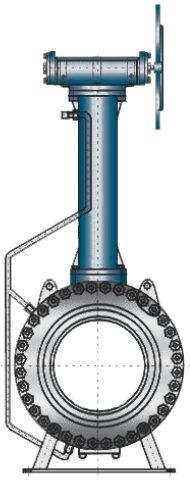
Depending on the valve application, FCA offers special treatments for specific abrasive and corrosive solutions like hardening, valve or component protective coating, etc... More information on request.

ANTI-STATIC DEVICE

While operating the valve, the friction between the ball (or stem) and a non metallic seat like PTFE may produce electrostatic charge that can be accumulated on the ball and can cause fire. To prevent static sparks, an anti-static device are placed to derive the accumulated electric charge.

EXTENDED STEM FOR BURIED SERVICE

Extension device may be provided for buried ball valves, which include valve stem extension, greasing valve and discharge valve. Will be designed according to customer specifications and length.



MATERIAL SELECTION

For material selection fluid type characteristic, pressure and working temperature shall be considered. FCA carries many years of experience with special materials such as duplex, superduplex, hastelloy, inconel, nickel alloys, etc... Moreover standard forged or casted steels are daily work standard for our engineers. Other materials could be considered and provided on request according to customer specifications.

For internal parts such as seat rings and ball, corrosion and wear resistant materials are considered in addition to pressure drop values and temperature working range specifications. Stainless steel materials are provided as standard, considering Stellite contribution for seat components, and hardened stainless steels for higher corrosion resistance.

The following table presents frequently used materials for FCA ball valves, generally selected for severe service working applications:

MATERIAL	**CASTED** (ASTM)	**FORGED** (ASTM)
Carbon Steel	A216 Gr. WCB	A105
Stainless Steel	A351 Gr. CF8 / CF8M	A182 F316
Duplex Steel	A890 Gr. 4A	A182 F51
Superduplex Steel	A890 Gr. 5A / Gr. 6A	A182 F53 / F55
Inconel	-	Alloy 718

*Other materials on request.

SEALING MATERIALS

FCA Soft seated Ball Valves commonly used sealing materials, and depending on the application and working conditions, are VITON, PTFE, RPTFE, PCTFE, NYLON, MOLON, DEVLON, PEEK. Other materials on request.

ACTUATION DEVICES

All valves are available with different actuators. FCA has close cooperation with many world leader actuator manufactories and can offer a wide variety of interchangeable actuators:

· Bevel gear - handwheel.
· Electric motor.
· Pneumatic cylinder.
· Hydraulic cylinder.





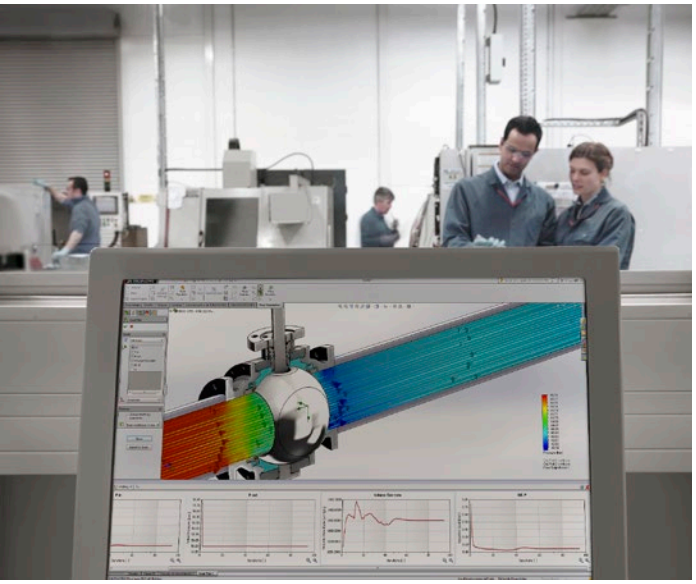
Cv FLOW COEFFICIENT VALUES

Cv is known as flow coefficient value of a valve. This coefficient Cv is related to the flow and pressure conditions by the following basic liquid equation:

$$Cv=Q^*(SG/\Delta P)^{1/2}$$

It is a relative measure of valves efficiency at allowing fluid flow. Q determines the flow rate (in gpm), SG refers to fluid specific gravity and Pressure drop is considered in psi. It describes the relationship between the pressure drop across the valve and the corresponding flow rate. In more practical terms, the flow coefficient Cv is the volume (in US gallons) of water at 60°F that will flow per minute through a valve with a pressure drop of 1 psi across the valve.

