



## 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.

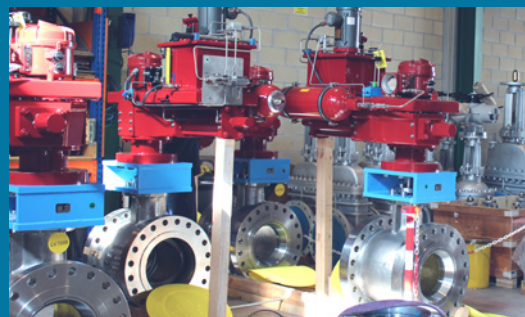
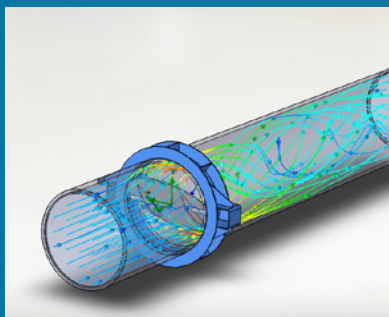
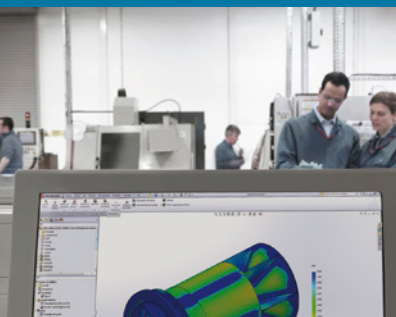
More and more customers trust our DNV certified solutions. **FCA** innovation-driven valves find solutions to any customer challenge or toughest application.

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 to 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.



## 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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GATE VALVES

- CLASS 600#
- CLASS 900#
- CLASS 1500#
- CLASS 2500#

# SPECIFICATIONS AND STANDARDS

Gate valves have an extended use in many industrial applications such as oil&gas, chemical and petrochemical plants, thermal applications, fertilizer plants, etc... They serve as on-off valves with bi-directional flow capacity and offers an straight-through unobstructed bore at full open position. Therefore, the head loss of the valve is small and provide a high flow rate capacity.

Metal to metal sealing design is available with different wedge configurations such as solid wedge, flexible wedge or with an splitted configuration wedge in order to best meet the specific service conditions. Parallel slide gate design is also available for more severe working thermal operations.

**SB** bolted bonnet design model ensures a perfect performance and sealing for pressure ratings up to ASME Class 1500#. For high sizes and pressure ratings up to 2500# **SP** Pressure seal bonneted desing model is available, performing a higher sealing force as internal pressure is increased.

**FCA** Gate 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** Gate Valves are mainly designed and manufactured according to API 600 "Bolted Bonnet Steel Gate 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". API 598 "Valve Inspection and Testing" is applied for valve testing.



# GENERAL FEATURES

## HIGHLIGHTS

- Design and Manufacture according to API 600.
- OS&Y Risign stem configuration.
- Solid, Flexible or split wedge design.
- Metal seated.
- Hardfacing coating with Stellite.
- Suitable for pigging operations.
- Forged T-Stem design.
- Handwheel, gearbox, electric, pneumatic or hydraulic actuation.
- Wide range of body, bonnet and trim materials.
- Extended stem availability.
- Bi-directional flow.
- Bolted or Pressure seal bonnet configuration.
- Two piece construction gland for better alignment.
- Bellows stem sealing on request.

## SECTORS

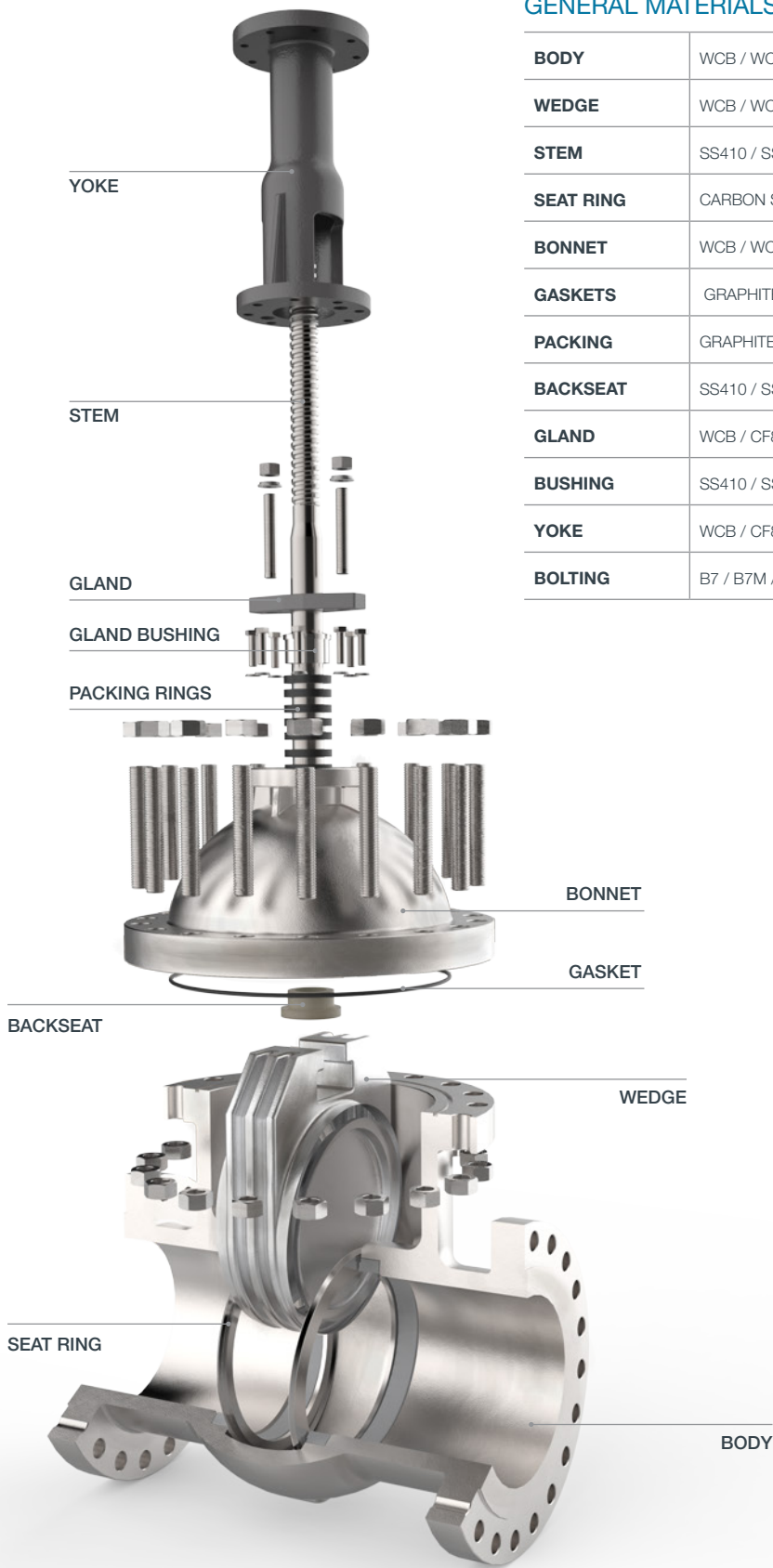
- Oil & Gas.
- Mineral Processing.
- Petrochemical plants.
- Thermal Power plants.
- Water distribution.
- Pump stations.
- etc...

## APPLICATIONS

- Natural Gas pipelines.
- Cogeneration.
- Combustion zone.
- Combined cycle.
- etc...

## MANUFACTURING PROGRAM

TYPE	CLASS	2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"	28"	30"	36"
Bolted bonnet API 600 design [SB Mod.]	150#	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	300#	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	600#	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	900#	●	●	●	●	●	●	●	●	●	●	●	●			
Pressure seal design [SP Mod.]	1500#	●	●	●	●	●	●	●	●	●	●	●	●			
	600#		●	●	●	●	●	●	●	●	●	●	●	●	●	●
	900#		●	●	●	●	●	●	●	●	●	●	●	●	●	●
	1500#		●	●	●	●	●	●	●	●	●	●	●	●	●	●
	2500#		●	●	●	●	●	●	●	●	●	●	●	●	●	●



GENERAL MATERIALS

BODY	WCB / WCC / A105 / LCB / LCC / LF2/ WC6 / CF8M / CF3M / F316 / F51 / F44
WEDGE	WCB / WCC / A105 / LCB / LCC / LF2/ WC6 / CF8M / CF3M / F316 / F51 / F44
STEM	SS410 / SS316 / SS630
SEAT RING	CARBON STEEL + STL 6 / STAINLESS STEEL+STL 6
BONNET	WCB / WCC / A105 / LCB / LCC / LF2/ WC6 / CF8M / CF3M / F316 / F51 / F44
GASKETS	GRAPHITE / SS304+GRAPHITE / VITON
PACKING	GRAPHITE / PTFE
BACKSEAT	SS410 / SS316 / SS630
GLAND	WCB / CF8 / LCB
BUSHING	SS410 / SS316 / SS630
YOKE	WCB / CF8 / LCB
BOLTING	B7 / B7M / B8 / B8M / L7

Stellite or tugnsten faced for seat ring and wedge availability.  
Special applications available under request.

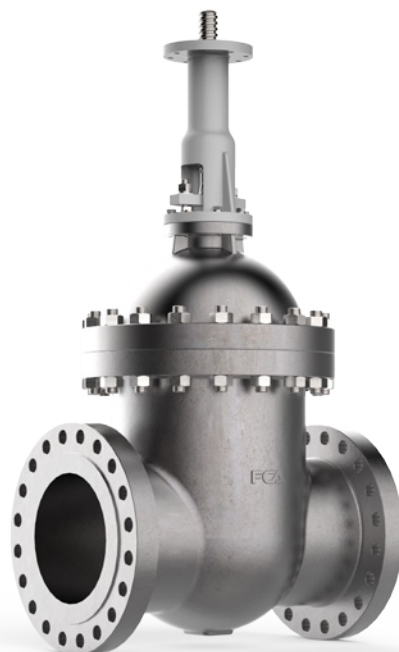
## BODY AND BONNET

**FCA** designed various body-bonnet constructions such as bolted bonnet, pressure seal design or welded bonnet.

Bodies and bonnets are high quality with uniform section cast and then precisely machined, offering high performance and preventing stress concentrations.

The bodies provide a straight through port that ensures minimal turbulences, reduces erosion effect and minimizes resistance to flow. Guide slots accommodate the wedge during opening or closing operations of the valve for accurate alignment and guidance.

Depending on the size of the valve, bonnets are made either of one piece only, the yoke being an integral part of the bonnet, or have two pieces. This ensures accurate alignment of the stem and a smooth operation.

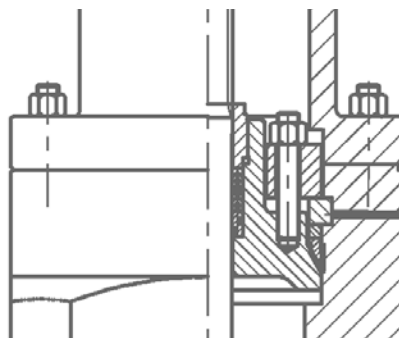


## BODY AND BONNET JOINT

Body and bonnet joints of **FCA** valves are designed with a more than adequate number of bonnet bolts. The standard joint varies, depending on valve Class. For Class 150# gate valves consist of a square joint or oval design depending on size. According to valve service it can be supplied flat-face gasket with graphite or PTFE. Class 300# and 600# valves consist of a circular spiral wound gasket. For class 900# and above consist of a ring type joint.

## PRESSURE SEAL BONNET DESIGN

In pressure seal bonnet designs the sealing is achieved through a graphite gasket that takes advantage of the internal pressure of the line. This configuration reduces the weight of the valve, since it avoids large diameter body bonnet connection flange and large size body-bonnet bolting.





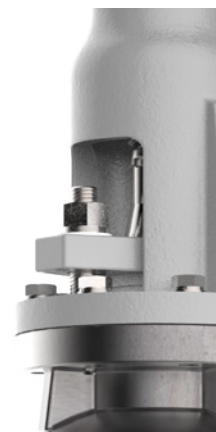
## OS&Y CONSTRUCTION

Outside Screw and Yoke construction (OS&Y) is used as standard for **FCA** gate valves. The yoke is designed in order to easily access valve stem.

## STEM

All wedges are provided with one piece forged and threaded stems. Are accurately machined and finally smoothed in order to minimize friction and reduce torque.

The wedge and stem union is reached by a T-shaped design that prevents stem disengaging itself from the wedge. The design also allows the wedge to self-align, eliminating the possibility of a bent stem jamming the wedge. The conical raised surface design presses the seat against the bonnet backseat in the fully open position.



## 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 ring with leak-off fittings connection and double packing stack can be provided to allow collection of leakage from the lower packing set.

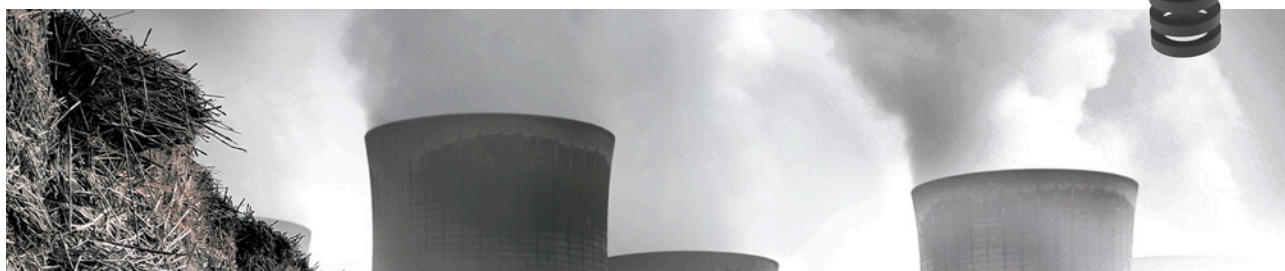


## BELLOWS

High-pressure resistance valve stem bellows can be provided to reduce external leakage and give a more reliable sealing. A zero fugitive emission system can be achieved by this configuration.

## BACKSEAT

**FCA** gate valves are provided with backseat threaded in the bonnet, or directly welded to the bonnet for pressure seal designs. This allows to change the packing even when the valve is under pressure.



## WEDGE

As standard flexible wedge design is featured on **FCA** gate valves unless otherwise specified. A selection of wedge types can be selected instead to match the specific operating service conditions.

The **flexible wedge** design is casted and machined with a circumferencial groove to allow the seating faces to move independently and adjust to movement of the body seats. Generally used for when line loads or thermal expansion is produced and can deform the seat face of the valve. Suited for steam or other high temperature services.

**Split wedge** design provides complete flexibility between the two halves of the wedge to compensate seat distorsions, specially in light weight and low pressure valves.

The **solid wedge** option is the strongest and simplest type selection. Offers a high resistance to corrosion and vibrations but the design do not compensate seat distorsions caused by thermal expansions or bending moments and may cause the wedge to stick in the seats.



## BY-PASS VALVE

A By-pass valve can be furnished with the cast steel valves for equalizing pressure around the main valve or for warning up the line before opening 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.

## 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 wedge, 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 gate 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.

## 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.





## TRIM NUMBER CHART

Different combinations of trim materials and hardenings are available according to API 600 Standard. the table below shows the trim number options for informational purposes only. Always consult current API publications to verify information and trim data.

API TRIM NUMBER	MATERIAL	SEAT	WEDGE	BACKSEAT	STEM
1	410	410	410	410	410
2	304	304	304	304	304
3	F310	310	310	310	310
4	Hard 410	Hard 410	Hard 410	410	410
5	Hardfaced	Stellite	Stellite	410	410
5A	Hardfaced	Ni-Cr	Ni-Cr	410	410
6	410 and Cu-Ni	Cu-Ni	Cu-Ni	410	410
7	410 and Hard 410	Hard 410	Hard 410	410	410
8	410 and Hardfaced	Stellite	410	410	410
8A	410 and Hardfaced	Ni-Cr	410	410	410
9	Monel	Monel	Monel	Monel	Monel
10	316	316	316	316	316
11	Monel and Hardfaced	Stellite	Monel	Monel	Monel
12	316 and Hardfaced	Stellite	316	316	316
13	Alloy 20	Alloy 20	Alloy 20	Alloy 20	Alloy 20
14	Alloy 20 and Hardfaced	Stellite	Alloy 20	Alloy 20	Alloy 20
15	304 and Hardfaced	Stellite	Stellite	304	304
16	316 and Hardfaced	Stellite	Stellite	316	316
17	347 and Hardfaced	Stellite	Stellite	347	347
18	Alloy 20 and Hardfaced	Stellite	Stellite	Alloy 20	Alloy 20

## 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:

$$C_v = Q \cdot (\text{SG} / \Delta P)^{1/2}$$

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.

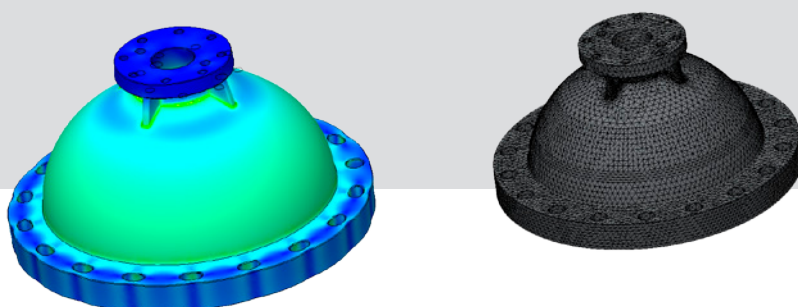
TYPE	CLASS	2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"	28"	30"	36"
Full Bore Gate Valves	150#	270	610	1100	2620	4800	7700	11500	14000	18500	23500	31000	45000	61500	73000	106000
	300#	270	610	1100	2600	4500	7400	10800	13500	18000	23000	30000	44200	60200	71500	102000
	600#	270	580	1050	2500	4400	7350	10700	13200	17500	22500	28800	43200	59000	68500	99000
	900#	230	550	1000	2400	4350	7200	10000	13000	16000	21500	27000	41000	55000	65000	95000
	1500#	230	500	900	2200	4300	7000	9500	12400	15600	20100	26000	40000	-	-	-
	2500#	220	450	850	2100	4100	6800	9000	11400	15000	19500	25400	38900	-	-	-

For reference only. Contact FCA for value confirmation.

## 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 SB and SP gates 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.

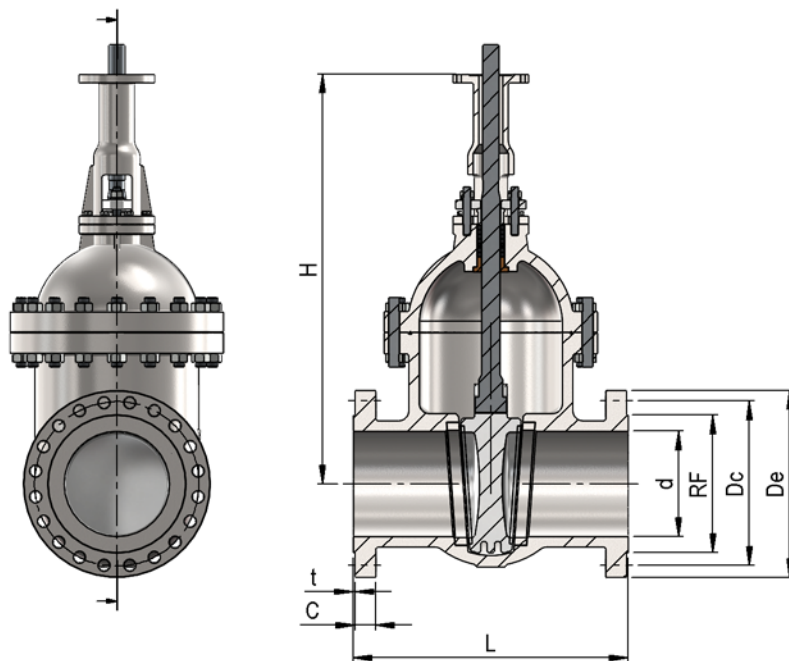


# BOLTED BONNET DESIGN GATE VALVES - SB MODEL

Standard version available from DN50/2" to DN900/36" and pressure rating up to Class 1500#. Other sizes and pressure on request.

## ACCESORIES AND OPTIONS

- Solid, Flexible or split wedge design.
- Hardfacing coating with Stellite.
- Handwheel, gearbox, electric, pneumatic or hydraulic actuation.
- Wide range of body, bonnet and trim materials according to API 600 trim chart.
- Extended stem availability.
- By-pass valves.
- Different end connections and flange drillings.
- Superior sizes and pressure.
- Bellows stem sealing.



## DIMENSIONS - CLASS 150#

SIZE			L		d	H	De	Dc	ØRF	Drilling	C	t
NPS	DN	RF	RTJ	BW								
2"	50	178	190	216	50	350	152	120.7	91.9	4-Ø19.1	15.8	1.6
3"	80	203	216	283	76	420	191	152.4	127	4-Ø19.1	19.1	1.6
4"	100	229	241	305	100	500	229	190.5	157.2	8-Ø19.1	23.9	1.6
6"	150	267	279	403	150	650	279	241.3	215.9	8-Ø22.2	25.4	1.6
8"	200	292	305	419	200	830	343	298.5	269.7	8-Ø22.2	28.4	1.6
10"	250	330	343	457	250	980	406	362	323.9	12-Ø25.4	30.2	1.6
12"	300	356	368	502	300	1070	483	431.8	381	12-Ø25.4	31.8	1.6
14"	350	381	394	572	336	1215	533	476.2	412.8	12-Ø28.6	35.1	1.6
16"	400	406	419	610	387	1380	597	539.8	469.9	16-Ø28.6	36.6	1.6
18"	450	432	445	660	438	1600	635	577.9	533.4	16-Ø31.8	39.6	1.6
20"	500	457	470	711	488	1704	699	635	584.2	20-Ø31.8	42.9	1.6
24"	600	508	521	813	590	2090	813	749.3	692.2	20-Ø34.9	47.8	1.6
28"	700	610	622	914	-	2450	927	863.6	800.1	28-Ø34.9	71.4	1.6
30"	750	610	622	914	-	2700	984	914.4	857.3	28-Ø34.9	74.7	1.6
36"	900	711	724	1016	-	2850	1168	1085.9	1022.4	32-Ø41.3	90.4	1.6

Notes: Dimensions in (mm). Flange drilling according to ASME B16.5/B16.47

## DIMENSIONS - CLASS 300#

SIZE			L		d	H	De	Dc	ØRF	Drilling	C	t
NPS	DN	RF	RTJ	BW								
2"	50	216	232	216	50	400	165	127	91.9	8-Ø19.1	22.4	1.6
3"	80	283	299	283	76	480	210	168.3	127	8-Ø22.2	28.4	1.6
4"	100	305	321	305	100	570	254	200.2	157.2	8-Ø22.2	31.8	1.6
6"	150	403	419	403	150	730	318	269.8	215.9	12-Ø22.2	36.6	1.6
8"	200	419	435	419	200	890	381	330.2	269.7	12-Ø25.4	41.1	1.6
10"	250	457	473	457	250	1050	445	387.4	323.9	16-Ø28.6	47.8	1.6
12"	300	502	518	502	300	1140	521	450.9	381	16-Ø31.8	50.8	1.6
14"	350	762	778	762	336	1285	584	514.4	412.8	20-Ø31.8	53.8	1.6
16"	400	838	854	838	387	1460	648	571.5	469.9	20-Ø34.9	57.2	1.6
18"	450	914	930	914	431	1680	711	628.7	533.4	24-Ø34.9	60.5	1.6
20"	500	991	1010	991	482	1810	775	685.8	584.2	24-Ø34.9	63.5	1.6
24"	600	1143	1165	1143	584	2210	914	812.8	692.2	24-Ø41.3	69.9	1.6
28"	700	1346	1372	1346	-	2600	1035	939.8	800.1	28-Ø44.5	85.9	1.6
30"	750	1397	1422	1397	-	2820	1092	991	857.3	28-Ø47.6	91.9	1.6
36"	900	1727	1756	1727	-	2980	1270	1168.4	1022.4	32-Ø54	104.6	1.6

Notes: Dimensions in (mm). Flange drilling according to ASME B16.5/B16.47

## DIMENSIONS - CLASS 600#

SIZE			L		d	H	De	Dc	ØRF	Drilling	C	t
NPS	DN	RF	RTJ	BW								
2"	50	292	295	292	50	420	165	127	91.9	8-Ø19.1	25.4	6.4
3"	80	356	359	356	76	500	210	168.3	127	8-Ø22.2	31.8	6.4
4"	100	432	435	432	100	590	273	215.9	157.2	8-Ø25.4	38.1	6.4
6"	150	559	562	559	150	750	356	292.1	215.9	12-Ø28.6	47.8	6.4
8"	200	660	664	660	199	710	419	349.2	269.7	12-Ø31.8	55.6	6.4
10"	250	787	791	787	247	1080	508	431.8	323.9	16-Ø34.9	63.5	6.4
12"	300	838	841	838	298	1190	559	489	381	20-Ø34.9	66.5	6.4
14"	350	889	892	889	326	1325	603	527.1	412.8	20-Ø38.1	69.9	6.4
16"	400	991	994	991	374	1490	686	603.2	469.9	20-Ø41.3	76.2	6.4
18"	450	1092	1095	1092	419	1730	743	654.1	533.4	20-Ø44.5	82.6	6.4
20"	500	1194	1200	1194	463	1890	813	723.9	584.2	24-Ø44.5	88.9	6.4
24"	600	1397	1407	1397	558	2310	940	838.2	692.2	24-Ø50.8	101.6	6.4
28"	700	1549	1562	1549	-	2680	1073	965.2	800.1	28-Ø54	111.3	6.4
30"	750	1651	1664	1651	-	2920	1130	1022.4	857.3	28-Ø54	114.3	6.4
36"	900	2083	2099	2083	-	3050	1314	1193.8	1022.4	32-Ø66.7	124	6.4

Notes: Dimensions in (mm). Flange drilling according to ASME B16.5/B16.47

## DIMENSIONS - CLASS 900#

SIZE			L		d	H	De	Dc	ØRF	Drilling	C	t
NPS	DN	RF	RTJ	BW								
2"	50	368	371	368	47	520	216	165.1	91.9	8-Ø25.4	38.1	6.4
3"	80	381	384	381	72	590	241	190.5	127	8-Ø25.4	38.1	6.4
4"	100	457	460	457	98	680	292	235	157.2	8-Ø31.8	44.5	6.4
6"	150	610	613	610	146	850	381	317.5	215.9	12-Ø31.8	55.6	6.4
8"	200	737	740	737	190	830	470	393.7	269.7	12-Ø38.1	63.5	6.4
10"	250	838	841	838	238	1130	546	469.9	323.9	16-Ø38.1	69.9	6.4
12"	300	965	968	965	282	1380	610	533.4	381	20-Ø38.1	79.2	6.4
14"	350	1029	1038	1029	311	1425	641	558.8	412.8	20-Ø41.3	85.9	6.4
16"	400	1130	1140	1130	355	1720	705	616	469.9	20-Ø44.5	88.9	6.4
18"	450	1219	1232	1219	400	1990	787	685.8	533.4	20-Ø50.8	101.6	6.4
20"	500	1321	1334	1321	444	2110	857	749.3	584.2	20-Ø54	108	6.4
24"	600	1549	1568	1549	533	2580	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#

SIZE			L		d	H	De	Dc	ØRF	Drilling	C	t
NPS	DN	RF	RTJ	BW								
2"	50	368	371	368	47	570	216	165.1	91.9	8-Ø25.4	38.1	6.4
3"	80	470	473	470	69	650	267	203.2	127	8-Ø31.8	47.8	6.4
4"	100	546	549	546	92	780	311	241.3	157.2	8-Ø34.9	53.8	6.4
6"	150	705	711	705	136	1050	394	317.5	215.9	12-Ø38.1	82.6	6.4
8"	200	832	841	832	177	1140	483	393.7	269.7	12-Ø44.5	91.9	6.4
10"	250	991	1000	991	222	1430	584	482.6	323.9	12-Ø50.8	108	6.4
12"	300	1130	1146	1130	263	1680	673	571.5	381	16-Ø54	124	6.4
14"	350	1257	1276	1257	288	1755	749	635	412.8	16-Ø60.3	133.4	6.4
16"	400	1384	1407	1384	330	1930	826	704.9	469.9	16-Ø66.7	146.1	6.4
18"	450	1537	1559	1537	371	2110	914	774.7	533.4	16-Ø73	162.1	6.4
20"	500	1664	1686	1664	415	2300	984	831.9	584.2	16-Ø79.4	177.8	6.4
24"	600	1943	1972	1943	498	2770	1168	990.6	692.2	16-Ø92	203.2	6.4

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



# GLOBE VALVES CATALOGUE

**FCA LGS, LPS AND LPY MODEL GLOBE VALVES**

BS 1873 / API 602 AND ASME B16.34 DESIGNS

ASME CLASSES 150#, 300#, 600#, 900# AND 1500#.