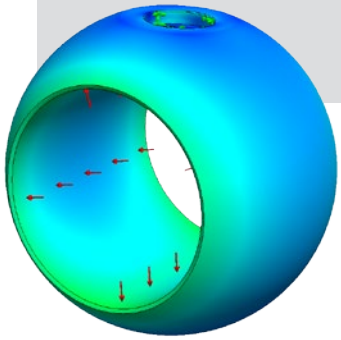
TYPE	CLASS	2''	3''	4''	6''	8''	10''	12''	14''	16''	18''	20''	24''
Full Bore BR Ball Valves	150#	400	1250	2300	4900	8500	14000	22000	28000	38000	51000	58000	86000
	300#	400	1200	2300	4850	8000	13000	20000	27000	37000	50000	58000	84000
	600#	350	1000	2000	4400	7500	12500	18000	26000	34500	50000	55000	84000
	900#	300	900	1900	4320	7000	11000	17500	24000	30000	47000	52000	80000
	1500#	300	850	1850	3750	6200	9500	16000	21000	28000	41000	45000	74000
	2500#	240	650	1320	2800	4800	8000	14000	-	-	-	-	-

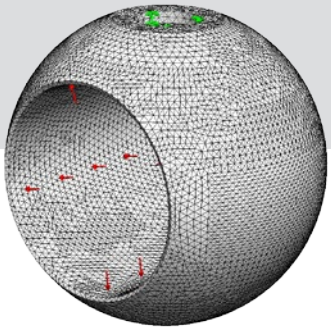


CAE ENGINEERING TOOLS

Advanced software applications including Finite Element Analysis (FEA), computational fluid dynamics (CFD) and three-dimensional solid modeling, and our proven know-how, help FCA designing high specification valves to meet most demanded working requirements.

FCA Ball valves are engineered to meet high pressure working conditions, up to Class 2500#, considering the most cost effective design. For this aim, parametric studies with finite element analysis are performed by FCA engineering team.





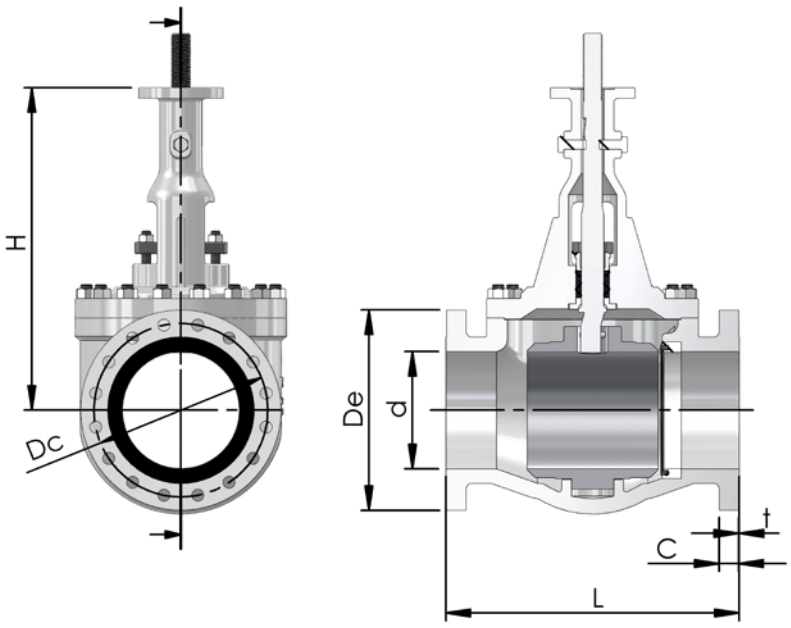
DRAWING AND DIMENSIONS

TOP ENTRY RISING STEM BALL VALVES
- FULL BORE BR MODEL

Standard version available form DN50/2'' to DN600/24'' and pressure rating up to Class 2500#. Other sizes and pressure on request.

ACCESORIES AND OPTIONS

· Switch indicator for manually operated valves.
· Locking devices.
· Anti-blow-out stem.
· Antistatic devices.
· Emergency sealant injectors.
· Backseat.
· Fire protection structure.
· Full and reduced bore design.
· Different end connections and flange drillings.



DIMENSIONS - CLASS 150# FULL BORE

SIZE		L			d	H	De	Dc	ØRF	Drilling	C	t
NPS	DN	RF	RTJ	BW								
2''	50	178	190.5	216	49	345	152	120.7	91.9	4-Ø19.1	15.8	1.6
3''	80	203	216	283	74	410	191	152.4	127	4-Ø19.1	19.1	1.6
4''	100	229	241	305	100	497	229	190.5	157.2	8-Ø19.1	23.9	1.6
6''	150	394	406.5	457	150	770	279	241.3	215.9	8-Ø22.2	25.4	1.6
8''	200	457	470	521	201	1010	343	298.5	269.7	8-Ø22.2	28.4	1.6
10''	250	533	546	559	252	1180	406	362	323.9	12-Ø25.4	30.2	1.6
12''	300	609.5	622	635	303	1400	483	431.8	381	12-Ø25.4	31.8	1.6
14''	350	686	698.5	762	334	1430	533	476.2	412.8	12-Ø28.6	35.1	1.6
16''	400	762	775	838	385	1650	597	539.8	469.9	16-Ø28.6	36.6	1.6
18''	450	864	876	914.5	436	1860	635	577.9	533.4	16-Ø31.8	39.6	1.6
20''	500	914.5	927	991	487	1910	699	635	584.2	20-Ø31.8	42.9	1.6
24''	600	1067	1079.5	1143	589	2020	813	749.3	692.2	20-Ø34.9	47.8	1.6

Notes: Dimensions in (mm). Flange drilling according to ASME B16.5

DIMENSIONS - CLASS 300# FULL BORE

SIZE		L			d	H	De	Dc	ØRF	Drilling	C	t
NPS	DN	RF	RTJ	BW								
2''	50	216	232	216	49	340	165	127	91.9	8-Ø19.1	22.4	1.6
3''	80	283	298	283	74	425	210	168.3	127	8-Ø22.2	28.4	1.6
4''	100	305	321	305	100	520	254	200.2	157.2	8-Ø22.2	31.8	1.6
6''	150	403	419	403	150	782	318	269.8	215.9	12-Ø22.2	36.6	1.6
8''	200	502	518	502	201	1102	381	330.2	269.7	12-Ø25.4	41.1	1.6
10''	250	568	584	568	252	1195	445	387.4	323.9	16-Ø28.6	47.8	1.6
12''	300	648	664	648	303	1440	521	450.9	381	16-Ø31.8	50.8	1.6
14''	350	762	787	762	334	1500	584	514.4	412.8	20-Ø31.8	53.8	1.6
16''	400	838	854	838	385	1680	648	571.5	469.9	20-Ø34.9	57.2	1.6
18''	450	914	930	914	436	1890	711	628.7	533.4	24-Ø34.9	60.5	1.6
20''	500	991	1010	991	487	1940	775	685.8	584.2	24-Ø34.9	63.5	1.6
24''	600	1143	1165	1143	589	2080	914	812.8	692.2	24-Ø41.3	69.9	1.6

Notes: Dimensions in (mm). Flange drilling according to ASME B16.5

DIMENSIONS - CLASS 600# FULL BORE

SIZE		L			d	H	De	Dc	ØRF	Drilling	C	t
NPS	DN	RF	RTJ	BW								
2''	50	292	295	292	49	380	165	127	91.9	8-Ø19.1	25.4	6.4
3''	80	356	359	356	74	455	210	168.3	127	8-Ø22.2	31.8	6.4
4''	100	432	435	432	100	550	273	215.9	157.2	8-Ø25.4	38.1	6.4
6''	150	559	562	559	150	820	356	292.1	215.9	12-Ø28.6	47.8	6.4
8''	200	660	664	660	201	1250	419	349.2	269.7	12-Ø31.8	55.6	6.4
10''	250	787	791	787	252	1315	508	431.8	323.9	16-Ø34.9	63.5	6.4
12''	300	838	841	838	303	1580	559	489	381	20-Ø34.9	66.5	6.4
14''	350	889	892	889	334	1820	603	527.1	412.8	20-Ø38.1	69.9	6.4
16''	400	991	994	991	385	1880	686	603.2	469.9	20-Ø41.3	76.2	6.4
18''	450	1092	1095	1092	436	2010	743	654.1	533.4	20-Ø44.5	82.6	6.4
20''	500	1194	1200	1194	487	2200	813	723.9	584.2	24-Ø44.5	88.9	6.4
24''	600	1397	1407	1397	589	2320	940	838.2	692.2	24-Ø50.8	101.6	6.4