SIZES FROM 2" UP TO 16".







## 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.

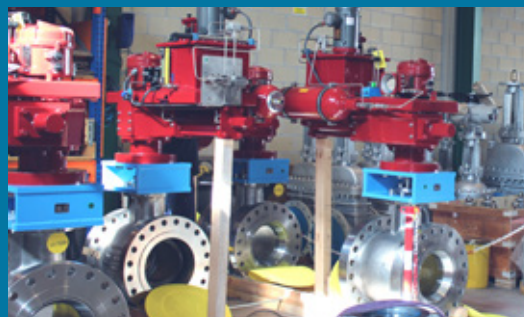
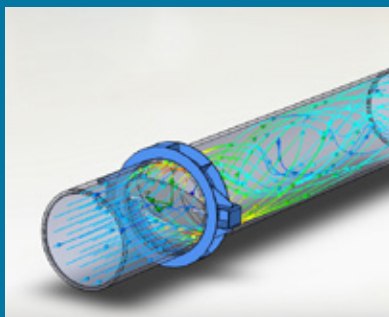
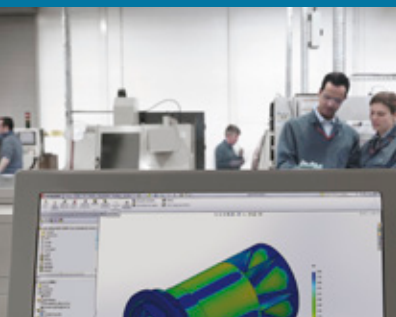
More and more customers trust our DNV certified solutions. **FCA** innovation-driven valves find solutions to any customer challenge or toughest application.

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 to 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.



## 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

Globe valves have an extended use in many industrial applications such as oil&gas, chemical and petrochemical plants, thermal applications, fertilizer plants, etc... They usually serve as on-off valves but can be used for flow regulation. For this main, FCA globe control valves such as TG or TGM models can be selected.

It's a metal seated design which could be suitable for a wide range of applications. The sealing is achieved due to the perfect tightness between the disc and the seat located in the valve's body.

**LGS** general service globe valve desing model ensures a perfect performance and sealing for pressure ratings up to ASME Class 900#. For high sizes and pressure ratings up to 2500# **LPS** Pressure seal bonneted desing model is available, performing a higher sealing force as internal pressure is increased. These straight pattern configurations provide large pressure drops across the valve.

**LPY** Y-Pattern model design forms a 45° angle at the stem disc joint in the flow direction and presents lower pressure drops to fluid flow than straightway design type valves. Angle Pattern design, for angles up to 90° can also be requested.

**FCA** Globe 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# and 1500#. Buttwelded ends can also be supplied, with schedule according to customer specifications.



## COVERING STANDARDS

**FCA** Globe Valves are mainly designed and manufactured according to standards such as BS-1873 "Specification for steel globe and globe stop and check valves (flanged and butt-welding ends) for the petroleum, petrochemical and allied industries", API 602 " Compact Steel Gate Valves - Flanged, Threaded, Welding, and Extended-Body Ends". The following standards are also considered: 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". API 598 "Valve Inspection and Testing" is applied for valve testing.

# GENERAL FEATURES

## HIGHLIGHTS

- Design and Manufacture according to BS1873, API602 and ASME B16.34.
- OS&Y Rising stem configuration, suitable for horizontal installation.
- Different body configurations; through way or Y-pattern designs.
- Conical Metal seated.
- Hardfacing coating with Stellite, ENP or Tungsten carbide.
- Forged T-Stem design.
- Handwheel, gearbox, electric, pneumatic or hydraulic actuation.
- Wide range of body, bonnet and trim materials.
- Extended stem availability.
- Bi-directional flow.
- Bolted or Pressure seal bonnet configuration.
- Two piece construction gland for better alignment.

## SECTORS

- Oil & Gas.
- Mineral Processing.
- Petrochemical plants.
- Thermal Power plants.
- Water distribution.
- Pump stations.
- etc...

## APPLICATIONS

- Natural Gas pipelines.
- Oil pipelines.
- Refineries.
- Corrosive fluids.
- etc...

## MANUFACTURING PROGRAM

TYPE	CLASS	2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"
General service Globe [LGS Mod.]	150#	●	●	●	●	●	●	●	●	●	●	●	●
	300#	●	●	●	●	●	●	●	●	●	●	●	●
	600#	●	●	●	●	●	●	●					
	900#		●	●	●	●	●						
Pressure seal design [LPS Mod.]	600#		●	●	●	●	●	●					
	900#		●	●	●	●	●						
	1500#		●	●	●	●	●						



## GENERAL MATERIALS

<b>BODY</b>	WCB / WCC / A105 / LCB / LCC / LF2/ WC6 / CF8M / CF3M / F316 / F51 / F44
<b>TRIM</b>	WCB / WCC / A105 / LCB / LCC / LF2/ WC6 / CF8M / CF3M / F316 / F51 / F44
<b>STEM</b>	SS410 / SS316 / SS630
<b>SEAT</b>	CARBON STEEL + STL 6 / STAINLESS STEEL+STL 6
<b>BONNET</b>	WCB / WCC / A105 / LCB / LCC / LF2/ WC6 / CF8M / CF3M / F316 / F51 / F44
<b>GASKETS</b>	GRAPHITE / SS304+GRAPHITE / VITON
<b>PACKING</b>	GRAPHITE / PTFE
<b>BACKSEAT</b>	SS410 / SS316 / SS630
<b>GLAND</b>	WCB / CF8 / LCB
<b>BUSHING</b>	SS410 / SS316 / SS630
<b>YOKE</b>	WCB / CF8 / LCB
<b>BOLTING</b>	B7 / B7M / B8 / B8M / L7

Other materials and special applications available under request.

## BODY AND BONNET

**FCA** designed various body-bonnet constructions such as bolted bonnet, pressure seal design or welded bonnet.

Bodies and bonnets are high quality with uniform section cast and then precisely machined, offering high performance and preventing stress concentrations.

The bodies provide a straight through port that ensures minimal turbulences, reduces erosion effect and minimizes resistance to flow. Guide slots accommodate the wedge during opening or closing operations of the valve for accurate alignment and guidance.

Depending on the size of the valve, bonnets are made either of one piece only, the yoke being an integral part of the bonnet, or have two pieces. This ensures accurate alignment of the stem and a smooth operation.



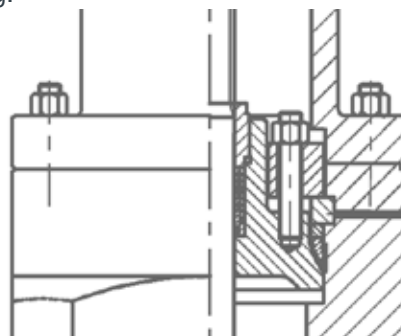
## BODY AND BONNET JOINT

Body and bonnet joints of **FCA** valves are designed with a more than adequate number of bonnet bolts. The standard joint varies, depending on valve Class. For Class 150# gate valves consist of a square joint or oval design depending on size. According to valve service it can be supplied flat-face gasket with graphite or PTFE. Class 300# and 600# valves consist of a circular spiral wound gasket. For class 900# and above consist of a ring type joint.



## RESSURE SEAL BONNET DESIGN

In pressure seal bonnet designs the sealing is achieved through a graphite gasket that takes advantage of the internal pressure of the line. This configuration reduces the weight of the valve sinze avoids large diameter body bonnet connection flange and large size body-bonnet bolting.



## TRIM AND SEAT

Trim consists of a disc and a seat ring, it can also be directly seated against the body according to valve size. The disc is lowered onto a matching horizontal seat located in the center of the valve, where a tight contact can be assured and to stop flow through the system. Its design could be floated or convex bottom type. Ball discs can also be provided to fit into a tapered, flat-surface seat. The ball disk is best used in low pressure, low temperature systems. They can be used for throttling services but they are best used to on/off flow.

According to the application different materials can be selected in order to meet operating conditions at best.

## BY-PASS VALVE

A By-pass valve can be furnished with the cast steel valves for equalizing pressure around the main valve or for warning up the line before opening the valve.





### OS&Y CONSTRUCTION

Outside Screw and Yoke construction (OS&Y) is used as standard for **FCA** globe valves. The yoke is designed in order to easily access valve stem.

### STEM

All trims are provided with one piece forged and threaded stems. Are accurately machined and finally smoothed in order to minimize friction and reduce torque.

The wedge and stem union is reached by a T-shaped design that prevents stem disengaging itself from the trim. The design also allows the trim 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.



### 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.

### BACKSEAT

**FCA** globe valves are provided with backseat threaded in the bonnet, or directly welded to the bonnet for pressure seal designs. This allows to change the packing even when the valve is under pressure.

### 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.



## 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 the body seat and trim, 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 globe 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.



## 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:

$$C_v = Q \cdot (SG / \Delta P)^{1/2}$$

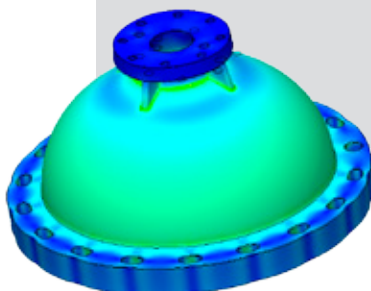
It is a relative measure of valves efficiency at allowing fluid flow. Q determines the flow rate (in gpm), SG refers to fluid specific gravity and Pressure drop is considered in psi. It describes the relationship between the pressure drop across the valve and the corresponding flow rate. In more practical 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"
FCA Straight Pattern Globe Valves	150#	60	100	190	450	820	1300	1900	2450	3250	4300	5400	7800
	300#	60	100	190	450	820	1300	1900	2450	3180	4220	5300	7650
	600#	45	70	170	390	780	1200	1400	-	-	-	-	-
	900#	-	70	170	390	770	1120	-	-	-	-	-	-
	1500#	-	60	162	360	750	1080	-	-	-	-	-	-

## 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 LGS, LPS and LPY globe 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.

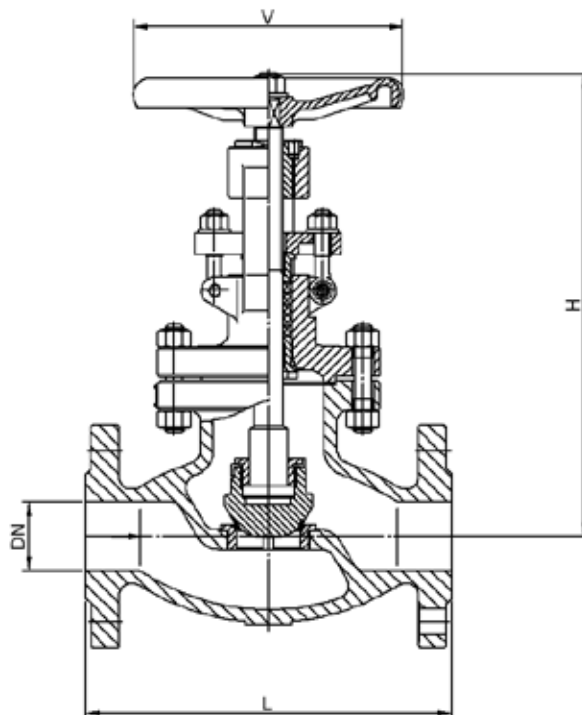


# GENERAL SERVICE GLOBE VALVES - LGS MODEL

Standard version available from DN50/2" to DN600/24" and pressure rating up to Class 900#. Other sizes and pressure on request.

## ACCESORIES AND OPTIONS

- Design Standard according to BS1873 and ASME B16.34. Forged API 602 dimensions on request.
- Hardfacing coating with Stellite, ENP or Tungsten carbide.
- Handwheel, gearbox, electric, pneumatic or hydraulic actuation.
- Wide range of body, bonnet and trim materials.
- Extended stem availability.
- By-pass valves.
- Different end connections and flange drillings.
- Superior sizes and pressure.



## DIMENSIONS - CLASS 150#

SIZE			L		H	V	Weight
NPS	DN	RF	RTJ	BW			
2"	50	203	216	203	340	200	25
3"	80	241	254	241	380	250	40
4"	100	292	305	292	450	250	65
6"	150	406	419	406	590	350	115
8"	200	495	508	495	650	450	185
10"	250	622	635	622	692	450	270
12"	300	698	711	698	810	610	375
14"	350	787	800	787	895	610	615
16"	400	914	927	914	980	720	885
18"	450	977	-	977	1070	720	1150
20"	500	977	-	977	1120	720	1650
24"	600	1295	-	1295	1310	850	2200

Notes: Dimensions in mm and estimated weight in Kg for RF design with manual actuator.  
Bevel gear design from 16" size.

## DIMENSIONS - CLASS 300#

SIZE			L		H	V	Weight
NPS	DN	RF	RTJ	BW			
2"	50	267	283	267	370	200	35
3"	80	318	333	318	420	250	65
4"	100	356	371	356	500	350	100
6"	150	444	460	444	640	450	180
8"	200	559	575	559	710	450	290
10"	250	622	638	622	800	860	575
12"	300	711	727	711	910	860	770
14"	350	838	-	838	1075	860	880
16"	400	863	-	863	1370	610	1200
18"	450	977	-	977	1470	610	1600
20"	500	1016	-	1016	1565	720	2100
24"	600	1346	-	1346	1800	720	3150

## DIMENSIONS - CLASS 600#

SIZE			L		H	V	Weight
NPS	DN	RF	RTJ	BW			
2"	50	292	295	292	460	250	54
3"	80	356	359	356	550	350	90
4"	100	432	435	432	670	450	145
6"	150	559	562	559	900	610	358
8"	200	660	664	660	1050	610	560
10"	250	787	791	787	1220	610	880
12"	300	838	841	838	1600	610	1300

## DIMENSIONS - CLASS 900#

SIZE			L		H	V	Weight
NPS	DN	RF	RTJ	BW			
3"	80	381	384	381	640	350	150
4"	100	457	460	457	780	500	250
6"	150	610	613	610	1040	500	400
8"	200	737	740	737	1340	610	800
10"	250	838	841	838	1630	610	1400

Notes: Dimensions in mm and estimated weight in Kg for RF design with manual actuator.

Bevel gear design from 10" size.



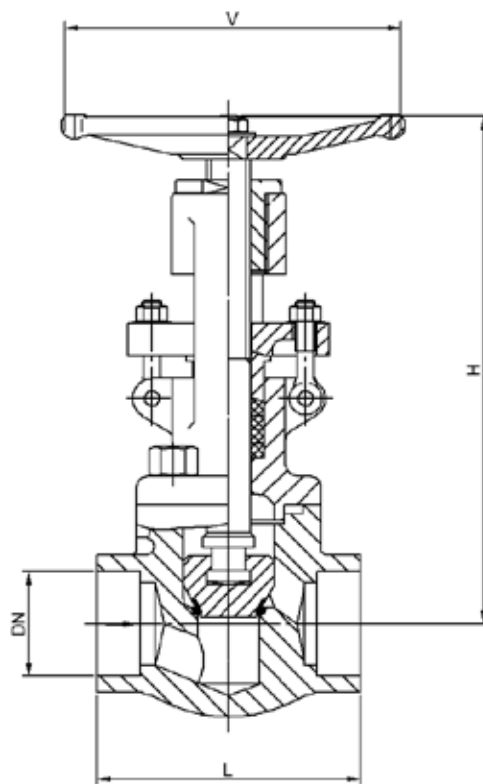
# PRESSURE SEAL BONNET DESIGN

## GLOBE VALVES - LPS MODEL

Standard version available from DN50/2" to DN300/12" and pressure rating up to Class 1500#. Other sizes and pressure on request.

### ACCESORIES AND OPTIONS

- Y-Pattern LPY model dimensions on request.
- Design Standard according to BS1873 and ASME B16.34.
- Hardfacing coating with Stellite, ENP or Tungsten carbide.
- Handwheel, gearbox, electric, pneumatic or hydraulic actuation.
- Wide range of body, bonnet and trim materials.
- Extended stem availability.
- By-pass valves.
- Different end connections and flange drillings.
- Superior sizes and pressure.



### DIMENSIONS - CLASS 600#

SIZE			L		H	V	Weight
NPS	DN	RF	RTJ	BW			
3"	80	356	359	356	510	350	80
4"	100	432	435	432	630	450	135
6"	150	559	562	559	880	610	280
8"	200	660	664	660	990	610	485
10"	250	787	791	787	1170	610	775
12"	300	838	841	838	1580	610	1180

### DIMENSIONS - CLASS 900#

SIZE			L		H	V	Weight
NPS	DN	RF	RTJ	BW			
3"	80	381	384	381	640	350	110
4"	100	457	460	457	780	500	180
6"	150	610	613	610	1040	500	380
8"	200	737	740	737	1340	610	720
10"	250	838	841	838	1630	610	1300

### DIMENSIONS - CLASS 1500#

SIZE			L		H	V	Weight BW
NPS	DN	RF	RTJ	BW			
3"	80	470	473	470	640	500	100
4"	100	546	549	546	780	610	160
6"	150	705	711	705	1040	610	400
8"	200	832	841	832	1340	880	640
10"	250	991	1000	991	1630	880	1200

Notes: Dimensions in mm and estimated weight in Kg for RF design with manual actuator.

Bevel gear design from 10" size.

# NOTES

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# BALL VALVES CATALOGUE

FLOATING AND TRUNNION MOUNTED SPLIT  
BODY AND TOP ENTRY FCA BS AND BT  
MODEL BALL VALVES



**FCA**  
FLOW CONTROL APPLICATIONS



## 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.

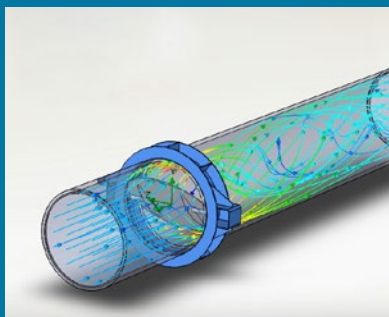
More and more customers trust our DNV certified solutions. **FCA** innovation-driven valves find solutions to any customer challenge or toughest application.

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## 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 to 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.



## 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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SPLIT BODY FLOATING BALL  
VALVES

- CLASS 150#

- CLASS 300#

- CLASS 600#

SPLIT BODY TRUNNION MOUNTED  
BALL VALVES

- CLASS 150#

- CLASS 300#

- CLASS 600#

- CLASS 900#

- CLASS 1500#

- CLASS 2500#



# SPECIFICATIONS AND STANDARDS

**FCA** Ball valves are specially engineered for heavy duty applications outstanding at high pressure working conditions, up to ASME Class 2500# and sizes up to 36". **BS** and **BT** model Ball valves solutions ensure a perfect performance at primary and secondary sealing due to an accurate design concept at any size.

Two or three pieced construction bodies can adopt **FCA** floating or trunnion mounted ball designs according valve rating and size, ensuring a bubble tight shut off and an efficient control. **BS** model stands for a split body design, for casted or forged carbon or stainless steel material. **BT** model relates to a top entry design, the main advantage of this valve consists in the chance to do any maintenance work without dismantling the valve from the pipeline. Depending on the application, both models can be supplied with soft or metal sealing.

**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 Vessel 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

## HIGHLIGHTS

- Design and Manufacture according to API 6D.
- Floating and Trunnion mounted configurations.
- 2 or 3-piece split body or top entry designs.
- Soft or metal seated.
- Hardfacing coating with Stellite, ENP or Tungsten carbide.
- Full or reduced bore option. Suitable for pigging operations.
- Fire safe design.
- Anti-static devices.
- Blowout proof stem.
- Lever or gearbox, electric, pneumatic and hydraulic actuation.
- Double Block and Bleed service.
- Cavity Relief.
- Sealant injection system.
- Extended stem availability.
- Bi-directional flow
- Wide range of materials and hardenings.

## SECTORS

- Oil & Gas.
- Petrochemical plants.
- Steel industry.
- Thermal Power plants.
- Water distribution.
- Water pump stations.
- etc...

## APPLICATIONS

- Natural Gas pipelines.
- Oil pipelines.
- Refineries.
- Corrosive fluids.
- etc...



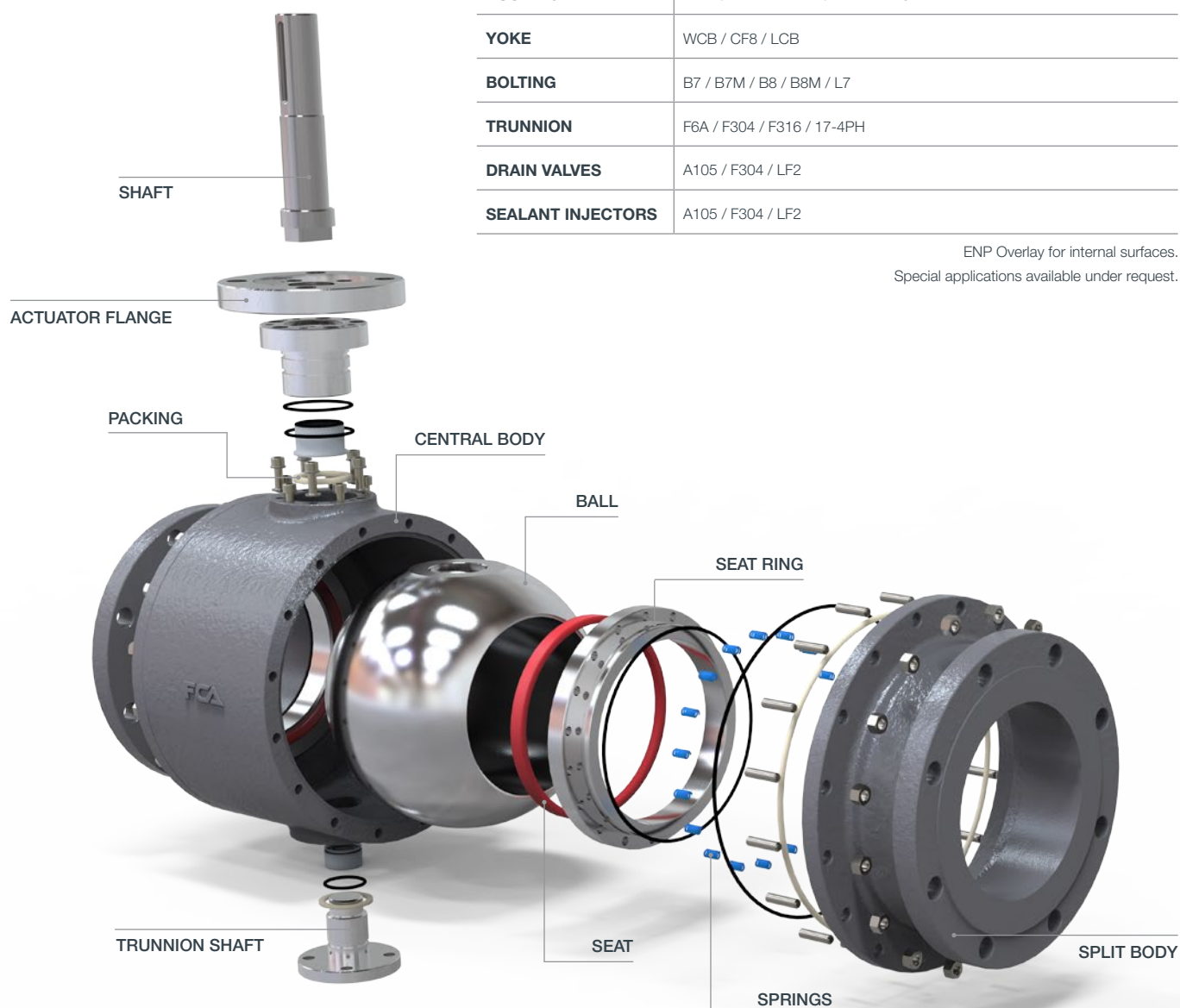
## MANUFACTURING PROGRAM

	TYPE	CLASS	2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"	28"	30"	36"
API 6D	Floating [BS & BT Mod.]	150#	•	•	•	•	•										
		300#	•	•	•	•	•										
		600#	•	•	•												
	Trunnion mounted [BS & BT Mod.]	150#						•	•	•	•	•	•	•	•	•	•
		300#						•	•	•	•	•	•	•	•	•	•
		600#				•	•	•	•	•	•	•	•	•	•	•	•
		900#	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
		1500#	•	•	•	•	•	•	•	•	•	•	•	•			
		2500#	•	•	•	•	•	•	•								

## GENERAL MATERIALS

<b>BODY</b>	WCB / WCC / A105 / LCB / LCC / LF2/ CF8M / CF3M / F316 / F51 / F44
<b>BALL</b>	A105 / F6A / SS316 / CF8M / CF3M / LF2 / F51 / F44 / 17-4PH
<b>SPRING</b>	INCONEL 750
<b>SEAT RING</b>	A105 / F6A / SS316 / CF8M / CF3M / LF2 / F51 / F44 / 17-4PH
<b>SEAT</b>	PTFE / RPTFE / NYLON / MOLON / PEEK / VITON / DEVLON
<b>STEM</b>	F6A / F304 / F316 / 17-4PH
<b>PACKING</b>	GRAPHITE / PTFE
<b>O-RING</b>	VITON
<b>BUSHING</b>	PTFE / METAL+PTFE / BRAIDED GRAPHITE
<b>YOKE</b>	WCB / CF8 / LCB
<b>BOLTING</b>	B7 / B7M / B8 / B8M / L7
<b>TRUNNION</b>	F6A / F304 / F316 / 17-4PH
<b>DRAIN VALVES</b>	A105 / F304 / LF2
<b>SEALANT INJECTORS</b>	A105 / F304 / LF2

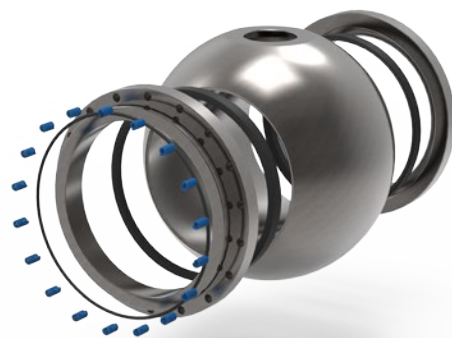
ENP Overlay for internal surfaces.  
Special applications available under request.



## 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. According to seat material, friction could be reduced and will result in torque reduction when operating the valve.

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, Tungsten or Chromium Carbide coatings may be applied on ball and seats to ensure component hardness and assure seating. This makes the valve maintenance free.



## SELF-RELIEVING SEAT RINGS

Two independent floating seats ensure the bi-directional seating of the ball valve, for soft or metal seated configurations. The coil springs press the seat ring against the ball to guarantee the contact between both components. These spring loaded seats are carefully designed to achieve low operating torque even with high pressure working conditions. Each ring achieves the alignment by itself, whenever the valve is fully opened or not.

## PISTON EFFECT

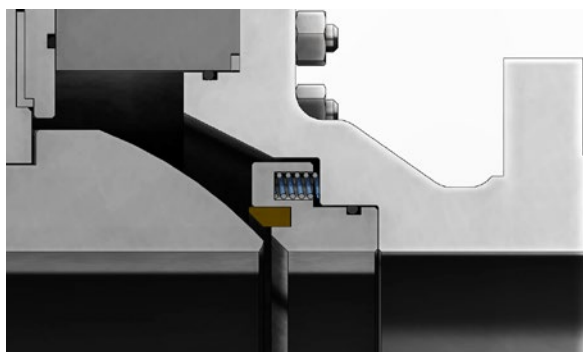
Seat configuration has been specially designed to meet what is called a "piston effect". In cases where the line pressure increases, the seat differential area creates a piston effect that pushes the seat against the ball surface. This action results in an additional load towards the seating as line pressure increases.

The piston effect principle assures a tight sealing simultaneously on both sides of the ball (upstream and downstream).

Double piston or combination of seats upstream/downstream can be supplied on request.

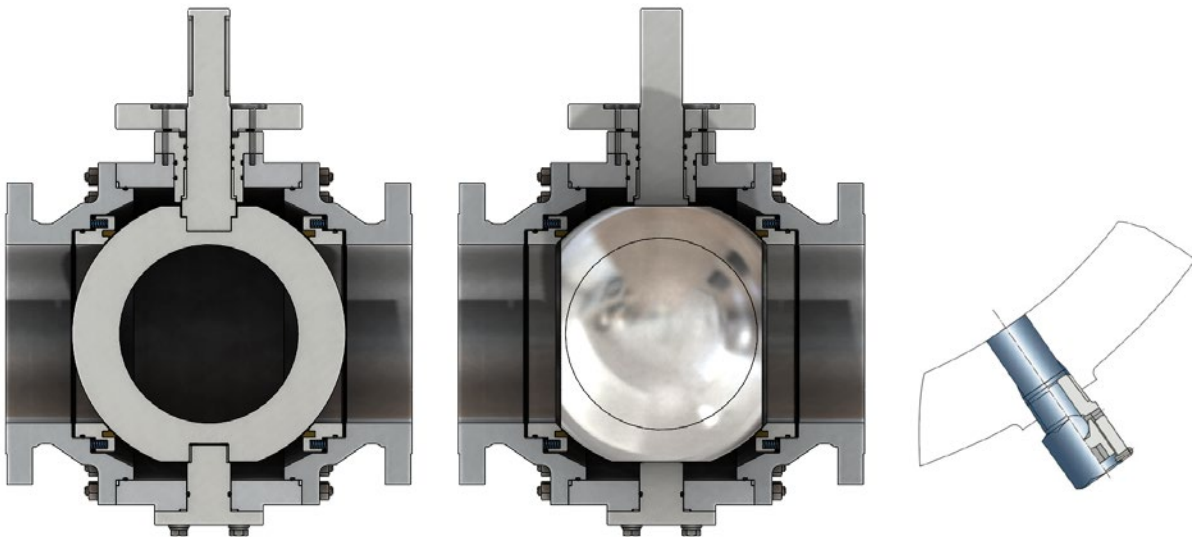
## CAVITY PRESSURE RELIEF

In case that a trunnion mounted ball valve is in the closed position, fluid media may be trapped in the body cavity. This media is subjected to a thermal expansion as the temperature rises, resulting in an increase of the pressure of the cavity. In order to avoid a determinate excess of pressure, the seat arrangement is designed to automatically self-relieve, allowing the media in the body cavity to escape to the pipeline.



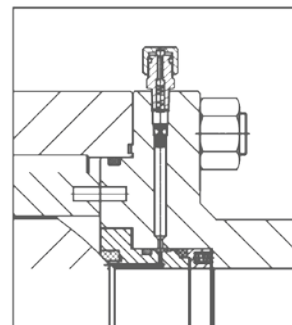
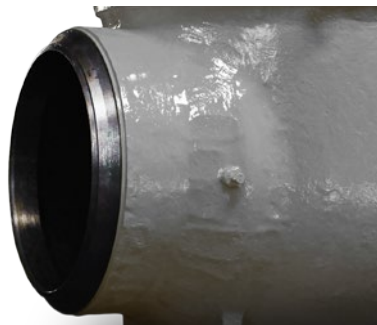
## DOUBLE BLOCK AND BLEED (DBB)

As the floating seating design performs sealing over upstream and downstream seat sides simultaneously, and anti-blow-out vent and drain plug allows the valve to vent and drain the body cavity in both open and closed positions.



## SEALANT INJECTION

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





## ANTI-BLOW-OUT STEM

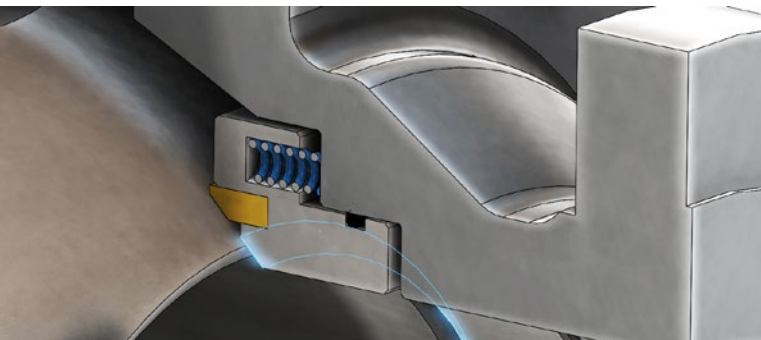
**FCA** provides a T-shaped stem as standard. When medium passes through the valve, the pressure may push the stem out and can cause serious safety problems. The stem is designed in order to prevent it from coming out of the body structure.



## FIRE SAFE DESIGN

**FCA** BS and BT 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.



## 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.

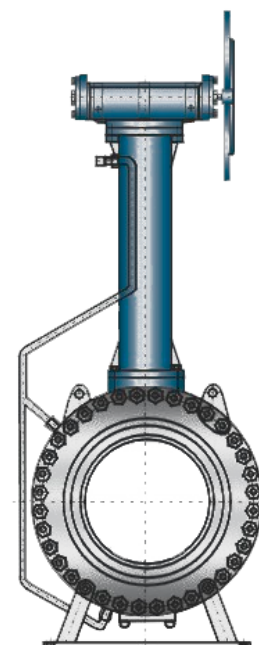
Depending on the valve application, FCA offers special treatments for specific abrasive and corrosive solutions like hardening, valve or component protective coating, etc... More information on request.

## 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 is placed on the ball-stem and on the stem-body structure 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:

- Lever.
- 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:

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

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"	28"	30"	36"
Full Bore Ball Valves	150#	400	1250	2300	4900	8500	14000	22000	28000	38000	51000	58000	86000	120000	135000	195000
	300#	400	1200	2300	4850	8000	13000	20000	27000	37000	50000	58000	84000	120000	125000	185000
	600#	350	1000	2000	4400	7500	12500	18000	26000	34500	50000	55000	84000	115000	110000	170000
	900#	300	900	1900	4320	7000	11000	17500	24000	30000	47000	52000	80000	95000	95000	158000
	1500#	300	850	1850	3750	6200	9500	16000	21000	28000	41000	45000	74000	-	-	-
	2500#	240	650	1320	2800	4800	8000	14000	-	-	-	-	-	-	-	-

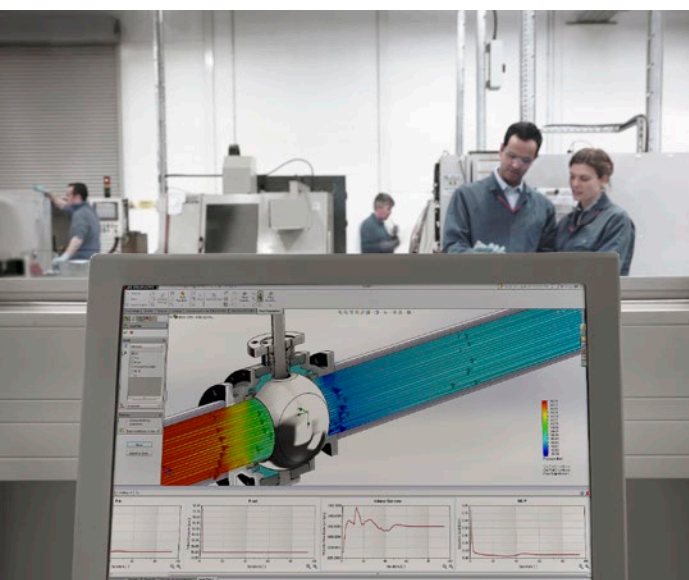
TYPE	CLASS	3"x2"	4"x3"	6"x4"	8"x6"	10"x8"	12"x10"	14"x12"	16"x14"	18"x16"	20"x18"	24"x20"	30"x24"	36"x30"
Reduced Bore Ball Valves	150#	200	500	750	2100	4000	7000	12000	15000	22000	27000	31000	36000	62000
	300#	200	500	750	2100	3800	7000	12000	15000	21000	26500	31000	35500	60000
	600#	200	480	720	1800	3800	7000	11500	14000	21000	26000	29500	32000	56000
	900#	180	480	700	1800	3800	6500	11500	14000	19500	26000	28000	31000	55000
	1500#	180	460	690	1680	3600	6400	11500	12000	18000	24000	25300	-	-
	2500#	170	440	660	1620	3400	6200	-	-	-	-	-	-	-

## TORQUE VALUES

Torque ratings listed below are for reference only. Properties of medium, seat materials and valve operation frequency shall be considered and extra factors may be applied.

For reference, a factor of 0.80 can be applied in case of clean lubricating oil medium and 1.20 for clean and slightly viscous particles or steam service. For heavy fluids such as slurry the torque may be increased by a factor of 1.50 and finally, a value of 2.00 should be applied for dry fine solids.

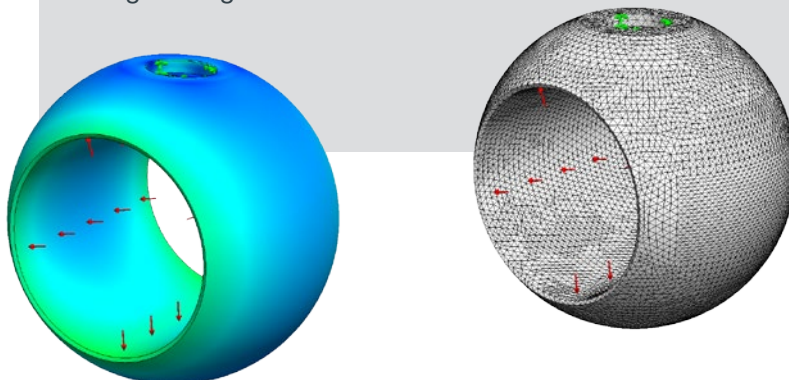
TYPE	CLASS	2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"	28"	30"	36"
Floating [BS & BT Mod.]	150#	25	65	125	410	700	-	-	-	-	-	-	-	-	-	-
	300#	60	160	280	950	1550	-	-	-	-	-	-	-	-	-	-
	600#	190	460	770	-	-	-	-	-	-	-	-	-	-	-	-
Trunnion mounted [BS & BT Mod.]	150#	57	122	192	274	832	1105	1502	1946	3164	3793	4769	7529	9832	11172	22987
	300#	99	212	335	544	1250	1736	2388	3224	5139	6194	7826	12958	15620	18703	34170
	600#	168	360	572	912	2177	3093	4282	7458	9310	14639	20011	31226	39897	41832	52262
	900#	228	512	946	1784	4116	5910	10137	14141	18866	22400	28544	43276	52486	56210	70355
	1500#	390	831	1524	2934	7215	11128	16103	24518	29630	34392	40918	65351	-	-	-
	2500#	589	1577	1965	5501	11786	13222	20075	-	-	-	-	-	-	-	-



## 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.



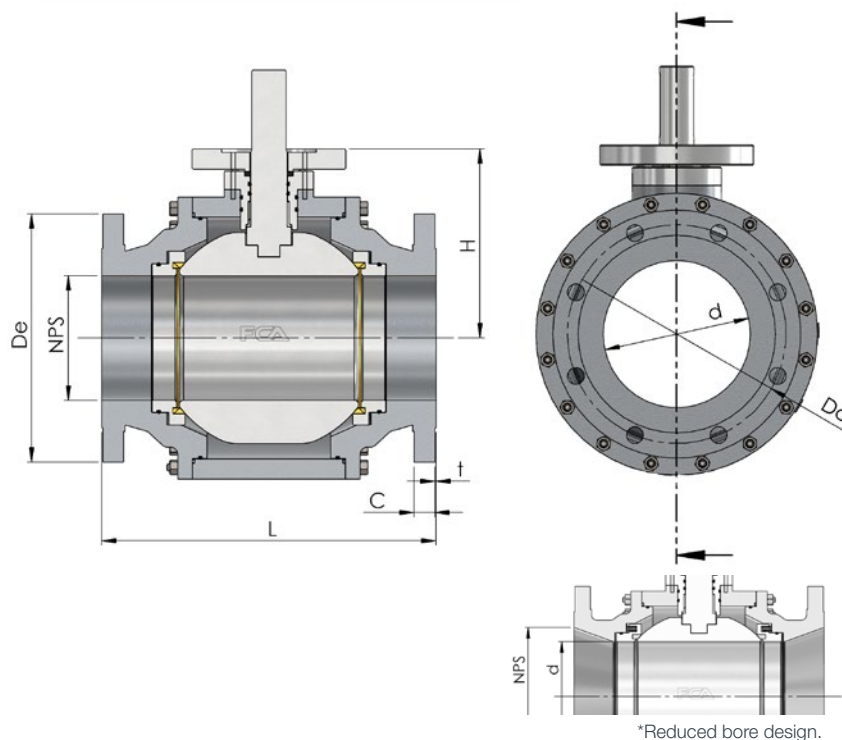
# DIMENSIONAL DATA

## SPLIT BODY FULL AND REDUCED BORE FLOATING BALL VALVES - BS MODEL

Standard version available from DN50/2" to DN200/8" and pressure rating up to Class 600#. Other sizes and pressure on request.

### ACCESORIES AND OPTIONS

- Switch indicator for manually operated valves.
- Locking devices.
- Anti-blow-out stem.
- Antistatic devices.
- Fire protection structure.
- Self-relieving seating.
- Full and reduced bore.
- Different end connections and flange drillings.



### DIMENSIONS - CLASS 150#

SIZE		L			d	H	De	Dc	ØRF	Drilling	C	t
NPS	DN	RF	RTJ	BW								
2"	50	178	190.5	216	49	85	152	120.7	91.9	4-Ø19.1	15.8	1.6
2"x1 1/2"	50x40	178	190.5	216	40	98	152	120.7	91.9	4-Ø19.1	15.8	1.6
3"	80	203	216	283	74	131	191	152.4	127	4-Ø19.1	19.1	1.6
3"x2 1/2"	80x65	203	216	283	65	120	191	152.4	127	4-Ø19.1	19.1	1.6
4"	100	229	241	305	100	155	229	190.5	157.2	8-Ø19.1	23.9	1.6
4"x3"	100x80	229	241	305	74	138	229	190.5	157.2	8-Ø19.1	23.9	1.6
6"	150	394	406.5	457	150	260	279	241.3	215.9	8-Ø22.2	25.4	1.6
6"x4"	150x100	394	406.5	457	100	165	279	241.3	215.9	8-Ø22.2	25.4	1.6
8"	200	457	470	521	201	315	343	298.5	269.7	8-Ø22.2	28.4	1.6
8"x6"	200x150	457	470	521	150	237	343	298.5	269.7	8-Ø22.2	28.4	1.6

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

## DIMENSIONS - CLASS 300#

SIZE			L		d	H	De	Dc	ØRF	Drilling	C	t
NPS	DN	RF	RTJ	BW								
2"	50	216	232	216	49	85	165	127	91.9	8-Ø19.1	22.4	1.6
2"x1 1/2"	50x40	216	232	216	40	98	165	127	91.9	8-Ø19.1	22.4	1.6
3"	80	283	299	283	74	131	210	168.3	127	8-Ø22.2	28.4	1.6
3"x2 1/2"	80x65	283	299	283	65	120	210	168.3	127	8-Ø22.2	28.4	1.6
4"	100	305	321	305	100	155	254	200.2	157.2	8-Ø22.2	31.8	1.6
4"x3"	100x80	305	321	305	74	138	254	200.2	157.2	8-Ø22.2	31.8	1.6
6"	150	404	419	457	150	260	318	269.8	215.9	12-Ø22.2	36.6	1.6
6"x4"	150x100	404	419	457	100	165	318	269.8	215.9	12-Ø22.2	36.6	1.6
8"	200	502	518	521	201	315	381	330.2	269.7	12-Ø25.4	41.1	1.6
8"x6"	200x150	502	518	521	150	237	381	330.2	269.7	12-Ø25.4	41.1	1.6

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

## DIMENSIONS - CLASS 600#

SIZE			L		d	H	De	Dc	ØRF	Drilling	C	t
NPS	DN	RF	RTJ	BW								
2"	50	292	295	292	49	85	165	127	91.9	8-Ø19.1	25.4	6.4
2"x1 1/2"	50x40	292	295	292	40	98	165	127	91.9	8-Ø19.1	25.4	6.4
3"	80	356	359	356	74	131	210	168.3	127	8-Ø22.2	31.8	6.4
3"x2 1/2"	80x65	356	359	356	65	120	210	168.3	127	8-Ø22.2	31.8	6.4
4"	100	432	435	432	100	155	273	215.9	157.2	8-Ø25.4	38.1	6.4
4"x3"	100x80	432	435	432	74	138	273	215.9	157.2	8-Ø25.4	38.1	6.4

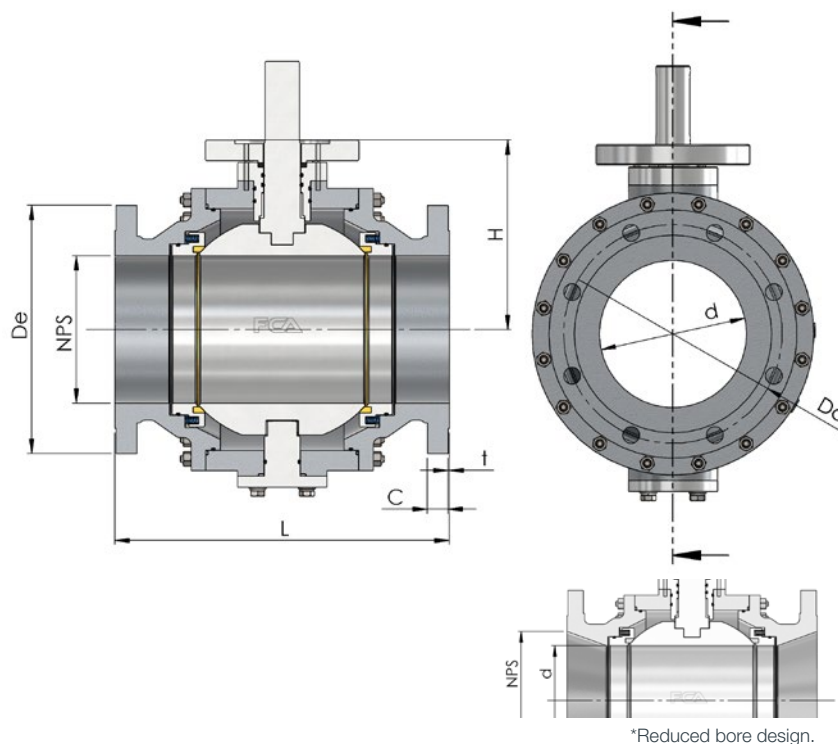
Notes: Dimensions in (mm). Flange drilling according to ASME B16.5

# SPLIT BODY FULL AND REDUCED BORE TRUNNION MOUNTED BALL VALVES - BS MODEL

Standard version available from DN50/2" to DN900/36" 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.
- Fire protection structure.
- Self-relieving seating.
- Full and reduced bore.
- Different end connections and flange drillings.
- Double Block and Bleed DBB feature.
- Extended bonnet and stem.



## DIMENSIONS - CLASS 150# FULL BORE

SIZE			L		d	H	De	Dc	ØRF	Drilling	C	t
NPS	DN	RF	RTJ	BW								
10"	250	533	546	559	252	415	406	362	323.9	12-Ø25.4	30.2	1.6
12"	300	609.5	622	635	303	480	483	431.8	381	12-Ø25.4	31.8	1.6
14"	350	686	698.5	762	334	545	533	476.2	412.8	12-Ø28.6	35.1	1.6
16"	400	762	775	838	385	675	597	539.8	469.9	16-Ø28.6	36.6	1.6
18"	450	864	876	914.5	436	720	635	577.9	533.4	16-Ø31.8	39.6	1.6
20"	500	914.5	927	991	487	774	699	635	584.2	20-Ø31.8	42.9	1.6
24"	600	1067	1079.5	1143	589	994	813	749.3	692.2	20-Ø34.9	47.8	1.6
28"	700	1245	-	1346	684	1090	927	863.6	800.1	28-Ø34.9	71.4	1.6
30"	750	1295	-	1397	735	1145	984	914.4	857.3	28-Ø34.9	74.7	1.6
36"	900	1524	-	1727	874	1378	1168	1085.9	1022.4	32-Ø41.3	90.4	1.6

Notes: Dimensions in (mm). Flange drilling according to ASME B16.5/B16.47

## DIMENSIONS - CLASS 150# REDUCED BORE

SIZE			L		d	H	De	Dc	ØRF	Drilling	C	t
NPS	DN	RF	RTJ	BW								
10"x8"	250x200	533	546	559	201	345	343	298.5	323.9	12-Ø25.4	28.4	1.6
12"x10"	300x250	609.5	622	635	252	415	406	362	381	12-Ø25.4	30.2	1.6
14"x12"	350x300	686	698.5	762	303	480	483	431.8	412.8	12-Ø28.6	31.8	1.6
16"x14"	400x350	762	775	838	334	545	533	476.2	469.9	16-Ø28.6	35.1	1.6
18"x16"	450x400	864	876	914.5	385	675	597	539.8	533.4	16-Ø31.8	36.6	1.6
20"x18"	500x450	914.5	927	991	436	720	635	577.9	584.2	20-Ø31.8	39.6	1.6
24"x20"	600x500	1067	1079.5	1143	487	775	813	749.3	692.2	20-Ø34.9	47.8	1.6
30"x24"	750x600	1295	-	1397	589	1006	984	914.4	857.3	28-Ø34.9	74.7	1.6
36"x30"	900x750	1524	-	1727	735	1147	1168	1085.9	1022.4	32-Ø41.3	90.4	1.6

Notes: Dimensions in (mm). Flange drilling according to ASME B16.5/B16.47

## DIMENSIONS - CLASS 300# FULL BORE

SIZE			L		d	H	De	Dc	ØRF	Drilling	C	t
NPS	DN	RF	RTJ	BW								
10"	250	568	584	568	252	415	445	387.4	323.9	16-Ø28.6	47.8	1.6
12"	300	648	664	648	303	480	521	450.9	381	16-Ø31.8	50.8	1.6
14"	350	762	787	762	334	545	584	514.4	412.8	20-Ø31.8	53.8	1.6
16"	400	838	854	838	385	675	648	571.5	469.9	20-Ø34.9	57.2	1.6
18"	450	914	930	914	436	720	711	628.7	533.4	24-Ø34.9	60.5	1.6
20"	500	991	1010	991	487	774	775	685.8	584.2	24-Ø34.9	63.5	1.6
24"	600	1143	1165	1143	589	994	914	812.8	692.2	24-Ø41.3	69.9	1.6
28"	700	1346	1372	1346	684	1090	1035	939.8	800.1	28-Ø44.5	85.9	1.6
30"	750	1397	1422	1397	735	1145	1092	991	857.3	28-Ø47.6	91.9	1.6
36"	900	1727	1756	1727	874	1378	1270	1168.4	1022.4	32-Ø54	104.6	1.6

Notes: Dimensions in (mm). Flange drilling according to ASME B16.5/B16.47

## DIMENSIONS - CLASS 300# REDUCED BORE

SIZE			L		d	H	De	Dc	ØRF	Drilling	C	t
NPS	DN	RF	RTJ	BW								
10"x8"	250x200	568	584	568	201	345	445	387.4	323.9	16-Ø28.6	47.8	1.6
12"x10"	300x250	648	664	648	252	415	521	450.9	381	16-Ø31.8	50.8	1.6
14"x12"	350x300	762	787	762	303	480	584	514.4	412.8	20-Ø31.8	53.8	1.6
16"x14"	400x350	838	854	838	334	545	648	571.5	469.9	20-Ø34.9	57.2	1.6
18"x16"	450x400	914	930	914	385	675	711	628.7	533.4	24-Ø34.9	60.5	1.6
20"x18"	500x450	991	1010	991	436	720	775	685.8	584.2	24-Ø34.9	63.5	1.6
24"x20"	600x500	1143	1165	1143	487	775	914	812.8	692.2	24-Ø41.3	69.9	1.6
30"x24"	750x600	1397	1422	1397	589	1006	1092	991	857.3	28-Ø47.6	91.9	1.6
36"x30"	900x750	1727	1756	1727	735	1147	1270	1168.4	1022.4	32-Ø54	104.6	1.6

Notes: Dimensions in (mm). Flange drilling according to ASME B16.5/B16.47



## DIMENSIONS - CLASS 600# FULL BORE

SIZE			L		d	H	De	Dc	ØRF	Drilling	C	t
NPS	DN	RF	RTJ	BW								
6"	150	559	562	559	150	394	356	292.1	215.9	12-Ø28.6	47.8	6.4
8"	200	660	664	660	201	450	419	349.2	269.7	12-Ø31.8	55.6	6.4
10"	250	787	791	787	252	502	508	431.8	323.9	16-Ø34.9	63.5	6.4
12"	300	838	841	838	303	560	559	489	381	20-Ø34.9	66.5	6.4
14"	350	889	892	889	334	586	603	527.1	412.8	20-Ø38.1	69.9	6.4
16"	400	991	994	991	385	690	686	603.2	469.9	20-Ø41.3	76.2	6.4
18"	450	1092	1095	1092	436	730	743	654.1	533.4	20-Ø44.5	82.6	6.4
20"	500	1194	1200	1194	487	778	813	723.9	584.2	24-Ø44.5	88.9	6.4
24"	600	1397	1407	1397	589	1002	940	838.2	692.2	24-Ø50.8	101.6	6.4
28"	700	1549	1562	1549	684	1086	1073	965.2	800.1	28-Ø54	111.3	6.4
30"	750	1651	1664	1651	735	1166	1130	1022.4	857.3	28-Ø54	114.3	6.4
36"	900	2083	2099	2083	874	1304	1314	1193.8	1022.4	32-Ø66.7	124	6.4

Notes: Dimensions in (mm). Flange drilling according to ASME B16.5/B16.47

## DIMENSIONS - CLASS 600# REDUCED BORE

SIZE			L		d	H	De	Dc	ØRF	Drilling	C	t
NPS	DN	RF	RTJ	BW								
6"x4"	150x100	559	562	559	100	182	356	292.1	215.9	12-Ø28.6	47.8	6.4
8"x6"	200x150	660	664	660	150	394	419	349.2	269.7	12-Ø31.8	55.6	6.4
10"x8"	250x200	787	791	787	201	450	508	431.8	323.9	16-Ø34.9	63.5	6.4
12"x10"	300x250	838	841	838	252	502	559	489	381	20-Ø34.9	66.5	6.4
14"x12"	350x300	889	892	889	303	560	603	527.1	412.8	20-Ø38.1	69.9	6.4
16"x14"	400x350	991	994	991	334	586	686	603.2	469.9	20-Ø41.3	76.2	6.4
18"x16"	450x400	1092	1095	1092	385	690	743	654.1	533.4	20-Ø44.5	82.6	6.4
20"x18"	500x450	1194	1200	1194	436	730	813	723.9	584.2	24-Ø44.5	88.9	6.4
24"x20"	600x500	1397	1407	1397	487	778	940	838.2	692.2	24-Ø50.8	101.6	6.4
30"x24"	750x600	1651	1664	1651	589	1002	1130	1022.4	857.3	28-Ø54	114.3	6.4
36"x30"	900x750	2083	2099	2083	735	1166	1314	1193.8	1022.4	32-Ø66.7	124	6.4

Notes: Dimensions in (mm). Flange drilling according to ASME B16.5/B16.47

## 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	126	216	165.1	91.9	8-Ø25.4	38.1	6.4
3"	80	381	384	381	74	180	241	190.5	127	8-Ø25.4	38.1	6.4
4"	100	457	460	457	100	225	292	235	157.2	8-Ø31.8	44.5	6.4
6"	150	610	613	610	150	396	381	317.5	215.9	12-Ø31.8	55.6	6.4
8"	200	737	740	737	201	451	470	393.7	269.7	12-Ø38.1	63.5	6.4
10"	250	838	841	838	252	502	546	469.9	323.9	16-Ø38.1	69.9	6.4
12"	300	965	968	965	303	550	610	533.4	381	20-Ø38.1	79.2	6.4
14"	350	1029	1038	1029	322	588	641	558.8	412.8	20-Ø41.3	85.9	6.4
16"	400	1130	1140	1130	373	686	705	616	469.9	20-Ø44.5	88.9	6.4
18"	450	1219	1232	1219	423	730	787	685.8	533.4	20-Ø50.8	101.6	6.4
20"	500	1321	1334	1321	471	770	857	749.3	584.2	20-54	108	6.4
24"	600	1549	1568	1549	570	1001	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 900# REDUCED BORE