Notes: Dimensions in (mm). Flange drilling according to ASME B16.5

DIMENSIONS - CLASS 900# FULL BORE

SIZE		L			d	H	De	Dc	ØRF	Drilling	C	t
NPS	DN	RF	RTJ	BW								
2''	50	368	371	368	49	395	216	165.1	91.9	8-Ø25.4	38.1	6.4
3''	80	381	384	381	74	465	241	190.5	127	8-Ø25.4	38.1	6.4
4''	100	457	460	457	100	590	292	235	157.2	8-Ø31.8	44.5	6.4
6''	150	610	613	610	150	840	381	317.5	215.9	12-Ø31.8	55.6	6.4
8''	200	737	740	737	201	1290	470	393.7	269.7	12-Ø38.1	63.5	6.4
10''	250	838	841	838	252	1385	546	469.9	323.9	16-Ø38.1	69.9	6.4
12''	300	965	968	965	303	1620	610	533.4	381	20-Ø38.1	79.2	6.4
14''	350	1029	1038	1029	322	1840	641	558.8	412.8	20-Ø41.3	85.9	6.4
16''	400	1130	1140	1130	373	1910	705	616	469.9	20-Ø44.5	88.9	6.4
18''	450	1219	1232	1219	423	2040	787	685.8	533.4	20-Ø50.8	101.6	6.4
20''	500	1321	1334	1321	471	2280	857	749.3	584.2	20-54	108	6.4
24''	600	1549	1568	1549	570	2430	1041	901.7	692.2	20-Ø66.7	139.7	6.4

Notes: Dimensions in (mm). Flange drilling according to ASME B16.5

DIMENSIONS - CLASS 1500# FULL BORE

SIZE		L			d	H	De	Dc	ØRF	Drilling	C	t
NPS	DN	RF	RTJ	BW								
2''	50	368	371	368	49	480	216	165.1	91.9	8-Ø25.4	38.1	6.4
3''	80	470	473	470	74	520	267	203.2	127	8-Ø31.8	47.8	6.4
4''	100	546	549	546	100	650	311	241.3	157.2	8-Ø34.9	53.8	6.4
6''	150	705	711	705	144	970	394	317.5	215.9	12-Ø38.1	82.6	6.4
8''	200	832	841	832	192	1340	483	393.7	269.7	12-Ø44.5	91.9	6.4
10''	250	991	1000	991	239	1485	584	482.6	323.9	12-Ø50.8	108	6.4
12''	300	1130	1146	1130	287	1720	673	571.5	381	16-Ø54	124	6.4
14''	350	1257	1276	1257	315	2010	749	635	412.8	16-Ø60.3	133.4	6.4

Notes: Dimensions in (mm). Flange drilling according to ASME B16.5

DIMENSIONS - CLASS 2500# FULL BORE

SIZE		L			d	H	De	Dc	ØRF	Drilling	C	t
NPS	DN	RF	RTJ	BW								
2''	50	451	545	451	42	540	235	171.5	91.9	8-Ø28.6	50.8	6.4
3''	80	578	584	578	62	630	305	228.6	127	8-Ø34.9	66.5	6.4
4''	100	673	683	673	87	710	356	273.1	157.2	8-Ø41.3	76.2	6.4
6''	150	914	927	914	131	1190	483	368.3	215.9	8-Ø54	108	6.4
8''	200	1022	1038	1022	179	1550	552	438.2	269.7	12-Ø54	127	6.4

Notes: Dimensions in (mm). Flange drilling according to ASME B16.5

NOTES

NOTES

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