SIZE		L			d	H	De	Dc	ØRF	Drilling	C	t
NPS	DN	RF	RTJ	BW								
3"x2"	80x50	381	384	381	49	126	241	190.5	127	8-Ø25.4	38.1	6.4
4"x3"	100x80	457	460	457	74	180	292	235	157.2	8-Ø31.8	44.5	6.4
6"x4"	150x100	610	613	610	100	225	381	317.5	215.9	12-Ø31.8	55.6	6.4
8"x6"	200x150	737	740	737	150	396	470	393.7	269.7	12-Ø38.1	63.5	6.4
10"x8"	250x200	838	841	838	201	451	546	469.9	323.9	16-Ø38.1	69.9	6.4
12"x10"	300x250	965	968	965	252	502	610	533.4	381	20-Ø38.1	79.2	6.4
14"x12"	350x300	1029	1038	1029	303	550	641	558.8	412.8	20-Ø41.3	85.9	6.4
16"x14"	400x350	1130	1140	1130	322	588	705	616	469.9	20-Ø44.5	88.9	6.4
18"x16"	450x400	1219	1232	1219	373	686	787	685.8	533.4	20-Ø50.8	101.6	6.4
20"x18"	500x450	1321	1334	1321	423	730	857	749.3	584.2	20-54	108	6.4
24"x20"	600x500	1549	1568	1549	471	770	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	150	216	165.1	91.9	8-Ø25.4	38.1	6.4
3"	80	470	473	470	74	192	267	203.2	127	8-Ø31.8	47.8	6.4
4"	100	546	549	546	100	215	311	241.3	157.2	8-Ø34.9	53.8	6.4
6"	150	705	711	705	144	342	394	317.5	215.9	12-Ø38.1	82.6	6.4
8"	200	832	841	832	192	388	483	393.7	269.7	12-Ø44.5	91.9	6.4
10"	250	991	1000	991	239	460	584	482.6	323.9	12-Ø50.8	108	6.4
12"	300	1130	1146	1130	287	520	673	571.5	381	16-Ø54	124	6.4
14"	350	1257	1276	1257	315	560	749	635	412.8	16-Ø60.3	133.4	6.4
16"	400	1384	1407	1384	360	600	826	704.9	469.9	16-Ø66.7	146.1	6.4
18"	450	1537	1559	1537	406	696	914	774.7	533.4	16-Ø73	162.1	6.4
20"	500	1664	1686	1664	454	724	984	831.9	584.2	16-79.4	177.8	6.4
24"	600	1943	1972	1943	546	806	1168	990.6	692.2	16-Ø92	203.2	6.4

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

## DIMENSIONS - CLASS 1500# REDUCED BORE

SIZE			L		d	H	De	Dc	ØRF	Drilling	C	t
NPS	DN	RF	RTJ	BW								
3"x2"	80x50	470	473	470	49	150	267	203.2	127	8-Ø31.8	47.8	6.4
4"x3"	100x80	546	549	546	74	192	311	241.3	157.2	8-Ø34.9	53.8	6.4
6"x4"	150x100	705	711	705	100	215	394	317.5	215.9	12-Ø38.1	82.6	6.4
8"x6"	200x150	832	841	832	144	342	483	393.7	269.7	12-Ø44.5	91.9	6.4
10"x8"	250x200	991	1000	991	192	388	584	482.6	323.9	12-Ø50.8	108	6.4
12"x10"	300x250	1130	1146	1130	239	460	673	571.5	381	16-Ø54	124	6.4
14"x12"	350x300	1257	1276	1257	287	520	749	635	412.8	16-Ø60.3	133.4	6.4
16"x14"	400x350	1384	1407	1384	315	560	826	704.9	469.9	16-Ø66.7	146.1	6.4
18"x16"	450x400	1537	1559	1537	360	600	914	774.7	533.4	16-Ø73	162.1	6.4
20"x18"	500x450	1664	1686	1664	406	696	984	831.9	584.2	16-79.4	177.8	6.4
24"x20"	600x500	1943	1972	1943	454	724	1168	990.6	692.2	16-Ø92	203.2	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	173	235	171.5	91.9	8-Ø28.6	50.8	6.4
3"	80	578	584	578	62	226	305	228.6	127	8-Ø34.9	66.5	6.4
4"	100	673	683	673	87	274	356	273.1	157.2	8-Ø41.3	76.2	6.4
6"	150	914	927	914	131	370	483	368.3	215.9	8-Ø54	108	6.4
8"	200	1022	1038	1022	179	420	552	438.2	269.7	12-Ø54	127	6.4
10"	250	1270	1292	1270	223	541	673	539.7	323.9	12-Ø66.7	165.1	6.4
12"	300	1422	1445	1422	265	643	762	619.2	381	12-Ø73	184.2	6.4

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

## DIMENSIONS - CLASS 2500# REDUCED BORE

SIZE			L		d	H	De	Dc	ØRF	Drilling	C	t
NPS	DN	RF	RTJ	BW								
3"x2"	80x50	578	584	578	42	173	305	228.6	127	8-Ø34.9	66.5	6.4
4"x3"	100x80	673	683	673	62	226	356	273.1	157.2	8-Ø41.3	76.2	6.4
6"x4"	150x100	914	927	914	87	274	483	368.3	215.9	8-Ø54	108	6.4
8"x6"	200x150	1022	1038	1022	131	370	552	438.2	269.7	12-Ø54	127	6.4
10"x8"	250x200	1270	1292	1270	179	420	673	539.7	323.9	12-Ø66.7	165.1	6.4
12"x10"	300x250	1422	1445	1422	223	541	762	619.2	381	12-Ø73	184.2	6.4

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

## NOTES

## NOTES



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# CONTROL VALVES GENERAL CATALOGUE

VALVES FOR PRESSURE AND  
FLOW CONTROL APPLICATIONS

## FCA CONTROL VALVE MODELS:

TG - GLOBE CONTROL VALVES  
TE - ECCENTRIC PLUG CONTROL VALVES  
TS - SEGMENTED PLUG CONTROL VALVES  
TA - AXIAL CONTROL VALVES

**FCA**

FLOW CONTROL APPLICATIONS





## 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.

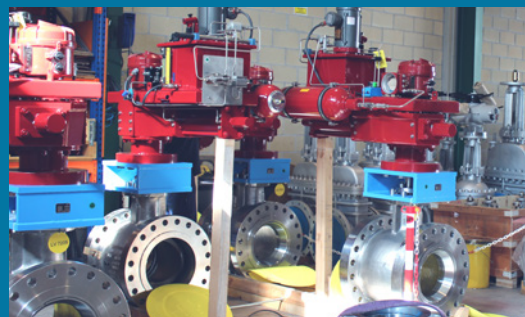
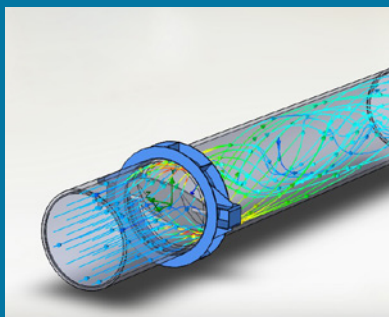
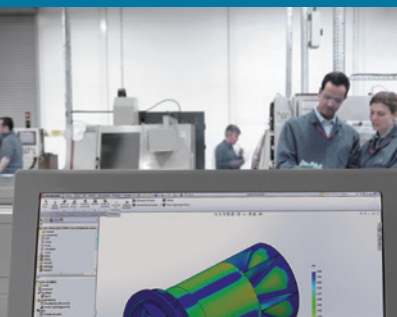
More and more customers trust our DNV certified solutions. **FCA** innovation-driven valves find solutions to any customer challenge or toughest application.

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.



## 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...



# CONTROL CONCEPT

Integral severe service solutions for customer application needs

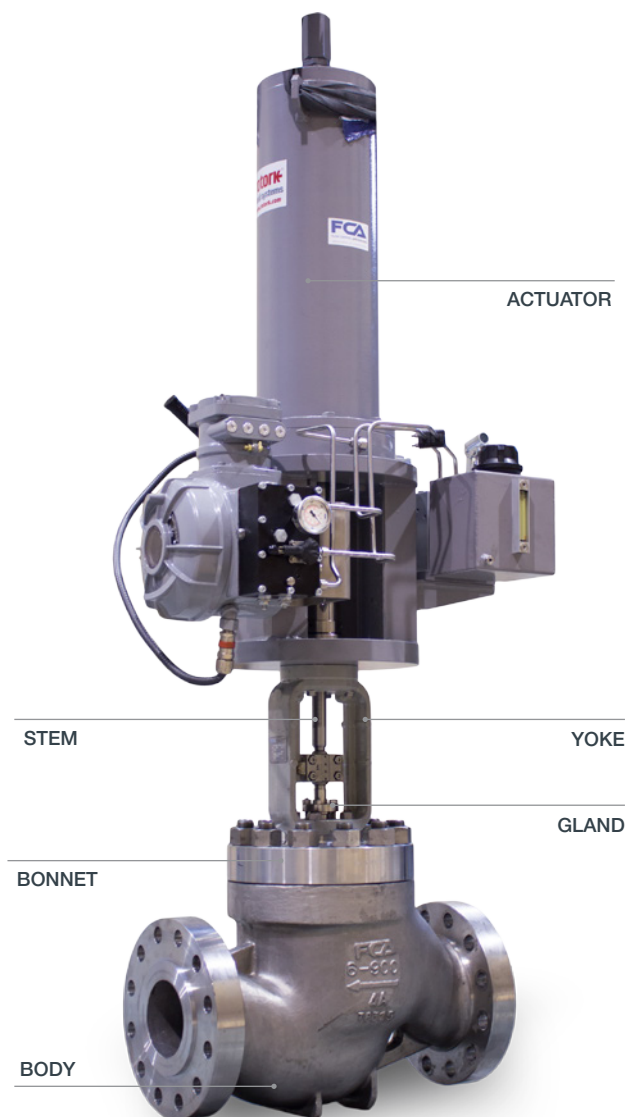
## CONTROL CAPACITY

Control valves are elements used in process control loops to adjust variables such as flow, liquid levels, pressure, etc... These devices are capable of modulating the flow varying degrees between minimal flow and full capacity in response to a signal from an external control device.

Control valves essentially consist of a valve and an actuator in order to achieve the desired controlling effect, essentially by throttling the flow. To modulate the flow, a valve plug moves in relation to the seat located within the valve body. The valve plug is attached to a stem connected to the actuator, which can be pneumatically, electrically or hydraulically operated.

Selection of a control valve is primarily dependent on the service conditions and necessary load characteristics of the application and must be sized according to it. The relationship between the control valve opening (also known as 'valve travel') and the flow through valve is known as the flow characteristic of that valve. This inherent flow characteristic is the relation between valve opening and flow capacity under constant pressure conditions. In relation to this point, different inherent flow characteristic curves can be reached and optimized for each working condition applications, so we can find **linear** flow characteristic curves, **equal percentage** designs, **quick opening** types and customized modified curves.

**FCA** offers control valve engineering for optimum valve sizing according to the working conditions, providing a wide range of designs able to efficiently meet customer specifications. Our product range consists of globe type valve, segmented, axial, butterfly and fixed cone valve designs which are capable to provide an extended range of **Cv values**, for valve sizes up to 48" and pressures up to class 2500#. Different trims designs can be selected in order to achieve the desired conditions.



## AUTOMATED SIZING TOOLS

**FCA** uses specific softwares for control valve sizing calculation which are based on current industry standards and calculation methods, considering standards such as ISA-75.01.01, ISA-S75.02, ISA-RP75.23, etc... These tools can significantly reduce the time needed to accurately specify and configure the valve so that right solution can be implemented for the considered working conditions. **FCA** control valve engineering department assures efficiently optimized designs and provides reliable parameter definitions to reach the correct goal.

# 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, 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 cage or trim for globe valves, 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 as AISI 410 or AISI 420 for higher corrosion resistance.

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

MATERIAL	CASTED (ASTM)	FORGED (ASTM)
Carbon Steel	A216 Gr. WCB	A105
Stainless Steel	A351 Gr. CF8 / Gr. 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.



# ACTUATION DEVICES

Pneumatic, Hydraulic or electric signals (or a combination of electro-hydraulic devices) are commonly used for valve direct acting to create a modulating control action from an external control device.

As standard a Pneumatic Diaphragm actuator controls the plug position on globe valves by a signal loaded by the internal or external controller, providing a good linearity relationship between air pressure signal and valve travel. The force of the air signal is received into the actuator through a top port and distributed across the full area of the actuator's diaphragm. The diaphragm presses down on it's plate and the return spring, which then moves the valve stem and plug assembly downward to stroke the valve.

Electric actuators are motor driven devices that uses an electrical input signal to generate a motor shaft rotation. This rotation can be translated into a linear motion system (for linear controlled valves) which drives the valve stem and plug for flow modulation.

FCA has close cooperation with many world leader actuator manufactories and can offer a wide variety of interchangeable actuators:

- Electric motor.
- Pneumatic cylinder.
- Hydraulic cylinder.
- Electro-Hydraulic cylinder.
- Manually operated emergency systems.





## FLOW COEFFICIENT VALUE

Control valve sizing and selection is based on a combination of theory and empirical data. The capacity, characteristic, rangeability and recovery are four important elements for selection of a control valve. **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. This important parameter is critical for control valve sizing and gives the essence of valve performance.

The required **Cv** for a valve can thus be calculated based on flow and pressure working conditions. This **Cv** should then be matched to a suitable valve so that the required **Cv** falls between reasonable valve travel of the selected valve **Cv** capability. Maximum and minimum process flows has also to be taken into consideration while selecting the valve.

# SIZING AND SELECTION ENGINEERING

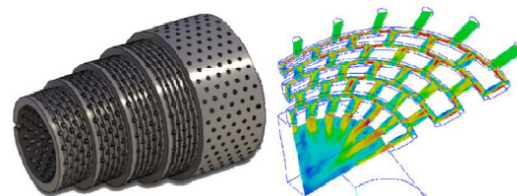
A control valve will perform satisfactory according to working conditions if it is sized correctly. For this sizing process the Cv shall be determined and also the required  $F_L$ , Flow velocities, Flow noise, appropriate actuator, etc... **FCA** Control valve specialists consider experimental and advanced software applications including computational fluid dynamics, together with their worldwide proven know-how, to analyze and select the appropriate valve accordingly. Selecting trims and configurations from an extended database with those and more determined parameters as:

- **FL: Liquid Pressure Recovery coefficient**, which is a dimensionless constant used to calculate pressure drop when the valve's liquid flow is choked.
- **Vena Contracta**: Where fluid's velocity is the highest and so on the fluid's pressure is the lowest.
- **Rangeability** of valve can be defined as the ratio of maximum to minimum flow over which good control can be achieved by using the valve.
- **Valve characteristic** is the relation between valve opening (valve travel) and flow through the valve.

Cavitation, flashing, choked flow, piping geometry, pressure drop ratio factors, actuator forces, noise, liquid properties and more important factors are also considered and performed by **FCA** team.

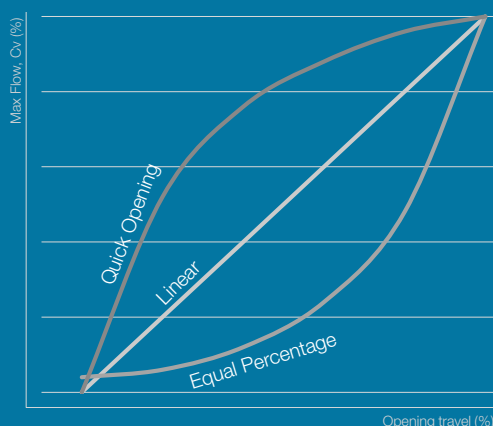
## CAE ENGINEERING TOOLS

**FCA** uses specific softwares for control valve sizing calculation which are based on current industry standards and calculation methods, considering standards such as ISA-75.01.01, ISA-S75.02, ISA-RP75.23, etc... These tools can significantly reduce the time needed to accurately specify and configure the valve so that right solution can be implemented for the considered working conditions. **FCA** control valve engineering department assures efficiently optimized designs and provides reliable parameter definitions to reach the correct goal.



Construction and response to pressure drop for a fluid through multi-stage trim.

# INHERENT FLOW CHARACTERISTIC



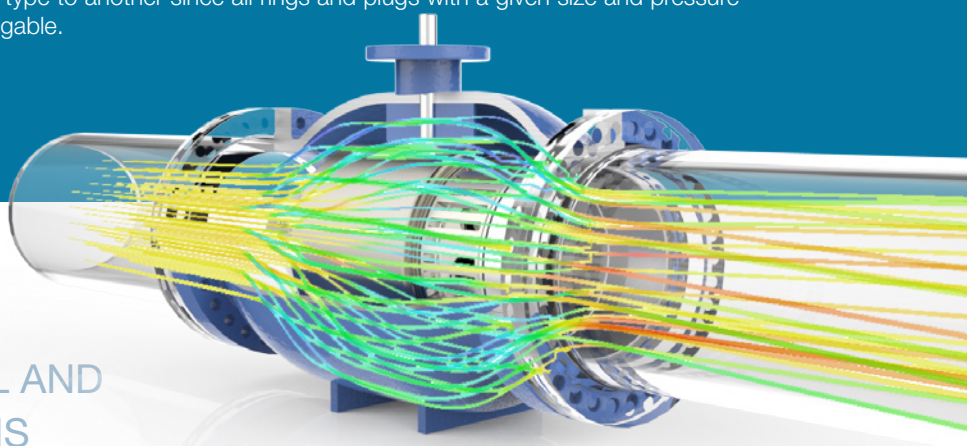
Linear flow characteristic curves have constant slope, therefore the linear gain is independent of travel. It produces equal changes in flow per unit of valve stroke regardless of plug position.

Quick opening characteristic can be provided by **FCA** to offer quick opening to establish significant flow with minimum travel. The gain of this characteristic is constant up to 70% of the rated flow and then decreases. generally used for on-off services, designed to produce maximum flow quickly.

For an inherent valve body gain directly proportional to flow equal percentage designs are available. Is the most commonly characteristic curve used in control processes.

Other characteristics such as modified linear or modified equal percentage result from specific valve trims accordingly designed to meet project working conditions.

**FCA** offers a wide range of trims structures and cage designs with unbalanced or balanced configurations to result in stronger vibration-proof closure performances. **FCA** valves can be converted from one trim type to another since all rings and plugs with a given size and pressure are completely interchangeable.



## FCA CAVITATION CONTROL AND NOISE-ATTENUATION TRIMS

Cavitation not only decreases flow capability through control valves, it may also cause material damage, excessive noise and high vibrations on body and its components.

Under severe working conditions Multi-hole and Multi-stage pressure cage structures are suitable for high temperature and high differential pressure control situations. **FCA** designs remarkably prevent the cavitation and reduces the noise providing to customer long service life valves.

### DESIGN FEATURES

The **FCA** Control Valves are selected to fit application and piping requirements and to eliminate problems like cavitation, noise, erosion and vibrations by effectively control fluid parameters.

**FCA** trims are built for long-term and trouble-free service. The key features of a **FCA** Control Valve are the valve body, which is sized efficiently to meet operation pressure and flow requirements; the cage, which provides control for different fluid parameters; the body assembly, which includes the seat ring, bonnet, plug assembly, and bonnet spacer or balance cylinder (depending on valve model); the actuator assembly, which regulates the valve trim; and accessory components and controls selected to meet or exceed valve performance requirements.



# FCA CONTROL SERVICE SOLUTIONS

Wide product range to meet application needs

## CONTROL GLOBE VALVES - TG/TGM MODELS

The TG and TGM control valve model from FCA is a robust and heavy-section globe valve with a plug designed to accurately control the flow. It is a high performance valve with high flow capacity and a tight shut-off. It is designed for excellent flow control rangeability and its cast steel body is proportioned to withstand high pipe stresses without distortion. It accepts high pressure drops and mechanisms to prevent cavitation and noise are available.

To face a wide range of applications different structure and trim types are available, such as top-guided or cage-guided structures with multi-hole cage (TGM valve model) making the valve competent for severe working conditions, supporting pressures up to class 2500#. Balanced or unbalanced trims, single or double seated structures, soft or metal seats together with different bonnet type designs are available to meet customer special application needs. Linear, equal percentage or quick opening flow characteristic curves can be provided.

Sizes from DN50/2" up to DN600/24", although other sizes can be available under request.

### PRESSURE RANGE

· ANSI CLASS 150#, 300#, 600#, 900#, 1500# and 2500#.

Other pressures on request.

### TESTING

All FCA Control valve models have been hydrostatically tested.

NOMINAL PRESSURE (Kg/cm <sup>2</sup> )		150#	300#	600#	900#	1500#	2500#
TEST PRESSURE	Shell Test	31	80	159	238	396	660
	Seat Test	4	4	4	4	4	4

### TECHNICAL SPECIFICATIONS

DESIGN AND MANUFACTURE	ANSI / ASME B16.34
FACE-TO-FACE	IEC 60534-3 / ISA 75.08 / ASME B16.10
FLANGE ENDS	ANSI / ASME B16.5 / B16.25 / B16.11
INSPECTION & TEST	IEC 60534-4 / ANSI-FCI 70-2-2006

### APPLICATIONS

- Modulating services.
- High pressure drops.
- Continuous working services.
- Severe working applications.
- Anti-Cavitation and noise attenuation.
- etc...

### SECTORS

- Water pump stations.
- Mineral processing.
- Petrochemical plants.
- Oil & gas.
- etc...



## FLOW COEFFICIENT TABLE - Standard Top guided Globe valve

SIZE		Rating Cv value									
		Valve opening travel %									
Valve	Seat	Equal Percentage Characteristic					Linear Characteristic				
		10	30	50	80	100	10	30	50	80	100
DN50 / 2"	1-1/4"	0.9	1.7	3.4	9.5	18.7	2.7	6.6	10.6	14.6	20.5
	1-1/2"	1.4	2.7	5.4	14.8	29.1	4.1	10.4	16.6	22.8	32.0
	2"	2.2	4.3	8.5	23.7	46.7	6.7	16.6	26.6	36.5	51.4
DN65 / 2-1/2"	1-1/2"	1.4	2.7	5.4	14.9	29.2	4.2	10.4	16.6	22.8	32.1
	2"	2.2	4.3	8.5	23.7	46.7	6.7	16.6	26.6	36.5	51.4
	2-1/2"	3.3	6.8	13.5	37.4	73.5	10.5	20.0	41.6	57.2	80.5
DN80 / 3"	2"	2.2	4.3	8.5	23.7	46.7	6.7	16.6	26.6	36.5	51.4
	2-1/2"	3.3	6.8	13.5	37.4	73.5	10.5	20.0	41.6	57.2	80.5
	3"	5.5	10.8	21.4	59.3	116.7	16.7	41.5	66.4	91.1	128.4
DN100 / 4"	2-1/2"	3.3	6.8	13.5	37.4	73.5	10.5	20.0	41.6	57.2	80.5
	3"	5.5	10.8	21.4	59.3	116.7	16.7	41.5	66.4	91.1	128.4
	4"	8.7	17.3	34.2	94.9	186.7	26.7	66.3	106.2	145.8	205.4
DN125 / 5"	3"	5.5	10.8	21.4	59.3	116.7	16.7	41.5	66.4	91.1	128.4
	4"	8.7	17.3	34.2	94.9	186.7	26.7	66.3	106.2	145.8	205.4
	5"	13.6	27.1	53.4	148.2	291.7	41.7	103.7	165.9	227.9	320.9
DN150 / 6"	4"	8.7	17.3	34.2	94.9	186.7	26.7	66.3	106.2	145.8	205.4
	5"	13.6	27.1	53.4	148.2	291.7	41.7	103.7	165.9	227.9	320.9
	6"	21.8	43.2	85.4	237.1	466.8	66.8	165.9	265.5	364.6	513.5
DN200 / 8"	5"	13.6	27.1	53.4	148.2	291.7	41.7	103.7	165.9	227.9	320.9
	6"	21.8	43.2	85.4	237.1	466.8	66.8	165.9	265.5	364.6	513.5
	8"	32.3	68.1	135.0	373.5	735.2	104.7	260.1	416.3	571.7	805.2
DN250 / 10"	10"	46.9	91.3	181.0	504.0	1000.0	144.0	356.0	569.0	783.0	1102.0
DN300 / 12"	12"	70.8	140.5	279.0	774.0	1521.0	220.0	543.0	868.0	1194.0	1680.0

## NOT STANDARD DESIGNS

Special valve construction is important as they have to adapt to the needs of each installation. The different designs are aimed to solve specific process problems and optimize their performance.

For special control valve design and manufacture, valve and other equipment engineering projects are made according to each client specifications and working conditions, which gives FCA a high capacity of adaptation, necessary and highly valued by the industrial customers.

## CE SECURITY MARKED

Following the CE norms, all valves equipped with automatic actuators are supplied with shields, which prevent any objects from being accidentally trapped or dragged.

## 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.

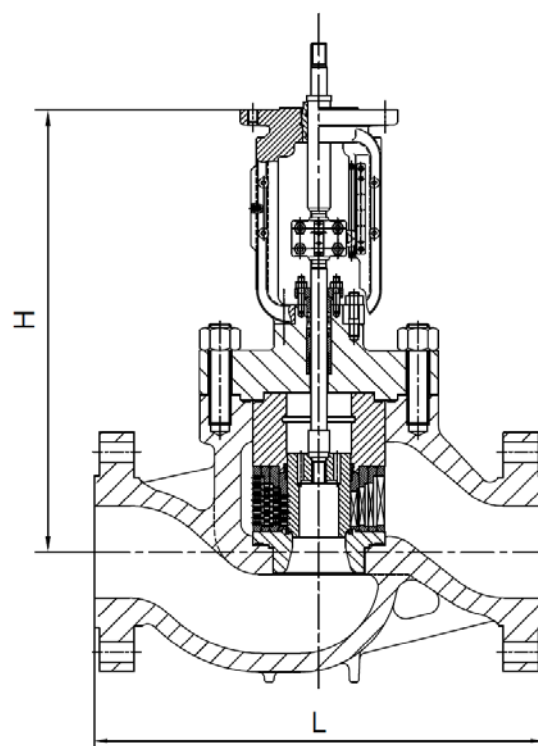
Depending on the valve application, FCA offers special treatments for specific abrasive and corrosive solutions like hardening, valve or component protective coating, etc... More information on request.

## CONTROL GLOBE VALVE GENERAL DIMENSIONS

Standard version available from DN50/2" to DN600/24", other sizes on request. Drawing according to multi-stage trim TGM globe valve.

### ACCESORIES AND OPTIONS

- Other Structures and Trim types.
- Linear, equal percentage or modified characteristic curve.
- Anti-cavitation trim.
- Noise reduction trim.
- Balanced or not-balanced.
- FTO and FTC configurations.
- Standard or extended bonnet design.
- Air filters, Positioners, Solenoid valves, Limit switches, Regulators,
- Superior sizes.
- Wide range of actuation types.
- By-pass valves.



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DN	SIZE	CLASS 150#				CLASS 300#				CLASS 600#			
		H mm	L - RF mm	L - RTJ mm	L - BW mm	H mm	L - RF mm	L - RTJ mm	L - BW mm	H mm	L - RF mm	L - RTJ mm	L - BW mm
50	2"	158	254	267	286	158	267	282	375	158	286	284	375
80	3"	210	298	311	337	210	318	333	460	218	337	340	460
100	4"	237	352	365	394	237	368	384	530	250	394	397	530
150	6"	318	451	464	508	318	473	489	768	327	508	511	768
200	8"	385	543	556	610	385	568	584	832	385	610	613	832
250	10"	395	673	686	752	395	708	724	991	398	752	755	991
300	12"	445	737	749	819	445	775	790	1130	455	819	822	1130
350	14"	515	889	902	1029	515	927	943	1257	535	972	975	1257
400	16"	520	1016	1029	1108	520	1057	1073	1422	543	1108	1111	1422
DN	SIZE	CLASS 900#				CLASS 1500#				CLASS 2500#			
		H mm	L - RF mm	L - RTJ mm	L - BW mm	H mm	L - RF mm	L - RTJ mm	L - BW mm	H mm	L - RF mm	L - RTJ mm	L - BW mm
50	2"	210	375	375	375	210	375	375	375	210	400	400	400
80	3"	281	410	410	460	281	460	460	460	281	660	660	498
100	4"	342	511	511	530	342	530	530	530	342	737	737	575
150	6"	429	714	714	768	429	768	768	768	429	864	864	819
200	8"	492	914	914	832	492	972	972	832	492	1022	1022	1029
250	10"	513	991	991	991	513	1067	1067	991	513	1372	1372	1270
300	12"	587	1130	1130	1130	587	1219	1219	1130	587	1575	1575	1422
350	14"	615	1257	1257	1257	615	1257	1257	1257	-	-	-	-
400	16"	735	1422	1422	1422	735	1422	1422	1422	-	-	-	-

RF: Raised Face flanged ends. RTJ: Ring Joint Type flanged ends. BW: Butt-Welded ends.  
Contact FCA for superior size valves up to 24".



## ECCENTRIC PLUG AND SEGMENT CONTROL VALVES - TE AND TS MODELS

FCA TE model is a rotatory control valve with an eccentric plug inside. The valve plug adopts a spherical surface that when turning the plug shaft from closed to open position, the eccentric plug design lifts off the seat smoothly, so open and close torque values are minimized. TE model valves provides a good seal and high dynamic stability, in metal or soft seated designs (up to class V for metal seated and class VI for soft configuration).

TS Model control valves provide a segmented trim which can fit to a wide range of control applications and characteristic curve requirements as different bore configurations can be supplied.

Both valves are compactly designed to perform high flow coefficient values (Cv) in comparison to globe valves so costs may be reduced to meet similar working conditions. Offers high rangeability values, even over 200:1 and can achieve linear or equal percentage flow characteristic curves. FCA quarter turn radial operation TE and TS valves perform a tight shutt-off and a straight-through bore. Suitable for controlling slurries, high viscosity fluids, pulp and paper, gases and vapours, etc...

Special materials for body and trim are available and flanges are supplied according to customer specifications. In sizes up to DN400/16".

### RESSURE RANGE

· ANSI CLASS 150#, 300#, 600# and 900#.

Other pressures on request.

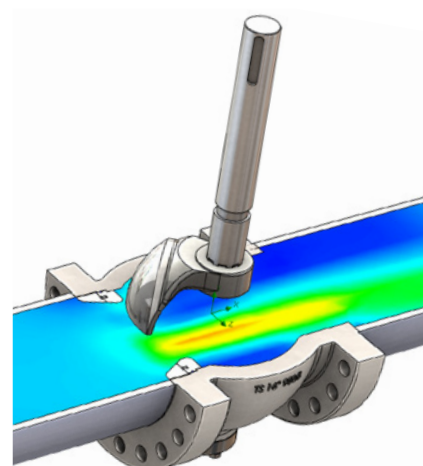
### FLOW COEFFICIENT TABLE - Standard TE valve model

SIZE	Rating Cv value			
	Valve opening travel %			
	Equal Percentage Characteristic			
	25	40	60	100
DN50 / 2"	22	36	50	81
DN80 / 3"	81	121	168	254
DN100 / 4"	116	173	243	416
DN150 / 6"	214	318	497	832
DN200 / 8"	283	451	728	1272
DN250 / 10"	578	983	1422	2254
DN300 / 12"	740	1040	1734	3121
DN400 / 16"	1272	1850	3121	5434
DN500 / 20"	1445	2659	4393	7746



### OPEN FLOW PATH

TE model control valve provides an open path that gives more high rated Cv values than valves that have the stem obstruction the flow. Considering this essential point, in many cases it is possible to use a smaller and more economical valve.



Velocity distribution as result of open flow path achieving high rated flow coefficients.



## TE MOD. ECCENTRIC PLUG VALVE GENERAL DIMENSIONS

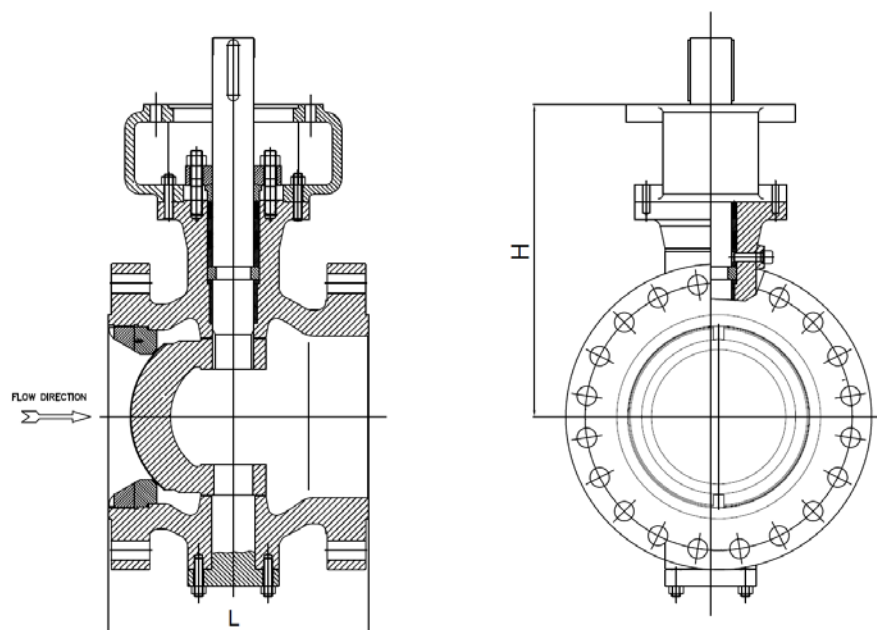
Standard version available from DN50/2" to DN400/16", other sizes on request.

Face to Face according to EN-558 Series 36, other face to face on request.

### ACCESORIES AND OPTIONS

- Linear, equal percentage or modified characteristic curve.
- Noise reduction trim.
- FTO and FTC configurations.
- Air filters, Positioners, Solenoid valves, Limit switches, Regulators,
- Superior sizes.
- Wide range of actuation types.
- By-pass valves.

Contact FCA for data regarding TS model segmented control valves or more information.



DN	SIZE	CLASS 150#		CLASS 300#		CLASS 600#		CLASS 900#	
		H mm	L - RF mm	H mm	L - RF mm	H mm	L - RF mm	H mm	L - RF mm
50	2"	240	124	240	124	250	124	250	124
80	3"	270	165	276	165	290	165	290	165
100	4"	295	194	302	194	315	194	315	194
150	6"	350	229	355	229	375	229	375	229
200	8"	388	243	395	243	422	243	422	243
250	10"	462	297	470	297	490	297	490	297
300	12"	545	338	555	338	575	338	575	338
350	14"	600	-	610	-	640	-	640	-
400	16"	670	400	690	400	720	400	720	400

RF: Raised Face flanged ends.

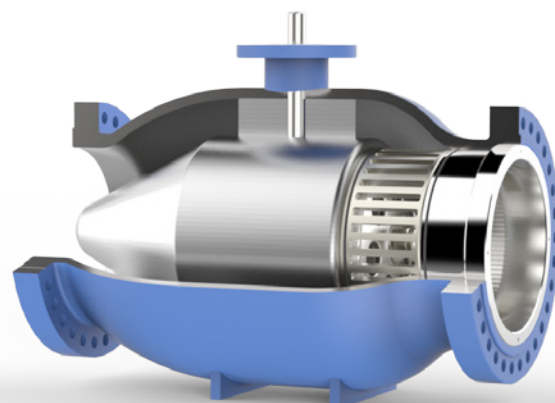
## AXIAL CONTROL VALVES - TA MODEL

The TA model Axial Control Valve from FCA is a robust, high performance and low maintenance control valve. It offers a streamlined symmetrical and unrestricted flow path between the valve body to eliminate indirect flows and unnecessary direction changes through the valve. Has been accurately designed to regulate pressure or flow rate, principally in water supplying applications.

The design enables a linear control curve over the entire control range of the valve and performs an annular flow cross section in any open position. This geometrically optimized and symmetrical shape design results in significant reductions in noise and turbulence.

The high inherent capacity of the FCA axial control valve compared to conventional globe designs allows a smaller valve size selection, and together with its compact and low weight design can result in a more efficient economical solution.

Special materials for body and trim are available and flanges are supplied according to customer specifications. In sizes up to DN1200/48".



### PRESSURE RANGE

· DIN PN10, PN16, PN25 & PN40.

Other pressures on request.

### OPERATIONAL BENEFITS

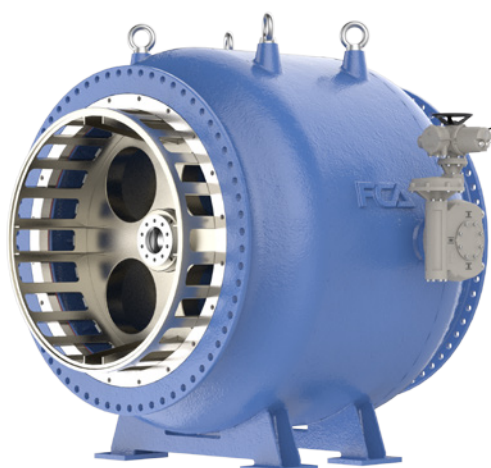
- High Flow Capacity ·
- Excelent Control Rangeability ·
- Noise, erosion and vibration reduction ·
- Anti-Cavitation design ·
- Bubble tight shut-off ·
- Compact design ·
- Pressure Balanced ·
- Fast response and short stroking time ·
- Multiple Trim design variety ·
- etc... ·

### APPLICATIONS

- Drinking water.
- Raw water.
- Bottom outlet of dams.
- Turbine control and bypass.
- Pump start-up.
- Reservoir inlet.
- industrial applications.
- Natural gas.
- etc...

### SECTORS

- Hydro power plants.
- Dams.
- Water treatment plants.
- Water distribution.
- Water pump stations.
- Oil & gas.
- etc...



### TECHNICAL SPECIFICATIONS

PRESSURE RATING	ASME / DIN
FACE-TO-FACE	Manufacturers standard
SEAT LEAKAGE	ANSI / FCI 70-2
INSPECTION & TEST	ANSI B16.34

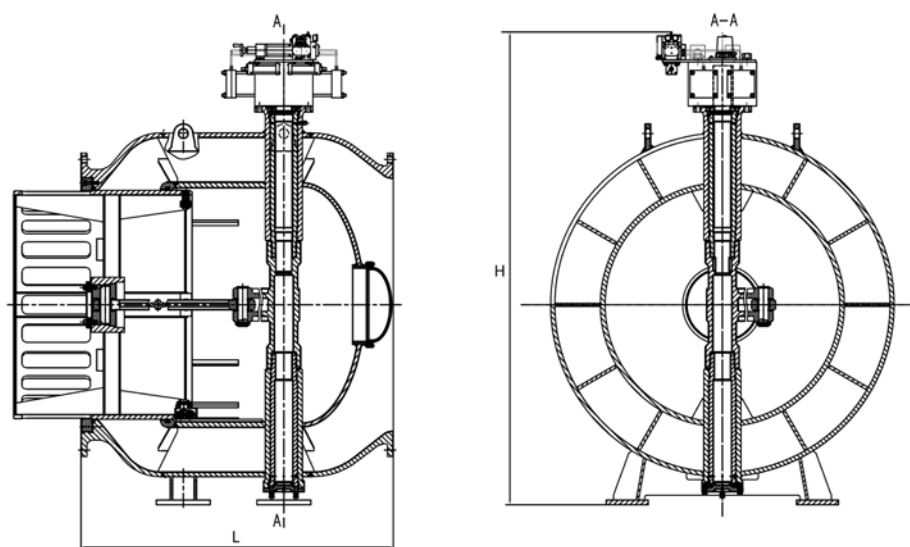
NOMINAL PRESSURE (bar)		PN10	PN16	PN25	PN40
TEST PRESSURE	Shell Test	11	18	28	44
	Seat Test	4	4	4	4

## AXIAL CONTROL VALVE GENERAL DIMENSIONS

Standard version available from DN150/6" to DN1200/48", other sizes on request.

### ACCESORIES AND OPTIONS

- Other Structures and Trim types.
- Linear, equal percentage or modified characteristic curve.
- Anti-cavitation trim.
- Noise reduction trim.
- Air filters, Positioners, Solenoid valves, Limit switches, Regulators,
- Superior sizes.
- Wide range of actuation types.
- By-pass valves.



DN	SIZE	PN10			PN16			PN25		
		L mm	H mm	Weight Kg	L mm	H mm	Weight Kg	L mm	H mm	Weight Kg
150	6"	300	710	80	300	710	80	300	710	85
200	8"	400	768	125	400	768	125	400	768	130
250	10"	500	825	160	500	825	165	500	825	185
300	12"	600	900	245	600	900	255	600	900	290
400	16"	800	1120	410	800	1120	440	800	1120	465
450	18"	900	1120	610	900	1120	620	900	1120	645
500	20"	1000	1220	890	1000	1220	915	1000	1220	940
600	24"	1200	1420	1510	1200	1420	1590	1200	1420	1680
700	28"	1400	1520	2210	1400	1520	2310	1400	1520	2450
800	32"	1600	1730	2710	1600	1730	2780	1600	1730	2905
900	36"	1800	1840	3390	1800	1840	3480	1800	1840	3660
1000	40"	2000	1940	4610	2000	1940	4700	2000	1940	4830
1200	48"	2400	2250	6700	2400	2250	6770	2400	2250	6920

# FLANGE DRILLING INFORMATION

FCA offers the possibility of valve adaptation to most common pipe fitting flanges. As standard ASME B16.5 or ASME B16.47 (for valve sizes over 24") will be supplied for Control valves.



## ASME B16.5

### CLASS 150#

&lt;&lt;

SIZE inch	FLANGE DIAMETER inch	No. HOLES	HOLE DIAMETER inch	BOLT CIRCLE inch
2	6.00	4	0.75	4.75
3	7.50	4	0.75	6.00
4	9.00	8	0.75	7.50
6	11.00	8	0.88	9.50
8	13.50	8	0.88	11.75
10	16.00	12	1.00	14.25
12	19.00	12	1.00	17.00
14	21.00	12	1.12	18.75
16	23.50	16	1.12	21.25
18	25.00	16	1.25	22.75
20	27.50	20	1.25	25.00
24	32.00	20	1.38	29.50

### CLASS 300#

&lt;&lt;

SIZE inch	FLANGE DIAMETER inch	No. HOLES	HOLE DIAMETER inch	BOLT CIRCLE inch
2	6.50	8	0.75	5.00
3	8.25	8	0.88	6.62
4	10.00	8	0.88	7.88
6	12.50	12	0.88	10.62
8	15.00	12	1.00	13.00
10	17.50	16	1.12	15.25
12	20.50	16	1.25	17.75
14	23.00	20	1.25	20.25
16	25.50	20	1.38	22.50
18	28.00	24	1.38	24.75
20	30.50	24	1.38	27.00
24	36.00	24	1.62	32.00

## CLASS 600#

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SIZE inch	FLANGE DIAMETER inch	No. HOLES	HOLE DIAMETER inch	BOLT CIRCLE inch
2	6.50	8	0.75	5.00
3	8.25	8	0.88	6.62
4	10.75	8	1.00	8.50
6	14.00	12	1.12	11.50
8	16.50	12	1.25	13.75
10	20.00	16	1.38	17.00
12	22.00	20	1.38	19.25
14	23.75	20	1.50	20.75
16	27.00	20	1.62	23.75
18	29.25	20	1.75	25.75
20	32.00	24	1.75	28.50
24	37.00	24	2.00	33.00

## CLASS 900#

<<

SIZE inch	FLANGE DIAMETER inch	No. HOLES	HOLE DIAMETER inch	BOLT CIRCLE inch
2	6.50	8	0.75	5.00
3	9.50	8	1.00	7.50
4	11.50	8	1.25	9.25
6	15.00	12	1.25	12.50
8	18.50	12	1.50	15.50
10	21.50	16	1.50	18.50
12	24.00	20	1.50	21.00
14	25.25	20	1.62	22.00
16	27.75	20	1.75	24.25
18	31.00	20	2.00	27.00
20	33.75	20	2.12	29.50
24	41.00	20	2.62	35.50

## CLASS 1500#

<<

SIZE inch	FLANGE DIAMETER inch	No. HOLES	HOLE DIAMETER inch	BOLT CIRCLE inch
2	8.50	8	1.00	6.50
3	10.50	8	1.25	8.00
4	12.25	8	1.38	9.50
6	15.50	12	1.50	12.50
8	19.00	12	1.75	15.50
10	23.00	12	2.00	19.00
12	26.50	16	2.12	22.50
14	29.50	16	2.38	25.00
16	32.50	16	2.62	27.75
18	36.00	16	2.88	30.50
20	38.75	16	3.12	32.75
24	46.00	16	3.62	39.00

## CLASS 2500#

<<

SIZE inch	FLANGE DIAMETER inch	No. HOLES	HOLE DIAMETER inch	BOLT CIRCLE inch
2	9.25	8	1.12	6.75
3	12.00	8	1.38	9.00
4	14.00	8	1.62	10.75
6	19.00	8	2.12	14.50
8	21.75	12	2.12	17.25
10	26.50	12	2.62	21.25
12	30.00	12	2.88	24.38

## DIN EN1092-1

## PN6

&lt;&lt;

DN mm	FLANGE DIAMETER mm	No. HOLES	HOLE DIAMETER Met.	BOLT CIRCLE mm
50	140	4	M12	110
80	190	4	M16	150
100	210	4	M16	170
150	265	8	M16	225
200	320	8	M16	280
250	375	12	M16	335
300	440	12	M20	395
350	490	12	M20	445
400	540	16	M20	495
450	595	16	M20	550
500	645	20	M20	600
600	755	20	M24	705
700	860	24	M24	810
800	975	24	M27	920
900	1075	24	M27	1020
1000	1175	28	M27	1120
1200	1405	32	M30	1340

## PN10

&lt;&lt;

DN mm	FLANGE DIAMETER mm	No. HOLES	HOLE DIAMETER Met.	BOLT CIRCLE mm
50	165	4	M16	125
80	200	4	M16	160
100	220	4	M16	180
150	285	8	M20	240
200	340	8	M20	295
250	395	12	M20	350
300	445	12	M20	400
350	505	16	M20	460
400	565	16	M24	515
450	615	20	M24	565
500	670	20	M24	620
600	780	35	M27	725
700	895	24	M27	840
800	1015	24	M30	950
900	1115	28	M30	1050
1000	1230	28	M33	1160
1200	1455	32	M36	1380

## PN16

&lt;&lt;

DN mm	FLANGE DIAMETER inch	No. HOLES	HOLE DIAMETER Met.	BOLT CIRCLE inch
50	165	4	M16	125
80	200	8	M16	160
100	220	8	M16	180
150	285	8	M20	240
200	340	12	M20	295
250	405	12	M24	355
300	560	12	M24	410
350	520	16	M24	470
400	580	16	M27	525
450	640	20	M27	585
500	715	20	M30	650
600	840	20	M33	770
700	910	24	M33	840
800	1025	24	M36	950
900	1125	28	M36	1058
1000	1255	28	M39	1170
1200	1485	32	M45	1390

## PN25

&lt;&lt;

DN mm	FLANGE DIAMETER inch	No. HOLES	HOLE DIAMETER Met.	BOLT CIRCLE inch
50	165	4	M16	125
80	200	8	M16	160
100	235	8	M20	190
150	300	8	M24	250
200	360	12	M24	310
250	425	12	M27	370
300	485	16	M27	430
350	555	16	M30	490
400	620	16	M33	550
450	670	20	M33	600
500	730	20	M33	660
600	845	20	M36	770
700	980	24	M39	875
800	1085	24	M45	990
900	1185	28	M45	1090
1000	1320	28	M52	1210
1200	1530	32	M52	1420



## PN40

<<

DN mm	FLANGE DIAMETER mm	No. HOLES	HOLE DIAMETER Met.	BOLT CIRCLE mm
50	165	4	M16	125
80	200	8	M16	160
100	235	8	M20	190
150	300	8	M24	250
200	375	12	M27	320
250	450	12	M30	385
300	515	16	M30	450
350	580	16	M33	510
400	660	16	M36	585
450	685	20	M36	610
500	755	20	M39	670
600	890	20	M45	795

## PN63

<<

DN mm	FLANGE DIAMETER mm	No. HOLES	HOLE DIAMETER Met.	BOLT CIRCLE mm
50	180	4	M20	135
80	215	8	M20	170
100	250	8	M24	200
150	345	8	M30	280
200	415	12	M33	345
250	470	12	M33	400
300	530	16	M33	460
350	600	16	M36	525
400	670	16	M39	585
500	800	20	M45	705
600	930	20	M52	820
700	1045	24	M52	935
800	1165	24	M56	1050
900	1285	28	M56	1170
1000	1415	28	M64	1290
1200	1665	32	M72	1530



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## BELL VALVES CATALOGUE

VC MODEL VALVES





## 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.

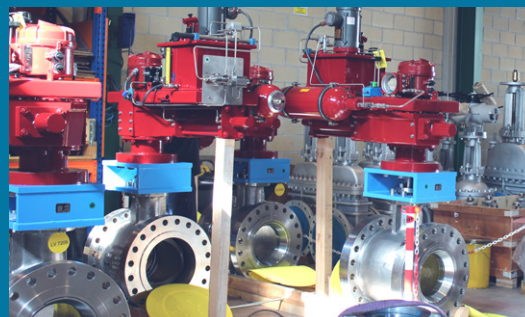
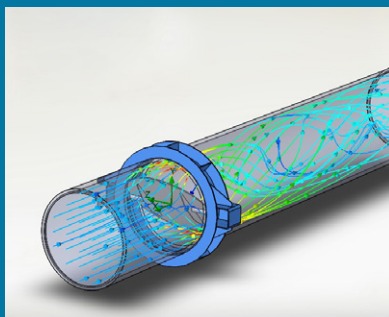
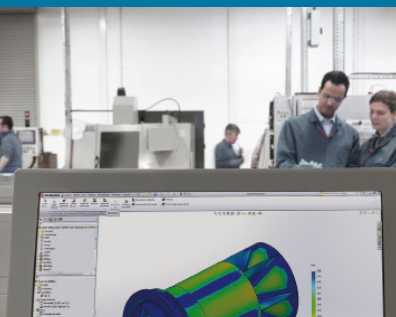
More and more customers trust our DNV certified solutions. **FCA** innovation-driven valves find solutions to any customer challenge or toughest application.

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.

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## 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 to 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.



## 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 9001-2015 quality standard, guaranteed and certified by DNV. Additionally, international certifications are met such as American Petroleum Institute for API 6D-Specification for Pipeline Valves and API 609-Butterfly Valves: Double-flanged, Lug-and Wafer-type. CE for Pressure Equipment Directive (97/23/EC), CE Directive 2006/42/EC for machinery, ATEX Directive 94/9/EC, GOST TR/CU, etc...



API-6D License No. 1588  
API-609 License No. 0116



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# SPECIFICATIONS AND STANDARDS

The VC model FCA bell valve is designed for its use in discharging tanks and is also installed at the inlet of pressure propellers. Its main use is related to the pneumatic transport of abrasive dust and solids.

This valve performs two combined functions: it is used as a discharging element and, at the same time, it isolates the tank. The sealing is 100% tight with the provision of a bell type obturator with a circular base and a soft seal ring that can be provided in different materials. Depending on the working conditions, the sealing may be metal to metal contact, specially provided for high temperature applications.

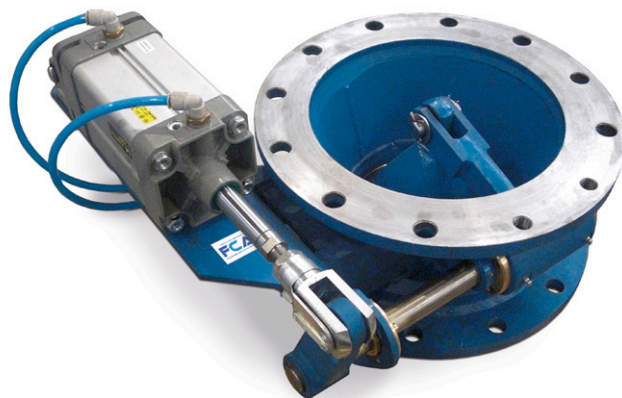
In addition, valve can be designed in order to fit customer requisitions, considering even different flanges for both sides.

## SECTORS

- Petrochemical Plants.
- Steel Industry.
- Thermal power plants.
- etc...

## APPLICATIONS

- Discharge tanks.
- Inlet of pressure propellers.
- Dust and solid transport.
- etc...



## SIZES

- » DN 200/8" to DN 400/16".
- Other sizes on request.

## PRESSURE RANGE

- » Up to 6 bar.
- Other pressures on request.

## TESTING

Each FCA VC bell valves is hydrostatically tested to ensure shell resistance, packing and seat integrity and valve operation reliability.

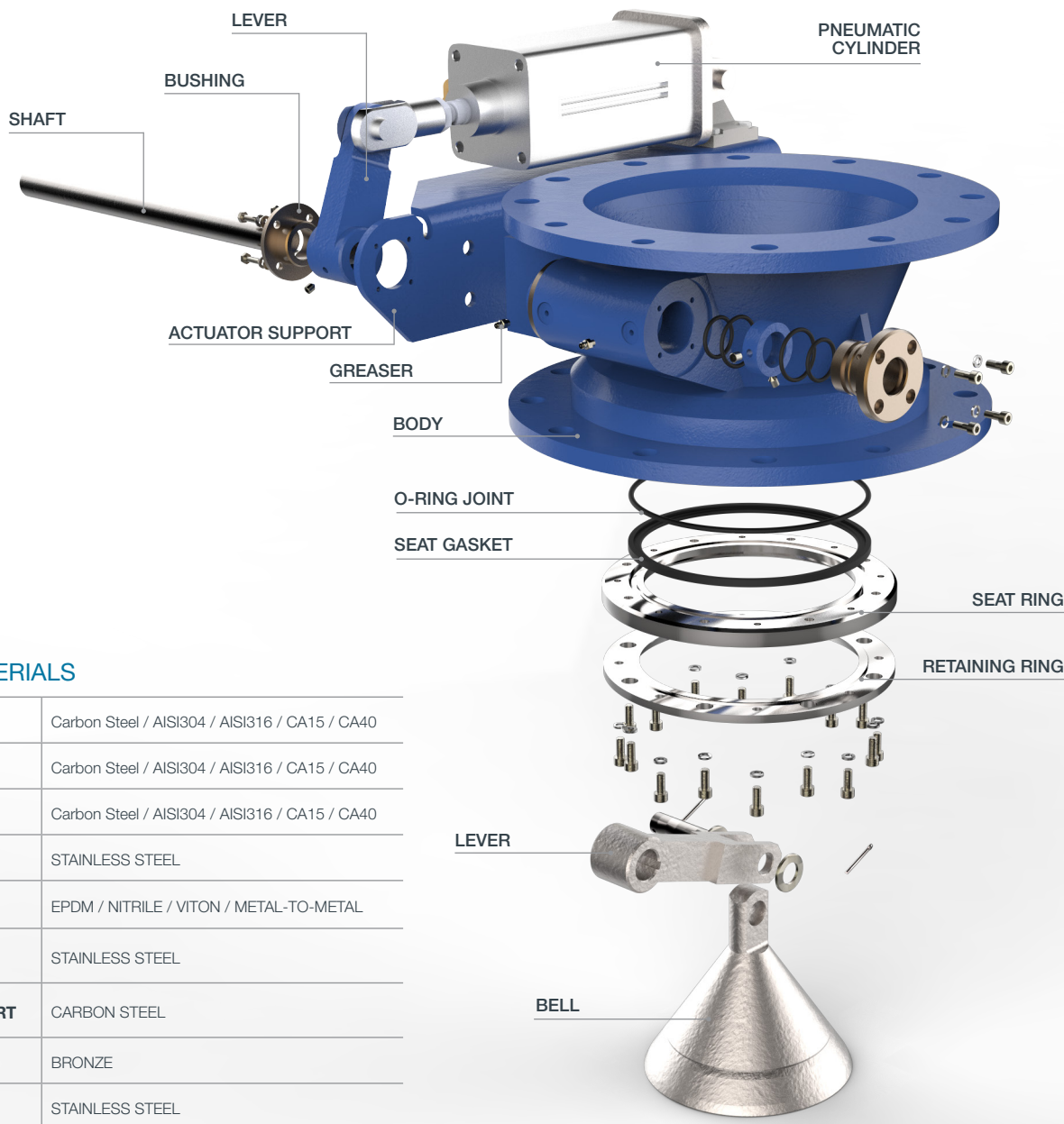
## FLANGE DRILLING

- » DIN PN6 / PN10 & PN16.
  - » ANSI B16.5 CLASS 150.
- Other flange drillings on request. Refer to Annex for more information on dimensions and measures.

## DIRECTIVES

Pressure Equipment Directive: DIR 97/23/CE (PED).  
Other Directives: DIR 2006/42/CE, DIR 94/9/CE, GOST TR/CU.

# GENERAL FEATURES



## GENERAL MATERIALS

<b>BODY</b>	Carbon Steel / AISI304 / AISI316 / CA15 / CA40
<b>BELL</b>	Carbon Steel / AISI304 / AISI316 / CA15 / CA40
<b>LEVER</b>	Carbon Steel / AISI304 / AISI316 / CA15 / CA40
<b>SHAFT</b>	STAINLESS STEEL
<b>SEAT</b>	EPDM / NITRILE / VITON / METAL-TO-METAL
<b>SEAT RING</b>	STAINLESS STEEL
<b>ACTUATOR SUPPORT</b>	CARBON STEEL
<b>BUSHING</b>	BRONZE
<b>ID PLATE</b>	STAINLESS STEEL

Special applications available under request.

## BODY

Monoblock casted or welding assembly construction body is produced in carbon steel and is coated with anti-corrosion treatment that provides the necessary protection against corrosion and an excellent surface finish. Special coatings are available for different working conditions.

Stainless steel materials and different alloys are available on request to meet specific application requirements.

## SHAFT

The shaft, as standard made of stainless steel, provides high resistance and an excellent corrosion resistance in most applications.

## ACTUATOR SUPPORT

FCA actuator supports have been designed to support the stresses generated in the most severe working conditions. As standard constructed as a carbon steel welding assembly and coated with the appropriate specification.

## BELL

Bell has a conical design specially engineered to meet dust and solid flow distribution. This casted valve piece is done in the appropriate material according to the valve application.

The bottom part of the casted cone is precisely machined to fit the valve soft or metal seating.

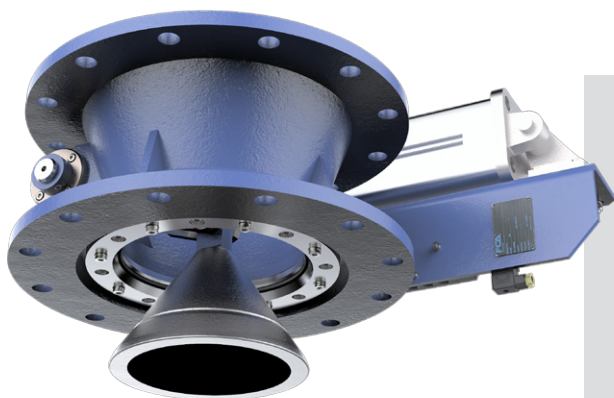
## LEVER

The machined lever system is mechanically designed to provide a smooth and controlled movement of the bell while operating the valve.

External hardening coatings or special materials will be applied for exposed components such as the internal lever in order to comply with operation conditions to provide the best reliable performance and longer life of the valve.

## SEAT

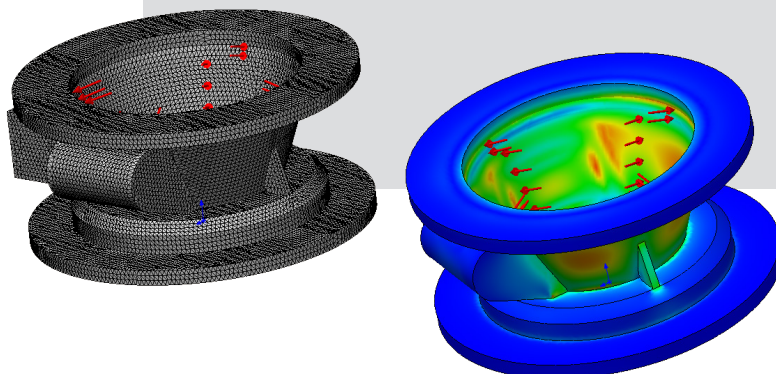
Integral metal to metal seat or different soft seat designs can meet a wide range of fluid applications. For a zero leakage valve design, a soft seat solution shall be provided considering the most suitable material for the application.



## 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** VC Bell valves are engineered to meet pressures up to 6bar. To consider the best cost effective design parametric studies with finite element analysis are performed by **FCA** engineering team.



## ACTUATORS

**FCA offers a variety of interchangeable actuators:**

- Hand wheel.
- Bevel gear.
- Electric motor.
- Pneumatic cylinder.
- Hydraulic cylinder.



## 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.

## CE SECURITY MARKED

Following the CE norms, all valves equipped with automatic actuators are supplied with shields, which prevent any objects from being accidentally trapped or dragged.

## NOT STANDARD DESIGNS

Special valve construction is important as they have to adapt to the needs of each installation. The different designs are aimed to solve specific process problems and optimize their performance.

For special valve design and manufacture, valve and other equipment engineering projects are made according to each client specifications and working condition, which gives FCA a high capacity of adaptation, necessary and highly valued by the industrial customers.

Within the non-standard designs FCA includes:

- Welding assembly.
- Other materials construction as carbon steel alloys, stainless steels, special alloys, titanium...

# ACCESSORIES AND OPTIONS

## Accessories and options applicable to FCA VC valve model are:

- Limit switches.
- Solenoid valve.
- Proximity switches.
- Injection holes.
- Filters.
- Emergency closing device.
- Emergency System.
- Junction box.
- Stem extension.

### LIMIT SWITCHES

Installation and supply of end of stroke switches for position indication.

### EMERGENCY SYSTEMS

Supply of different emergency systems and accessories.



### PROXIMITY SWITCHES

Installation and supply of proximity switches for position indication.



### STEM EXTENSION

Allows valve actuation from remote positions.



JUNCTION BOX

SOLENOID VALVE

FILTERS-REGULATORS-LUBRICATORS



### SOLENOID VALVE

For air distribution in valves with pneumatic actuators.

### FILTERS-REGULATORS-LUBRICATORS

For air treatment in valves with pneumatic actuators.

### JUNCTION BOX

Fully assembled units supplied with all accessories.

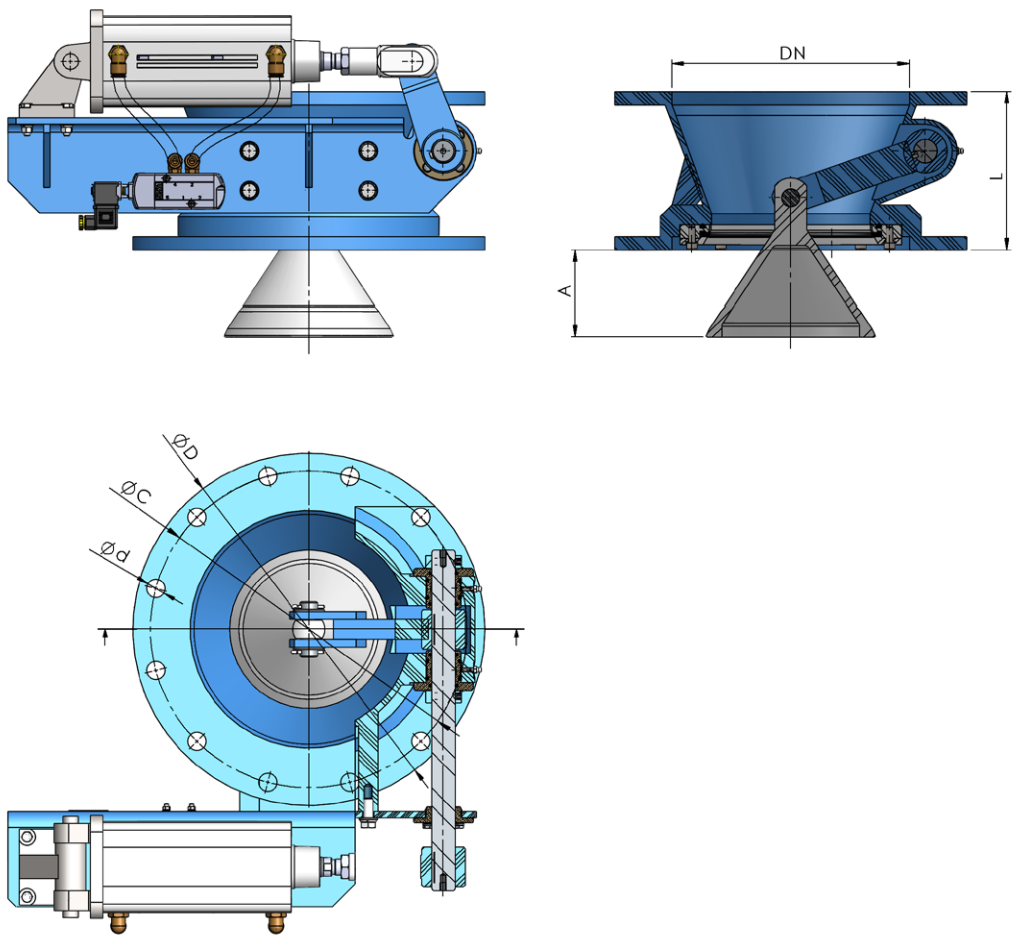


# DRAWINGS AND DIMENSIONS

## PNEUMATIC CYLINDER

Dimensions available form DN200/8" to DN400/16",  
other sizes on request.

As standard flange based on DIN PN6.



DN	SIZE	L mm	A mm	ØC mm	ØD mm	Ød mm
200	8"	150	80	280	320	8xØ19
250	10"	200	110	335	375	12xØ19
300	12"	200	110	395	440	12xØ23
350	14"	260	130	445	490	12xØ23
400	16"	310	168	495	540	16xØ23

\*Orientative dimensions. Contact FCA for different sizes,  
flanges and customized designs.

# FLANGE DRILLING INFORMATION

FCA offers the possibility of valve adaptation to most common pipe fitting flanges. ASME, DIN, MSS, BSI, AS or according to customer flange drilling specifications can be supplied for FCA standard bell valves.



## ASME B16.5

### CLASS 150#

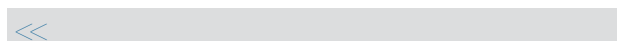


SIZE inch	FLANGE DIAMETER inch	No. HOLES	HOLE DIAMETER inch	BOLT CIRCLE inch
2	6.00	4	0.75	4.75
3	7.50	4	0.75	6.00
4	9.00	8	0.75	7.50
6	11.00	8	0.88	9.50
8	13.50	8	0.88	11.75
10	16.00	12	1.00	14.25
12	19.00	12	1.00	17.00
14	21.00	12	1.12	18.75
16	23.50	16	1.12	21.25
18	25.00	16	1.25	22.75
20	27.50	20	1.25	25.00
24	32.00	20	1.38	29.50

\*Refer to ASME B16.47 for superior sizes

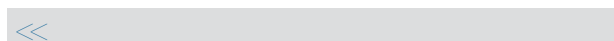
# DIN (based on EN1092-2)

## PN6



DN mm	FLANGE DIAMETER mm	No. HOLES	HOLE DIAMETER mm	BOLT CIRCLE mm
50	140	4	14	110
80	190	4	19	150
100	210	4	19	170
150	265	8	19	225
200	320	8	19	280
250	375	12	19	335
300	440	12	23	395
350	490	12	23	445
400	540	16	23	495
450	595	16	23	550
500	645	20	23	600
600	755	20	28	705

## PN10



DN mm	FLANGE DIAMETER mm	No. HOLES	HOLE DIAMETER mm	BOLT CIRCLE mm
50	165	4	18	125
80	200	4	18	160
100	220	4	18	180
150	285	8	22	240
200	340	8	23	295
250	395	12	23	350
300	445	12	23	400
350	505	16	23	460
400	565	16	28	515
450	615	20	28	565
500	670	20	28	620
600	780	35	31	725

## PN16



DN mm	FLANGE DIAMETER mm	No. HOLES	HOLE DIAMETER mm	BOLT CIRCLE mm
50	165	4	19	125
80	200	8	19	160
100	220	8	19	180
150	285	8	23	240
200	340	12	23	295
250	405	12	28	355
300	560	12	28	410
350	520	16	28	470
400	580	16	31	525
450	640	20	31	585
500	715	20	34	650
600	840	20	37	770

# NOTES

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# ECCENTRIC BUTTERFLY VALVES CATALOGUE

DOUBLE AND TRIPLE ECCENTRIC  
FCA MD AND MT MODEL BUTTERFLY VALVES



**FCA**  
FLOW CONTROL APPLICATIONS





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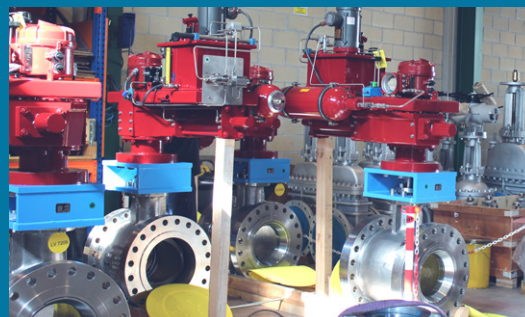
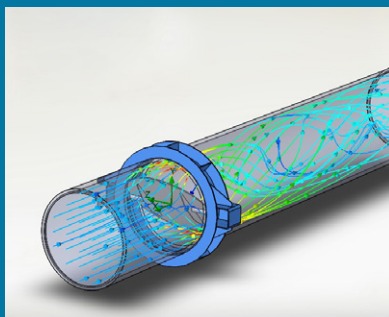
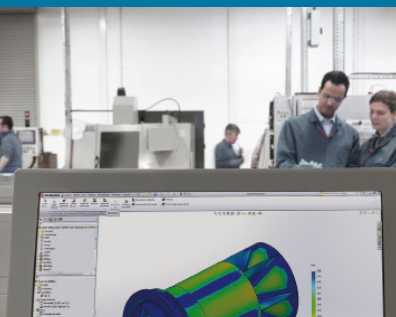
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ECCENTRIC BUTTERFLY VALVES

- CLASS 150#
- CLASS 300#
- CLASS 600#



# SPECIFICATIONS AND STANDARDS

Centered axis or simple eccentric butterfly valves do not present the correct performance when used for severe applications such as high temperatures or at high opening and closing frequencies. **FCA** double and triple eccentric valves are designed to withstand this type of conditions that do not allow the use of soft seat butterflies.

Butterfly valves are typically used to open and close (seal type) or adjust the medium flow in pipes. They have an extended use in many industrial applications such as oil&gas, chemical and petrochemical plants, water pipelines, mining applications, etc...

MD double eccentric butterfly model consists of a body with a sealing gasket (fixed with a steel ring) that allows a tight sealing of the disc. Double eccentric constructions allows operation at very low torques while the wear of the closure is minimal, even when applying the highest performance.

In many applications, double offset metal-seated butterfly valves cannot offer bubble tight shut-off. For these applications, **FCA** triple offset metal seated valves are the best option. This model features a special sealing mechanism based on a conical machined disc and seat. As a result, the friction and abrasion between the sealing elements are minimized in the 90° rotation, providing low operation torques and a tight shut-off.

Butterfly valves ensures a perfect performance and sealing for pressure ratings up to ASME Class 600#. A variety of configurations are available according to API 609 Design standard for B class valves: Double Flanged type, Wafer and Lug construction. Buttwelded end connection also available upon request.



## COVERING STANDARDS

**FCA** Butterfly Valves are mainly designed and manufactured according to API 609 "Butterfly Valves: Double Flanged, Lug- and Wafer-Type." and considering standards such as API 607 "Fire Test for Soft-Seated Quarter Turn Valves", ASME BPVC "Boiler and Pressure Vessel 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". API 598 "Valve Inspection and Testing" is applied for butterfly valve testing.



# GENERAL FEATURES

## HIGHLIGHTS

- API 609 compliance design.
- Soft or Metal seated configurations.
- Anti Blow-out proof one-piece shaft design.
- Bi-directional flow capability upon request.
- Fire safe design.
- Low operation torques.
- Bubble shut-off according to API 598.
- Double flanged, wafer or Lug type and butt welded configurations.
- Handwheel, gearbox, electric, pneumatic or hydraulic actuation.
- Wide range of body, bonnet and trim materials.
- Extended stem availability.

## SIZES

- DN 50/2" to DN 1200/48".
- Other sizes on request.

## PRESSURE RANGE

- ANSI CLASS 150#, 300# & 600#.
  - DIN PN6, PN10, PN16, PN25, PN40 & PN63.
- Other pressures on request.

## DIRECTIVES

Pressure Equipment Directive: DIR 97/23/CE (PED) group II Cat. I module A fluids.

Other Directives: DIR 2006/42/CE, DIR 94/9/CE, GOST TR/CU.



## SECTORS

- Oil & Gas.
- Mineral Processing.
- Petrochemical plants.
- Water distribution.
- Pump stations.
- Food industry.
- etc...

## APPLICATIONS

- Water pipelines.
- Corrosive and Abrasive media.
- Equipment isolation.
- Drain systems.
- Oil pipelines.
- etc...

## TECHNICAL SPECIFICATIONS

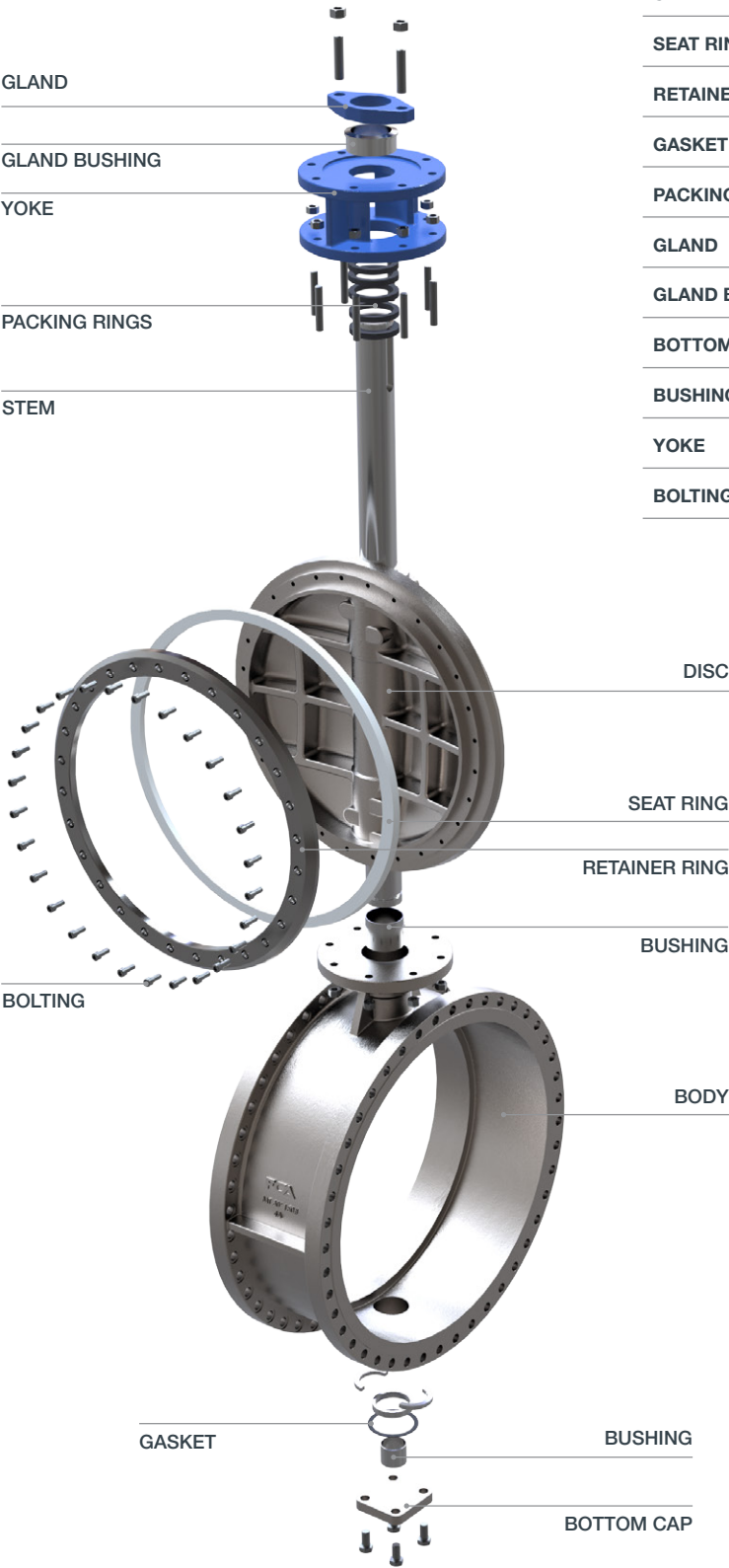
DESIGN STANDARD	API 609
PRESSURE & TEMPERATURE RATING	API 609 / ASME B16.34
FACE-TO-FACE	API 609 / ISO5752 / ASME B16.10
FLANGE ENDS	ASME B16.5 / B16.47
INSPECTION & TEST	API 598
FIRE SAFE DESIGN	API 607 / API 6FA

## TESTING

All FCA MD and MT Butterfly valves have been hydrostatically tested.

NOMINAL PRESSURE (bar)		150#	300#	600#
TEST PRESSURE	Shell Test	30	75	150
	Seal Test	22	55	110





GENERAL MATERIALS

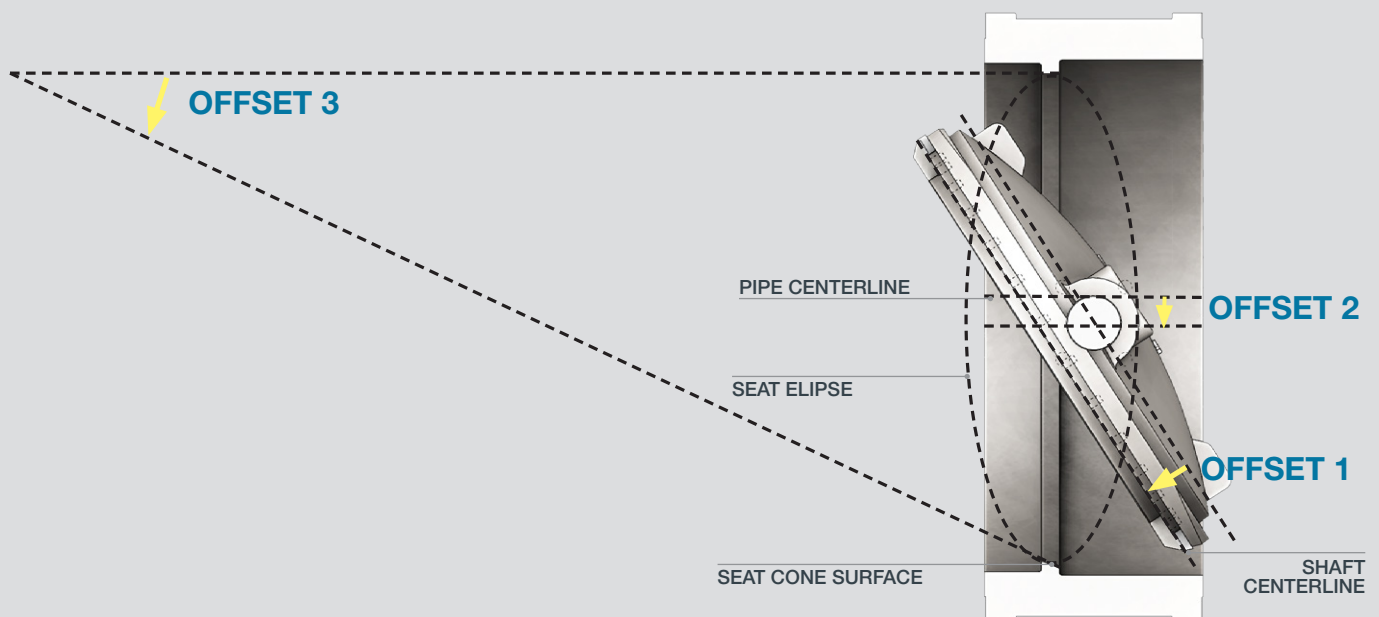
BODY	WCB / CF8 / CF8M / DUPLEX 4A
DISC	WCB / CF8 / CF8M / DUPLEX 4A
STEM	SS410 / SS316 / SS630 / INCONEL 718
SEAT RING	PTFE / RPTFE / SS+GRAPHITE
RETAINER RING	A105 / SS316 / SS410 / DUPLEX F51
GASKET	SS+GRAPHITE
PACKING	GRAPHITE
GLAND	WCB / CF8 / CF8M
GLAND BUSHING	SS316 / F51
BOTTOM CAP	WCB / A105 / CF8 / CF8M / SS316
BUSHING	SS410 / SS316 / F51 (+PTFE)
YOKE	WCB
BOLTING	B7 / B7M / B8 / B8M / F51

Other materials and special applications available under request.

## OFFSET PRINCIPLE OF OPERATION

For MD model double eccentric butterfly valves the axis of the disc rotation is double offset to the seat, making the sealing face of the disc disengaged from seat sealing face more quickly than single eccentric seal valve during the open-close process. It enables a bubble tight shut-off over extended periods of service. This type of butterfly valves are designed to decrease the mechanical wear and deformation between the two sealing faces, offering a better sealing performance butterfly valve.

First eccentric corresponds to the shaft deviation from the centerline of sealing face. The second, to the deviation from centerline of pipe and valve as in double eccentric butterfly MD model valve. For the third eccentric, corresponding to the MT model valve, a distinctive seating angle can be found between the eccentric seat and the centerline of the pipe. Thus making the seat completely disengaged from the sealing ring during the whole 90° degree opening and closing process. This structure ensures the body seat only at the final shut-off position and also avoids abrasion and minimized operation torque.



### SINGLE OFFSET

The shaft is placed behind the plane of the sealing surface to have a continuous sealing surface around the entire disc.

### DOUBLE OFFSET

The shaft is placed to one side of the valve centerline. The purpose of this offset is to provide a interference-free feature during the 90° opening.

### TRIPLE OFFSET

The seat and seal cone centerlines are inclined in respect to the valve centerline. The purpose is to eliminate rubbing and wear at the sealing surface during operation. This design achieve an uniform compressive sealing around the seat providing a bubble tight shut-off.

## BODY AND DISC

**FCA** designed high quality bodies and discs with uniform section cast and then precisely machined, offering high performance and preventing stress concentrations. Disc is structured in close contact with the seat to avoid leaking from the stem surface. This precision profile disc provides bubble-tight shut-off and assures minimum torque value. Flow coefficient of the valve is closely associated with the structure of it.

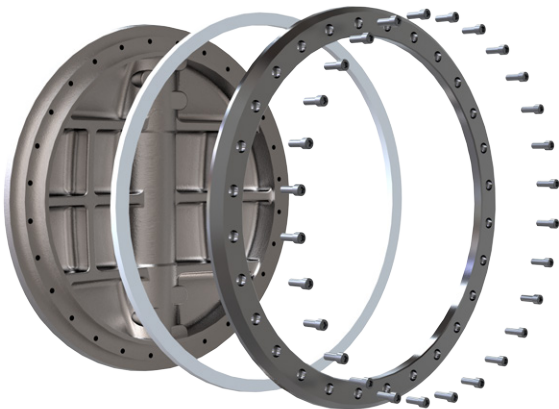


MD DOUBLE ECCENTRIC BUTTERFLY

## FRICTION FREE SEALING

The sealing surfaces of the elliptical sealing system are completely in contact at the final position only, and upon opening, all contact points are released immediately from the seat ring. The seat ring is fixed in the body with screws along with a retaining ring. Therefore, the seat ring is not directly influenced by fluid in open positions.

Sealing materials may be soft or hard (multilayer), placed on body or disc. Designed to meet different working conditions and to assure a tight sealing and long life. Defined according to working conditions or customer specifications.



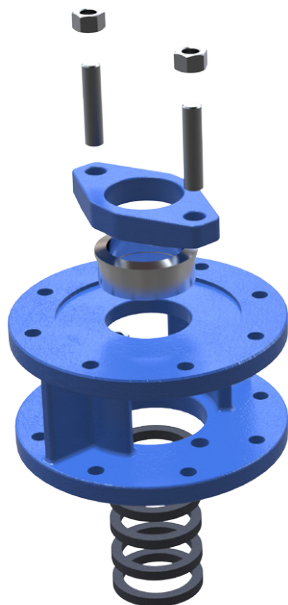
## SEATING TORQUE

**FCA** seating force is generated by externally applied torque rather than by mechanical interference as in some position-seated ball, butterfly, gate and plug valve models. This feature allows our valve to handle high pressure classes and provide reliable and highly controlled operating torque.

MT model conical seated design contributes to a very low and constant torque demand as the operating ensures no rubbing across the 90° degree rotation.

## METAL-TO-METAL SEATING

In order to handle all possible applications the triple eccentric MT model can be selected with metal-to-metal seating. For this aim a laminated seat ring can be provided, composed of alternating layers of metal and graphite. The elements of the laminated metal plate can be made of various metals including Inconel, Monel and Hastelloy depending on the application.



### 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 ring 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 hydraulic cylinders, etc...

### BUSHING

Stem bushing reduces valve torque, isolate the stem from the valve body and prevents the stem from corrosion.

### ANTI-BLOW-OUT SHAFT

All discs are provided with one piece forged shaft. Are accurately machined and finally smoothed in order to minimize friction and reduce torque.

**FCA** provides a T-shaped shaft as standard. When medium passes through the valve, the pressure may push the shaft out and can cause serious safety problems. It is designed in order to prevent it from coming out of the body structure.



### 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.

## 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 disc, 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 for metal seated valves.

The following table presents frequently used materials for FCA butterfly valves:

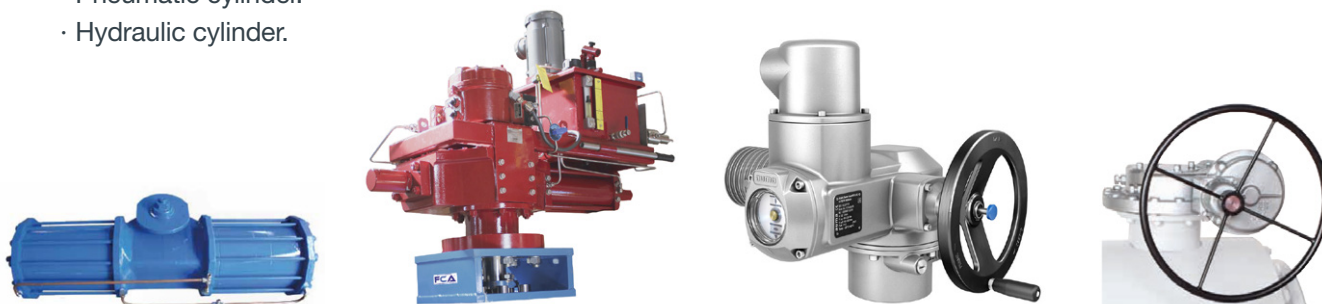
MATERIAL	CASTED (ASTM)	FORGED (ASTM)
Carbon Steel	A216 Gr. WCB	A105
Stainless Steel	A351 Gr. CF8 / CF8M	A182 F316
Duplex Steel	A890 Gr. 4A	A182 F51
Superduplex Steel	A890 Gr. 5A / Gr. 6A	A182 F53 / F55
Inconel	-	Alloy 718

\*Other materials on request.

## 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:

- Lever.
- 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.

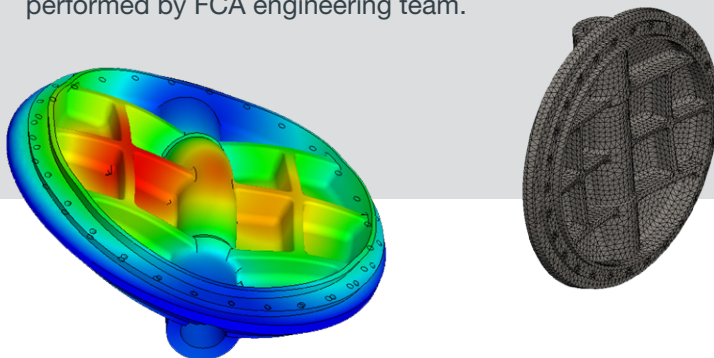
FLOW COEFFICIENT TABLE - Cv Value

SIZE (mm)		CLASS 150#	CLASS 300#	CLASS 600#
DN	inch			
50	2	100	100	60
80	3	210	205	130
100	4	340	330	238
150	6	960	880	760
200	8	1810	1680	1460
250	10	2750	2500	2125
300	12	3900	3500	2760
350	14	5500	4940	4250
400	16	8400	7600	6490
450	18	11000	10400	8870
500	20	14100	12970	11070
600	24	20700	18950	16388
700	28	26500	26500	24000
750	30	33700	29600	27600
800	32	37000	33200	30200
900	36	50470	42900	38500
1050	42	71200	58500	52000
1200	48	95800	82000	76000

## 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 MD and MT butterfly valves are engineered to meet high pressure working conditions, up to Class 600#, considering the most cost effective design. For this aim, parametric studies with finite element analysis are performed by FCA engineering team.



# ECCENTRIC BUTTERFLY VALVES

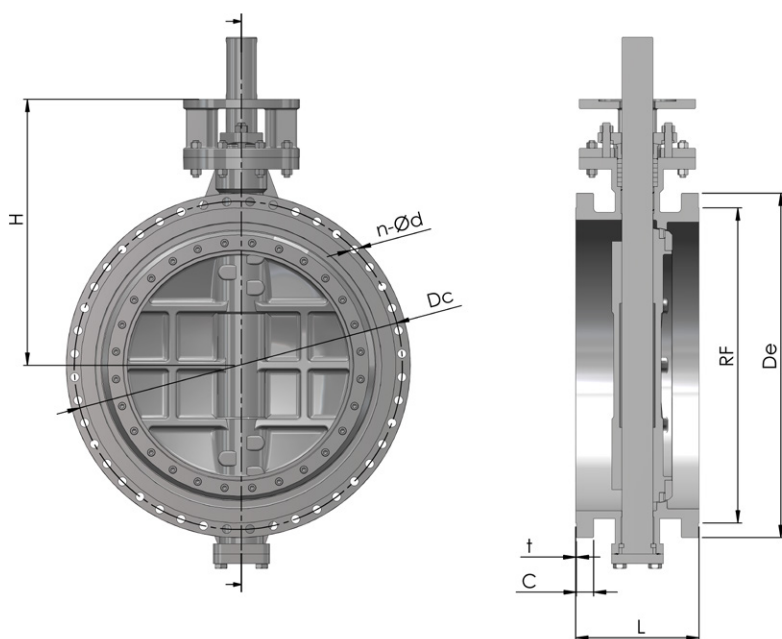
## - DOUBLE AND TRIPLE ECCENTRIC MD AND MT MODELS

Standard version available from DN50/2" to DN1200/48" and pressure rating up to Class 600#. Other sizes and pressure on request.

### ACCESORIES AND OPTIONS

- Double or triple eccentric design.
- Wafer, Lug, Buttwelded or Double Flanged configurations.
- Fire safe design.
- Design and Manufacturing according to API 609.
- Lever, Handwheel, gearbox, electric, pneumatic or hydraulic actuation.
- Wide range of body and disc materials.
- Extended stem availability.
- By-pass valves.
- Superior sizes and pressure.

\*Face to Face according to API Standard 609 - Cat B



### DIMENSIONS - CLASS 150#

SIZE		L				H	De	Dc	ØRF	n-Ød	C	t
NPS	DN	WF	LG	RF	BW							
3"	80	48	48	114	114	262	191	152.4	127	4-Ø19.1	19.1	1.6
4"	100	54	54	127	127	280	229	190.5	157.2	8-Ø19.1	23.9	1.6
6"	150	57	57	140	140	295	279	241.3	215.9	8-Ø22.2	25.4	1.6
8"	200	64	64	152	152	320	343	298.5	269.7	8-Ø22.2	28.4	1.6
10"	250	71	71	165	165	330	406	362	323.9	12-Ø25.4	30.2	1.6
12"	300	81	81	178	178	365	483	431.8	381	12-Ø25.4	31.8	1.6
14"	350	92	92	190	190	410	533	476.2	412.8	12-Ø28.6	35.1	1.6
16"	400	102	102	216	216	440	597	539.8	469.9	16-Ø28.6	36.6	1.6
18"	450	114	114	222	222	485	635	577.9	533.4	16-Ø31.8	39.6	1.6
20"	500	127	127	229	229	520	699	635	584.2	20-Ø31.8	42.9	1.6
24"	600	154	154	267	267	625	813	749.3	692.2	20-Ø34.9	47.8	1.6
28"	700	161	161	292	292	745	927	863.6	800.1	28-Ø34.9	71.4	1.6
30"	750	165	165	318	318	780	984	914.4	857.3	28-Ø34.9	74.7	1.6
36"	900	200	200	330	330	875	1168	1085.9	1022.4	32-Ø41.3	90.4	1.6
40"	1000	216	216	410	410	970	1289	1200.1	1123.9	36-Ø41.3	90.4	1.6
48"	1200	276	276	470	470	1100	1511	1422.4	1358.9	44-Ø41.3	108	1.6

Notes: Dimensions in (mm). Flange drilling according to ASME B16.5/B16.47

## DIMENSIONS - CLASS 300#

SIZE		L				H	De	Dc	ØRF	Drilling	C	t
NPS	DN	WF	LG	RF	BW							
3"	80	48	48	180	180	250	210	168.3	127	8-Ø22.2	28.4	1.6
4"	100	54	54	190	190	275	254	200.2	157.2	8-Ø22.2	31.8	1.6
6"	150	59	59	210	210	350	318	269.8	215.9	12-Ø22.2	36.6	1.6
8"	200	73	73	230	230	390	381	330.2	269.7	12-Ø25.4	41.1	1.6
10"	250	83	83	250	250	480	445	387.4	323.9	16-Ø28.6	47.8	1.6
12"	300	92	92	270	270	520	521	450.9	381	16-Ø31.8	50.8	1.6
14"	350	117	117	290	290	560	584	514.4	412.8	20-Ø31.8	53.8	1.6
16"	400	133	133	310	310	590	648	571.5	469.9	20-Ø34.9	57.2	1.6
18"	450	149	149	330	330	635	711	628.7	533.4	24-Ø34.9	60.5	1.6
20"	500	159	159	350	350	690	775	685.8	584.2	24-Ø34.9	63.5	1.6
24"	600	181	181	390	390	935	914	812.8	692.2	24-Ø41.3	69.9	1.6
28"	700	229	229	430	430	1040	1035	939.8	800.1	28-Ø44.5	85.9	1.6
30"	750	241	241	450	450	1060	1092	991	857.3	28-Ø47.6	91.9	1.6
36"	900	286	286	510	510	1200	1270	1168.4	1022.4	32-Ø54	104.6	1.6

Notes: Dimensions in (mm). Flange drilling according to ASME B16.5/B16.47

## DIMENSIONS - CLASS 600#

SIZE		L				H	De	Dc	ØRF	Drilling	C	t
NPS	DN	WF	LG	RF	BW							
3"	80	54	54	180	180	290	210	168.3	127	8-Ø22.2	31.8	6.4
4"	100	64	64	190	190	360	273	215.9	157.2	8-Ø25.4	38.1	6.4
6"	150	78	78	210	210	390	356	292.1	215.9	12-Ø28.6	47.8	6.4
8"	200	102	102	230	230	415	419	349.2	269.7	12-Ø31.8	55.6	6.4
10"	250	117	117	250	250	465	508	431.8	323.9	16-Ø34.9	63.5	6.4
12"	300	140	140	270	270	550	559	489	381	20-Ø34.9	66.5	6.4
14"	350	155	155	290	290	580	603	527.1	412.8	20-Ø38.1	69.9	6.4
16"	400	178	178	310	310	640	686	603.2	469.9	20-Ø41.3	76.2	6.4
18"	450	200	200	330	330	670	743	654.1	533.4	20-Ø44.5	82.6	6.4
20"	500	216	216	350	350	700	813	723.9	584.2	24-Ø44.5	88.9	6.4
24"	600	232	232	390	390	775	940	838.2	692.2	24-Ø50.8	101.6	6.4

Notes: Dimensions in (mm). Flange drilling according to ASME B16.5/B16.47

## NOTES

#### HEADQUARTERS

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# STANDARD KNIFE GATE VALVES CATALOGUE

**GS AND GTAPPI MODEL VALVES**  
(UNI OR BI-DIRECTIONAL DESIGNS)



**FCA**  
FLOW CONTROL APPLICATIONS



## 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.

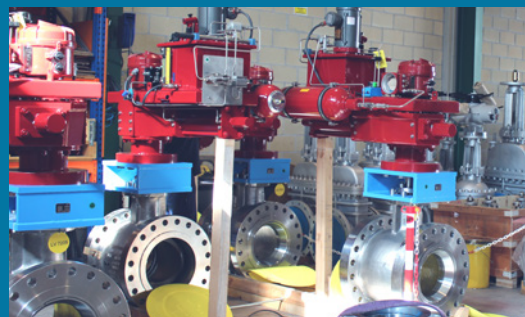
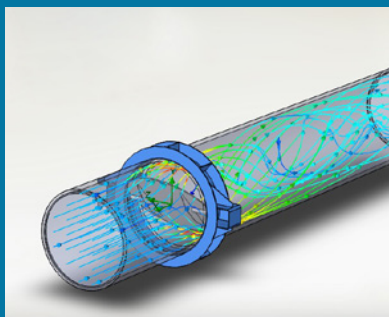
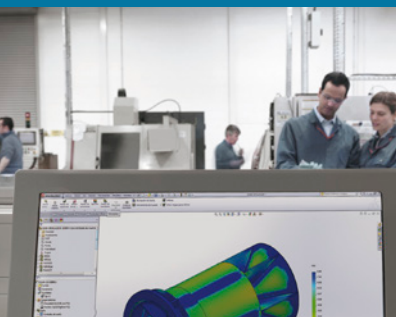
More and more customers trust our DNV certified solutions. **FCA** innovation-driven valves find solutions to any customer challenge or toughest application.

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 to 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.



## 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 9001-2015 quality standard, guaranteed and certified by DNV. Additionally, international certifications are met such as American Petroleum Institute for API 6D-Specification for Pipeline Valves and API 609-Butterfly Valves: Double-flanged, Lug-and Wafer-type. CE for Pressure Equipment Directive (97/23/EC), CE Directive 2006/42/EC for machinery, ATEX Directive 94/9/EC, GOST TR/CU, etc...



API 6D License No. 1588  
API 609 License No. 0116



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# SPECIFICATIONS AND STANDARDS

The GS model FCA knife gate valve is provided with a full bore and casted monoblock body. The standard model is wafer type to fit between flanges according to DIN PN10 or ANSI150.

As standard valve seat is uni-directional but it can be designed bi-directional according to customer requisition. The body is provided with internal guides to support knife gate and improve its resistance and tightness features. Gate is made of stainless steel, polished on both sides with rounded edges to extend the life of the seals and packing.

The GS valve is used in a wide and varied range of industrial applications such as pneumatic transport of solids, charged fluids, paper pulp, sludge, etc...

GTAPPI model valve is designed according to meet TAPPI TIS 405-8 and MSS SP-81 standards. Designed with Lug type end connection which allows valve to be installed between flanges or at the end of a line.

## HIGHLIGHTS:

- Bi-directional seat availability.
- Suitable for wide range of applications.
- Full port opening.
- Low Pressure drop.
- Reduced turbulence.
- V or Pentagonal port availability.
- Reinforced seat ring.
- Adaptable yoke.
- GTAPPI model suitable for end-of-line service.
- Single monobloc robust body.
- Bubble tight shut-off.
- Handwheel, gearbox, electric, pneumatic or hydraulic actuation.
- Wide range of body, bonnet and trim materials.
- Extended stem availability.



# GENERAL FEATURES

## SECTORS

- Hydro Power Plants and Dams.
- Pulp and paper.
- Steel Industry.
- Thermal power plants.
- Water Distribution.
- Water Treatment
- etc...

## APPLICATIONS

- Solids.
- Charged fluids.
- Paper pulp.
- Sludge.
- etc...

## SIZES

- » DN 50/2" to DN 1200/48".
- Other sizes on request.

## PRESSURE RANGE

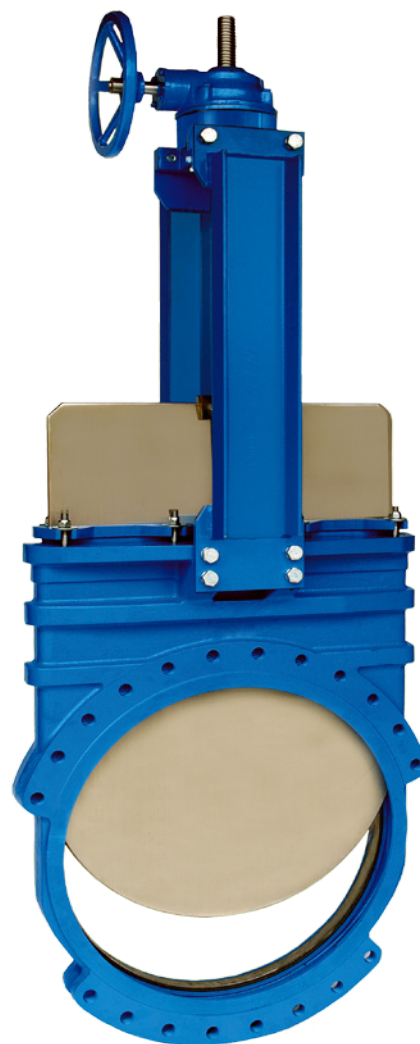
- » DN 50 (2") to DN 250 (10"): 10 bar.
  - » DN 300 (12") to DN 400 (16"): 6 bar.
  - » DN 450 (18"): 5 bar.
  - » DN 500 (20") to DN 600 (24"): 4 bar.
- Other pressures on request.

## TEMPERATURE RANGE

- » -25°C to 90°C.
- Other temperatures on request.

## TESTING

Each FCA GS and GTAPPI Knife Gate valves are hydrostatically tested to ensure shell resistance, packing and seat integrity and valve operation reliability.



## FLANGE DRILLING

- » DIN PN6 / PN10 & PN16.
  - » ANSI B16.5 CLASS 150.
- Other flange drillings on request. Refer to Annex for more information on dimensions and measures.

## DIRECTIVES

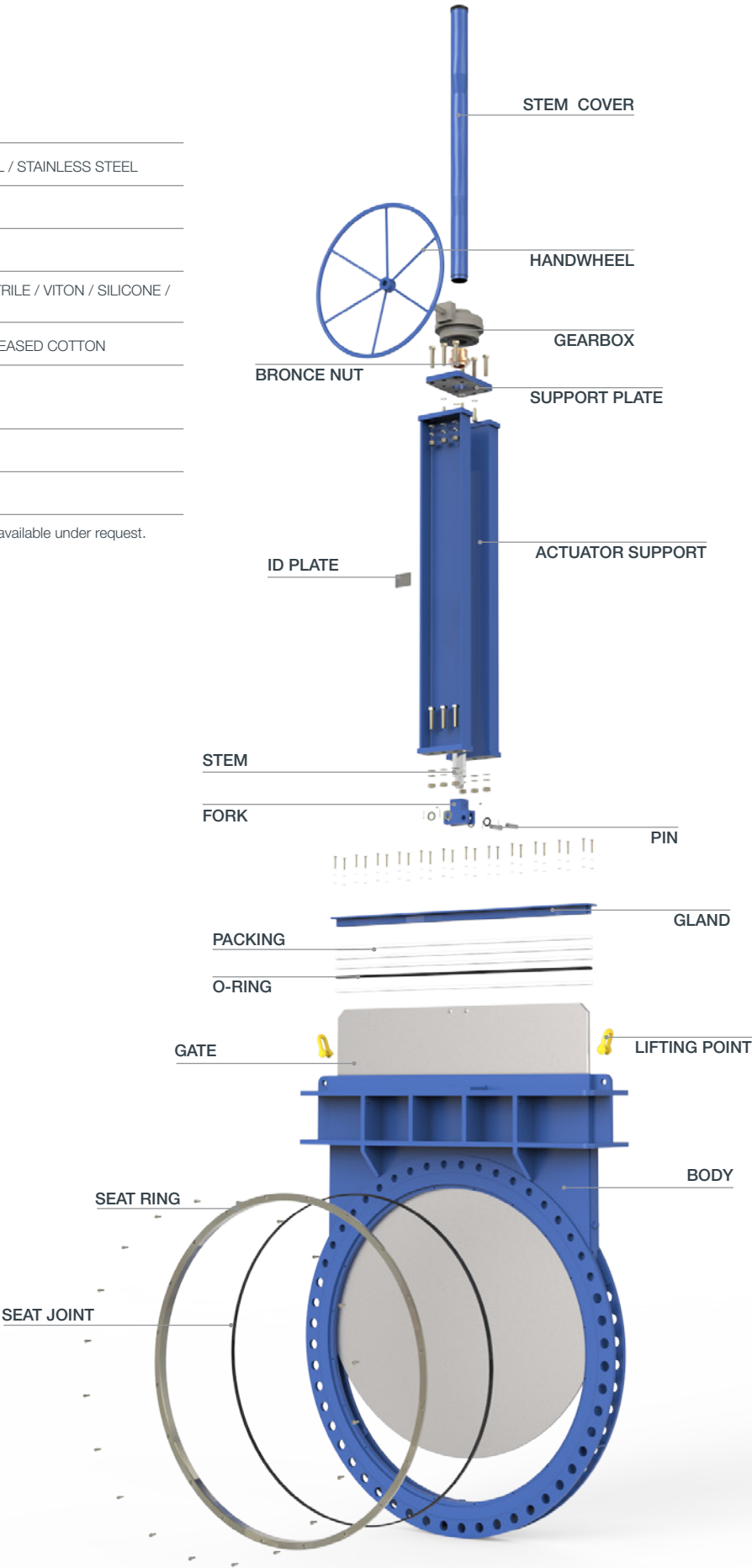
Pressure Equipment Directive: DIR 97/23/CE (PED).  
Other Directives: DIR 2006/42/CE, DIR 94/9/CE, GOST TR/CU.



GENERAL MATERIALS

BODY	DUCTILE IRON / CARBON STEEL / STAINLESS STEEL
GATE	STAINLESS STEEL / DUPLEX
STEM	STAINLESS STEEL
SEAT JOINT	NATURAL RUBBER / EPDM / NITRILE / VITON / SILICONE / PTFE / METAL-TO-METAL
PACKING	SYNTH.+PTFE / GRAPHITE / GREASED COTTON
ACTUATOR SUPPORT / SUPPORT PLATE	CARBON STEEL
SEAT RING	STAINLESS STEEL
ID PLATE	STAINLESS STEEL

Special applications available under request.



## BODY

The one-piece cast iron body is full bore and WAFER type as standard for GS Model valve. GTAPPI Lugged type body are suitable to be install between flanges or at the end of a line. Flanged type end connection can be done on request and threaded according with most international standards.

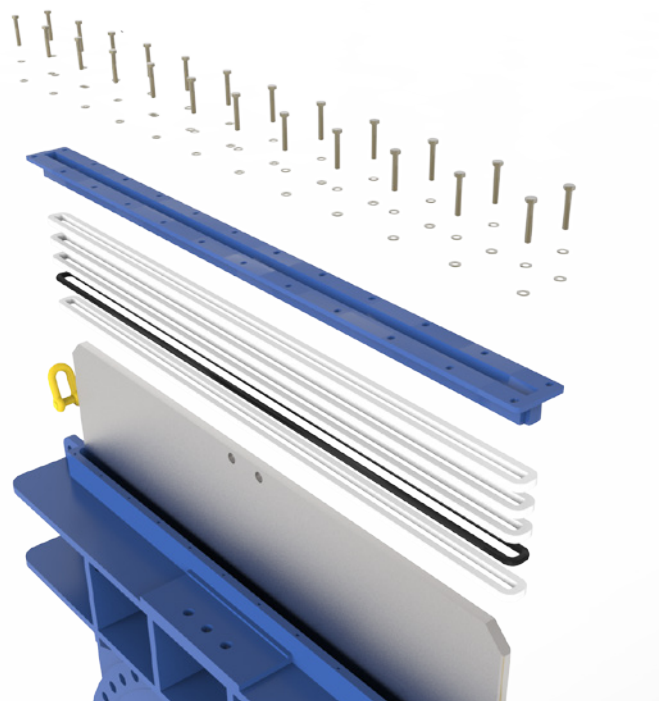
Produced as standard in GGG40 ductile iron and coated with anti-corrosion treatment that provides the necessary protection against corrosion and an excellent surface finish.

Uni-ditrectional valves will be tagged with an arrow on the body to show flow direction.

## STEM

The stem, as standard made of AISI 303 stainless steel, provides high resistance and an excellent corrosion resistance in most applications.

Valve can be designed either with a rising or non-risign stem configuration according to service application or customer requisitions.



FULL FLANGED STAINLESS STEEL DN1500  
KNIFE GATE VALVE

## KNIFE

The knife gate, made in stainless steel, is polished on both sides and the edges are rounded to extend the life of the packing and gaskets.

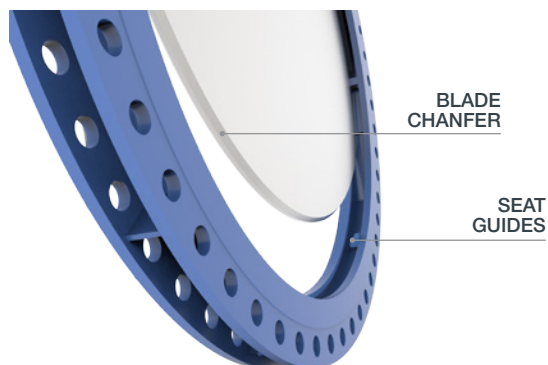
## PACKING

FCA packing guarantees the internal tightness of the gate, preventing any leakage to the atmosphere. It's composed of several packing lines together with an o-ring line to ensure the best watertight solution. Different packing materials can be provided for a wide range of applications.

The gland packing carbon steel or stainless steel piece can uniformly tight the packing lines to ensure a long time water tightening.

## ACTUATOR SUPPORT

FCA yokes have been specially designed to allow all drives being interchangeable with each other, and at the same time, are able to support the stresses generated in the most severe working conditions.



## SEAT

Integral metal to metal seat or different soft seat designs can meet a wide range of fluid applications. For a zero leakage valve design, a soft seat solution shall be provided considering the most suitable material for the application.

According to valve design or customer specifications, reinforced seats can provide a better abrasion resistance to valve seat. Flow can be guided to the center of the valve and pipeline with a **deflector cone** on the upstream side of the valve. A **bonnet** can also be provided in case that a tight stem sealing to the atmosphere is required for use with hazardous gasses or fluids and to reduce packing maintenance.

**Bi-directional** sealing can be supplied on request to ensure valve tightness in both upstream and downstream flow conditions.

### EPDM

This material has a wide variety of applications with a great resistance to solvents, acids, water and steam. Maximum working temperature is 90°C.

### NBR

Has excellent resistance to petroleum based oils, greases and nonoxidizing chemicals. Maximum working temperature is 90°C.

### VITON

Suitable for corrosive applications and for temperatures up to 200°C.

**OTHER MATERIALS:** SILICONE / PTFE / NEOPHRENE



## ACTUATORS

**FCA offers a variety of interchangeable actuators:**

- Hand wheel.
- Bevel gear.
- Electric motor.
- Pneumatic cylinder.
- Hydraulic cylinder.



## 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.

## CE SECURITY MARKED

Following the CE norms, all valves equipped with automatic actuators are supplied with shields, which prevent any objects from being accidentally trapped or dragged.

## NOT STANDARD DESIGNS

Special valve construction is important as they have to adapt to the needs of each installation. The different designs are aimed to solve specific process problems and optimize their performance.

For special valve design and manufacture, valve and other equipment engineering projects are made according to each client specifications and working condition, which gives FCA a high capacity of adaptation, necessary and highly valued by the industrial customers.

Within the non-standard designs FCA includes:

- Welding assembly.
- Other materials construction as carbon steel alloys, stainless steels, special alloys, titanium...

# ACCESSORIES AND OPTIONS

Accessories and options applicable to FCA GS and GTAPPI valve models are:

- Bi-directional seat.
- Bonnet.
- Deflector cone.
- Scraper.
- Reinforced socket.
- V or pentagonal port.
- Limit switches.
- Locking devices.
- Solenoid valve.
- Proximity switches.
- Injection holes.
- Filters.
- Emergency closing device.
- Emergency System.
- Junction box.
- Stem extension.
- Protection covers.



## LIMIT SWITCHES

Installation and supply of end of stroke switches for position indication.



## EMERGENCY SYSTEMS

Supply of different emergency systems and accessories.

## PROXIMITY SWITCHES

Installation and supply of proximity switches for position indication.



## STEM EXTENSION

Allows valve actuation from remote positions.

## LOCKING DEVICES

Allows locking of the valve on open or closed position preventing accidental actuation on manual drive valves.



## SCRAPER

Impurities and particles attached to the gate can be eliminated by the scraper to prevent these from reaching the packing and thus increasing valves life.

JUNCTION BOX

SOLENOID VALVE

FILTERS-REGULATORS-LUBRICATORS



## SOLENOID VALVE

For air distribution in valves with pneumatic actuators.

## FILTERS-REGULATORS-LUBRICATORS

For air treatment in valves with pneumatic actuators.

## JUNCTION BOX

Fully assembled units supplied with all accessories.

### BONNET

The bonnet provides a tight sealing to the outside, reducing packing maintenance.

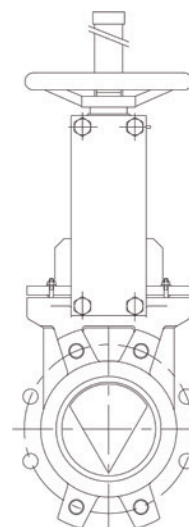


### EMERGENCY CLOSING DEVICES

Allows manual operation of the valve in case of power supply failure of the automatic drive.

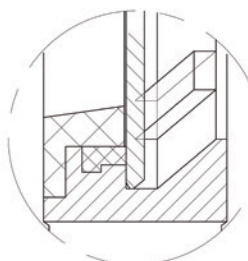


### V OR PENTAGONAL PORT



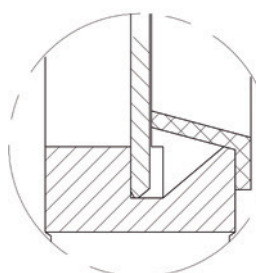
### REINFORCED SOCKET

With this socket the sealing gasket life can be increased, it protects the gasket from abrasive fluids that can run on the pipeline, thus reducing wear by abrasion.



### DEFLECTING CONE

The purpose of this cone is to channel the fluid outside the valve decreasing possible disturbances (cavitation...) that can be generated.



### INJECTION HOLES

Consists of holes which are prepared for connecting a circuit with the deemed appropriated fluid.





# EXTENSION TYPES



## FLOOR STANDS

Is based on coupling a column of the desired extension to the stem. From the bottom, usually a floor stand is incorporated to set the drive and support its weight.

### DESIGN VARIABLES:

- H1: Distance from the center of the valve to the base of the column.
- D1: Separation between the wall and the connecting flange.

### FEATURES:

- Supports any type of drive.
- FCA recommends a guided support for the stem every 1.5m.
- The standard floor stand is 800mm high.
- Possibility to place a valve opening degree indicator.
- Can be fitted with two types of floor stands.

## CARDAN

In case of misalignment between the actuator and valve, "cardan" joints can be incorporated.

## EXTENDED YOKE

If it is about small extensions, these ones can be obtained extending the actuators support plate. In necessary cases the support is reinforced by an intermediate bridge.

## TUBE

Consists on raising the drives position with a tube of the required length, the tube rotates with the handwheel and always keeps the same height. The rest of the drives stay at the same height.

### DESIGN VARIABLES:

- H1: Distance from the center of the valve to the base of the drive.
- D1: Separation between the wall and the connecting flange.

### FEATURES:

- Standard drives: Hand-wheel and "Square".
- FCA recommends a guided support for the stem every 1.5m.
- Standard Materials: Carbon Steel Epoxy coated or stainless steel. Other materials on request.

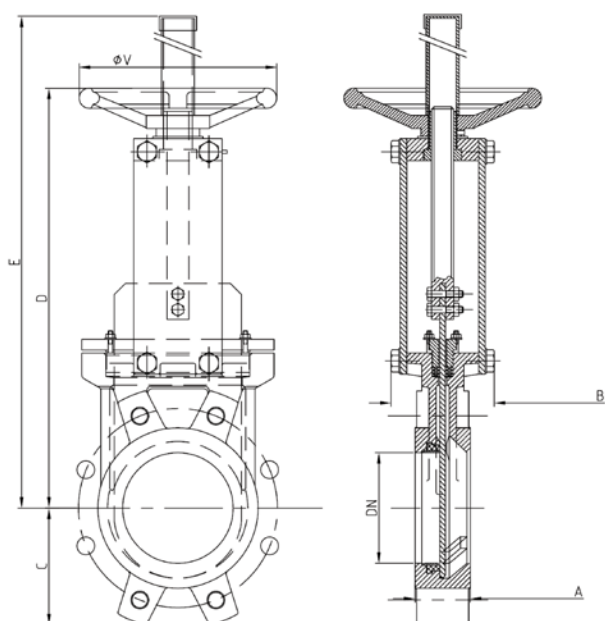
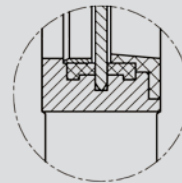


# DRAWINGS AND DIMENSIONS

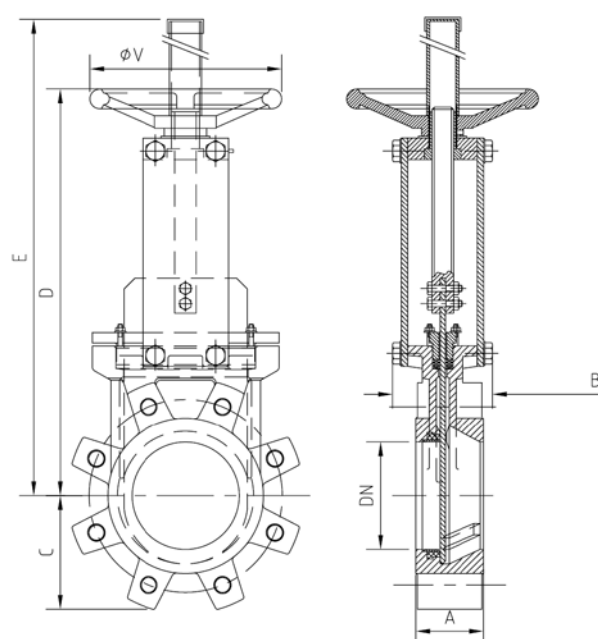
## HANDWHEEL RISING STEM

GS and GTAPPI Standard versions available from  
DN50/2" to DN600/24", other sizes on request.

BI-DIRECTIONAL  
Seat optional configuration:



GS MOD. STANDARD KNIFE GATE VALVE



GTAPPI MOD. TAPPI KNIFE GATE VALVE



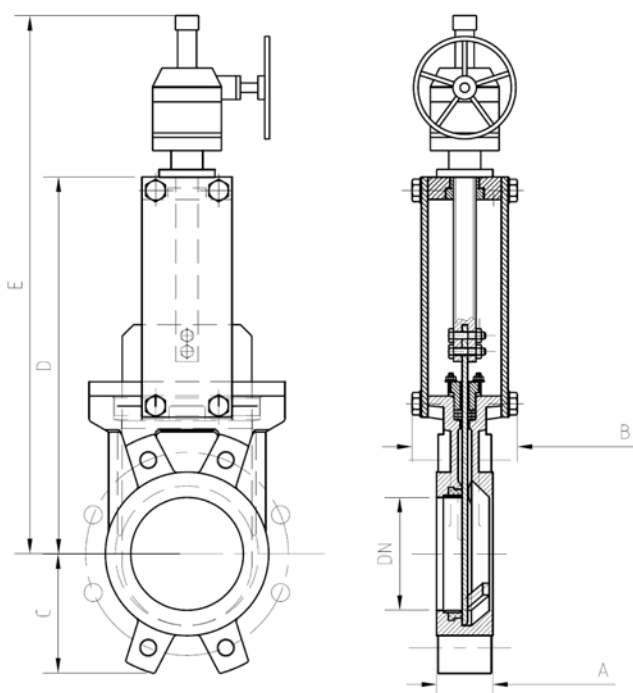
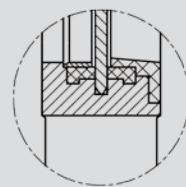
DN	SIZE	P bar	A mm	B mm	C mm	D mm	E mm	V mm
50	2"	10	40 / 47.8*	90	60	284	425	200
65	2 1/2"	10	40 / 47.8*	90	68	308	450	200
80	3"	10	50 / 50.8*	90	90	334	480	200
100	4"	10	50 / 50.8*	90	105	374	520	200
125	5"	10	50 / 54.2*	100	118	413	600	250
150	6"	10	60 / 57.2*	100	135	465	650	250
200	8"	10	60 / 69.8*	120	170	582	820	300
250	10"	10	70 / 69.8*	120	202	682	1020	300
300	12"	6 / 10*	70 / 76.2*	120	240	782	1120	300
350	14"	6 / 10*	96 / 76.2*	192	255	898	1380	400
400	16"	6 / 10*	100 / 88.9*	192	295	1003	1490	400
450	18"	5 / 10*	106 / 88.9*	192	318	1093	1580	500
500	20"	4 / 10*	110 / 114.3*	192	345	1207	1690	500
600	24"	4 / 10*	110 / 114.3*	290	405	1410	2030	500

\* AS STANDARD APPLIES ONLY TO GTAPPI MODEL VALVE.

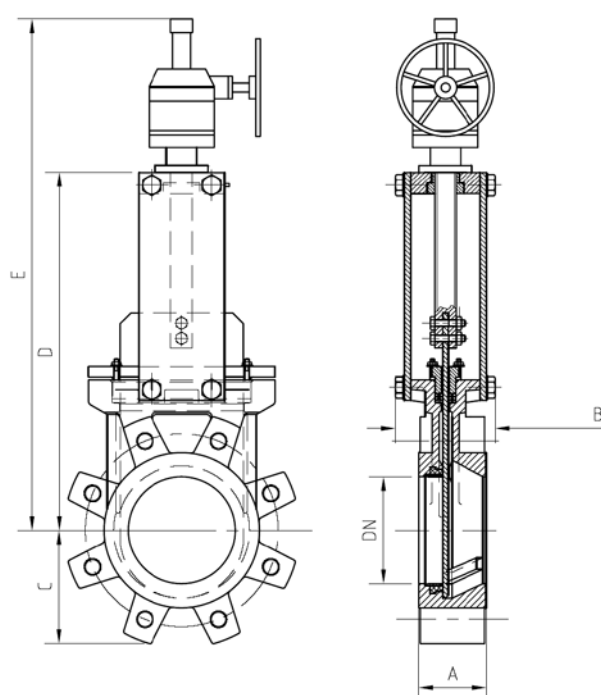
## BEVEL GEAR RISING STEM

GS MOD. Standard version available from DN200/8" to DN1200/48", GTAPPi Up to DN600/24". Other sizes on request.

BI-DIRECTIONAL  
Seat optional configuration:



GS MOD. STANDARD KNIFE GATE VALVE



GTAPPi MOD. TAPPI KNIFE GATE VALVE



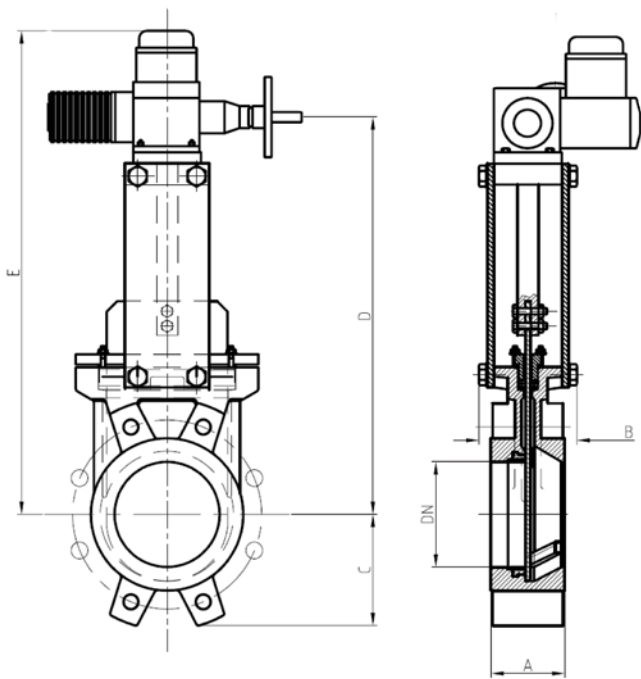
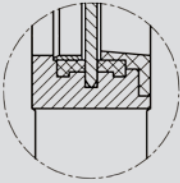
DN	SIZE	P bar	A mm	B mm	C mm	D mm	E mm
200	8"	10	60 / 69.8*	120	170	522	930
250	10"	10	70 / 69.8	120	202	625	1130
300	12"	6 / 10*	70 / 76.2*	120	240	725	1230
350	14"	6 / 10*	96 / 76.2*	192	255	845	1502
400	16"	6 / 10*	100 / 88.9*	192	295	945	1607
450	18"	5 / 10*	106 / 88.9*	192	318	1045	1697
500	20"	5 / 10*	110 / 114.3*	192	345	1148	1813
600	24"	4 / 10*	110 / 114.3*	290	405	1360	2148
700	28"	-	110	300	452	1680	2330
800	32"	-	110	300	505	1885	2640
900	36"	-	110	350	555	2120	2975
1000	40"	-	110	350	610	2315	3280
1200	48"	-	150	400	725	2810	3960

\* AS STANDARD APPLIES ONLY TO GTAPPi MODEL VALVE.

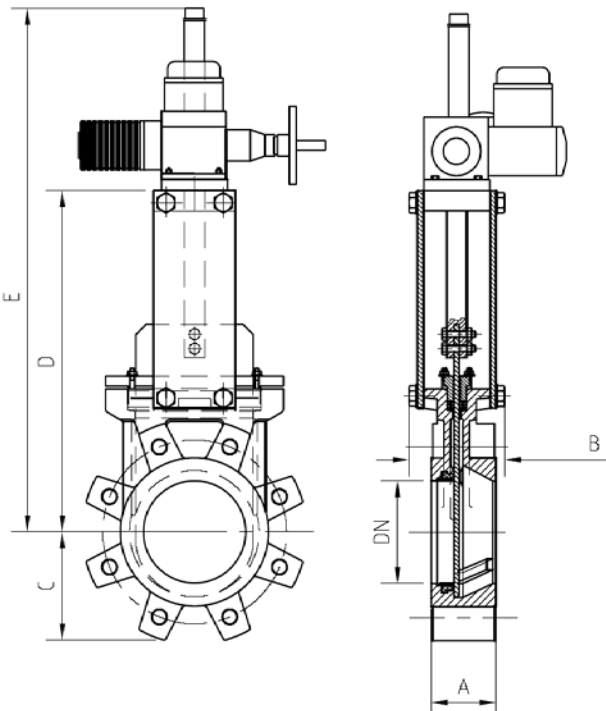
# ELECTRIC MOTOR RISING STEM

GS and GTAPPI Standard versions available from  
DN50/2" to DN600/24", other sizes on request.

BI-DIRECTIONAL  
Seat optional configuration:



GS MOD. STANDARD KNIFE GATE VALVE



GTAPPI MOD. TAPPI KNIFE GATE VALVE

<<

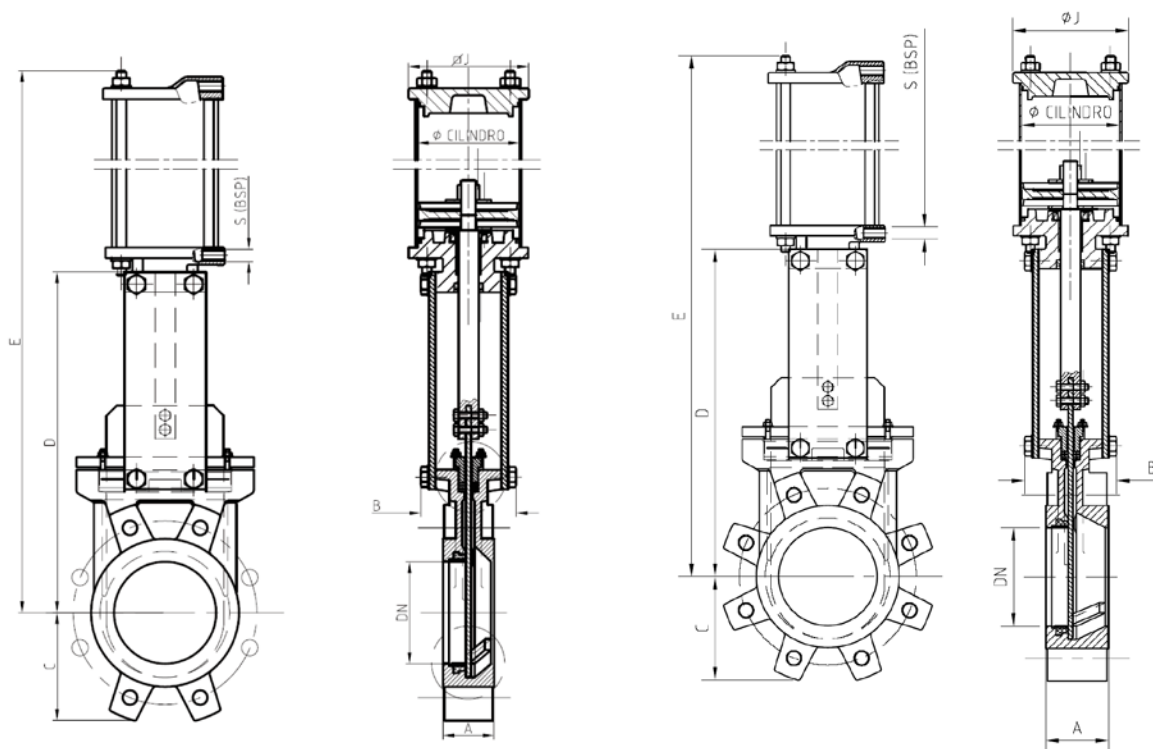
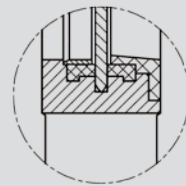
DN	SIZE	P bar	A mm	B mm	C mm	D mm	E mm
50	2"	10	40 / 47.8*	90	60	240	630
65	2 1/2"	10	40 / 47.8*	90	68	270	655
80	3"	10	50 / 50.8*	90	90	295	680
100	4"	10	50 / 50.8*	90	105	335	720
125	5"	10	50 / 54.2*	100	118	370	805
150	6"	10	60 / 57.2*	100	135	418	855
200	8"	10	60 / 69.8*	120	170	522	1050
250	10"	10	70 / 69.8*	120	202	625	1250
300	12"	6 / 10*	70 / 76.2*	120	240	725	1350
350	14"	6 / 10*	96 / 76.2*	192	255	845	1510
400	16"	6 / 10*	100 / 88.9*	192	295	945	1615
450	18"	5 / 10*	106 / 88.9*	192	318	1045	1870
500	20"	4 / 10*	110 / 114.3*	192	345	1148	1986
600	24"	4 / 10*	110 / 114.3*	290	405	1360	2115

\* AS STANDARD APPLIES ONLY TO GTAPPI MODEL VALVE.

## PNEUMATIC CYLINDER

GS MOD. Standard version available from DN200/8" to DN700/28", GTAPPi Up to DN600/24". Other sizes on request.

BI-DIRECTIONAL  
Seat optional configuration:



GS MOD. STANDARD KNIFE GATE VALVE

GTAPPi MOD. TAPPI KNIFE GATE VALVE

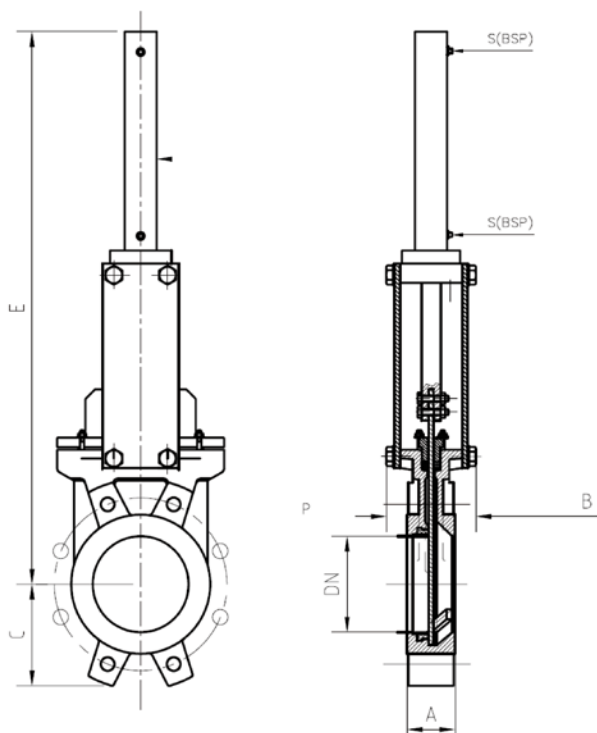
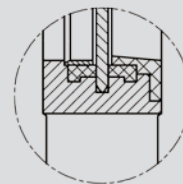
DN	SIZE	P bar	A mm	B mm	C mm	D mm	E mm	CIL. mm	J mm	S mm
50	2"	10	40 / 47.8*	90	60	240	410	80	96	1/4"
65	2 1/2"	10	40 / 47.8*	90	68	270	456	80	96	1/4"
80	3"	10	50 / 50.8*	90	90	295	500	80	96	1/4"
100	4"	10	50 / 50.8*	90	105	335	560	100	115	1/4"
125	5"	10	50 / 54.2*	100	118	370	640	125	138	1/4"
150	6"	10	60 / 57.2*	100	135	418	716	125	138	1/4"
200	8"	10	60 / 69.8*	120	170	522	880	160	175	1/4"
250	10"	10	70 / 69.8*	120	202	625	1042	200	218	3/8"
300	12"	6 / 10*	70 / 76.2*	120	240	725	1182	200 / **	218 / **	3/8"
350	14"	6 / 10*	96 / 76.2*	192	255	845	1360	250 / **	270 / **	3/8"
400	16"	6 / 10*	100 / 88.9*	192	295	945	1540	250 / **	270 / **	3/8"
450	18"	5 / 10*	106 / 88.9*	192	318	1045	1675	300 / **	382 / **	1/2"
500	20"	4 / 10*	110 / 114.3*	192	345	1148	1840	300 / **	382 / **	1/2"
600	24"	4 / 10*	110 / 114.3*	290	405	1360	2145	300 / **	382 / **	1/2"
700	28"	-	110	300	452	-	2580	350	426	1/2"

\* AS STANDARD APPLIES ONLY TO GTAPPi MODEL VALVE.  
\*\* DATA ON REQUEST.

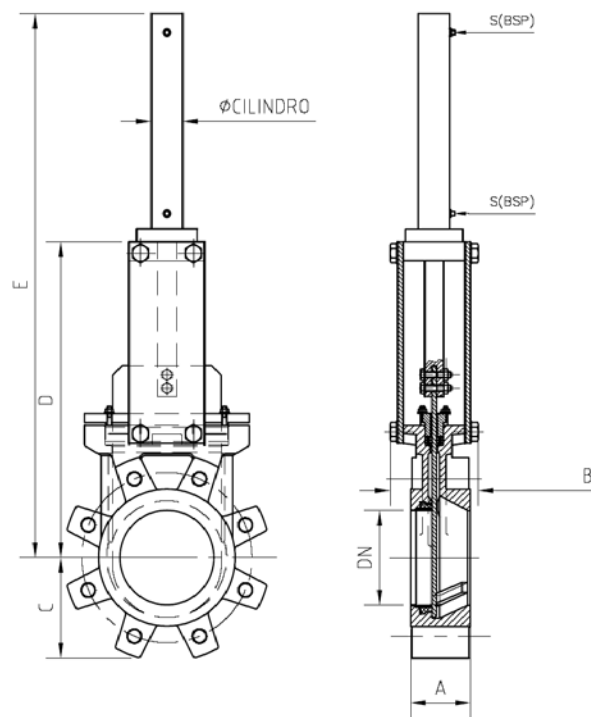
## HYDRAULIC CYLINDER

GS and GTAPPI Standard versions available from DN50/2" to DN600/24", other sizes on request.

BI-DIRECTIONAL  
Seat optional configuration:



GS MOD. STANDARD KNIFE GATE VALVE



GTAPPI MOD. TAPPI KNIFE GATE VALVE

<<

DN	SIZE	P bar	A mm	B mm	C mm	D mm	E mm	CIL. mm	S mm
50	2"	10	40 / 47.8*	90	60	240	402	40	1/2"
65	2 1/2"	10	40 / 47.8*	90	68	270	447	40	1/2"
80	3"	10	50 / 50.8*	90	90	295	487	40	1/2"
100	4"	10	50 / 50.8*	90	105	335	547	40	1/2"
125	5"	10	50 / 54.2*	100	118	370	612	40	1/2"
150	6"	10	60 / 57.2*	100	135	418	685	40	1/2"
200	8"	10	60 / 69.8*	120	170	522	846	50	1/2"
250	10"	10	70 / 69.8*	120	202	625	999	50	1/2"
300	12"	6 / 10*	70 / 76.2*	120	240	725	1151	63 / **	3/4"
350	14"	6 / 10*	96 / 76.2*	192	255	845	1326	63 / **	3/4"
400	16"	6 / 10*	100 / 88.9*	192	295	945	1476	63 / **	3/4"
450	18"	5 / 10*	106 / 88.9*	192	318	1045	1646	80 / **	3/4"
500	20"	4 / 10*	110 / 114.3*	192	345	1148	1799	80 / **	3/4"
600	24"	4 / 10*	110 / 114.3*	290	405	1360	2111	80 / **	3/4"

\* AS STANDARD APPLIES ONLY TO GTAPPI MODEL VALVE.

\*\* DATA ON REQUEST.



# FLANGE DRILLING INFORMATION

FCA offers the possibility of valve adaptation to most common pipe fitting flanges. ASME, DIN, MSS, BSI, AS or according to customer flange drilling specifications can be supplied for FCA standard knife gate valves.



## ASME B16.5

### CLASS 150#



SIZE inch	FLANGE DIAMETER inch	No. HOLES	HOLE DIAMETER inch	BOLT CIRCLE inch
2	6.00	4	0.75	4.75
3	7.50	4	0.75	6.00
4	9.00	8	0.75	7.50
6	11.00	8	0.88	9.50
8	13.50	8	0.88	11.75
10	16.00	12	1.00	14.25
12	19.00	12	1.00	17.00
14	21.00	12	1.12	18.75
16	23.50	16	1.12	21.25
18	25.00	16	1.25	22.75
20	27.50	20	1.25	25.00
24	32.00	20	1.38	29.50

\*Reffer to ASME B16.47 for superior sizes

### CLASS 300#



SIZE inch	FLANGE DIAMETER inch	No. HOLES	HOLE DIAMETER inch	BOLT CIRCLE inch
2	6.50	8	0.75	5.00
3	8.25	8	0.88	6.62
4	10.00	8	0.88	7.88
6	12.50	12	0.88	10.62
8	15.00	12	1.00	13.00
10	17.50	16	1.12	15.25
12	20.50	16	1.25	17.75
14	23.00	20	1.25	20.25
16	25.50	20	1.38	22.50
18	28.00	24	1.38	24.75
20	30.50	24	1.38	27.00
24	36.00	24	1.62	32.00

\*Reffer to ASME B16.47 for superior sizes

DIN

## PN6

<<

DN mm	FLANGE DIAMETER mm	No. HOLES	HOLE DIAMETER mm	BOLT CIRCLE mm
50	140	4	14	110
80	190	4	19	150
100	210	4	19	170
150	265	8	19	225
200	320	8	19	280
250	375	12	19	335
300	440	12	23	395
350	490	12	23	445
400	540	16	23	495
450	595	16	23	550
500	645	20	23	600
600	755	20	28	705
700	860	24	28	810
800	975	24	31	920
900	1075	24	31	1020
1000	1175	28	31	1120
1200	1405	32	34	1340

## PN10

<<

DN mm	FLANGE DIAMETER mm	No. HOLES	HOLE DIAMETER mm	BOLT CIRCLE mm
50	165	4	18	125
80	200	4	18	160
100	220	4	18	180
150	285	8	22	240
200	340	8	23	295
250	395	12	23	350
300	445	12	23	400
350	505	16	23	460
400	565	16	28	515
450	615	20	28	565
500	670	20	28	620
600	780	35	31	725
700	895	24	31	840
800	1015	24	34	950
900	1115	28	34	1050
1000	1230	28	37	1160
1200	1455	32	41	1380

# NOTES

#### HEADQUARTERS

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[fca@fcavalves.com](mailto:fca@fcavalves.com)

[www.fcavalves.com](http://www.fcavalves.com)



# SWING CHECK VALVES CATALOGUE

BOLTED BONNET AND PRESSURE SEAL  
FCA RS AND RPS MODEL CHECK VALVES



FLOW CONTROL APPLICATIONS



## 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.

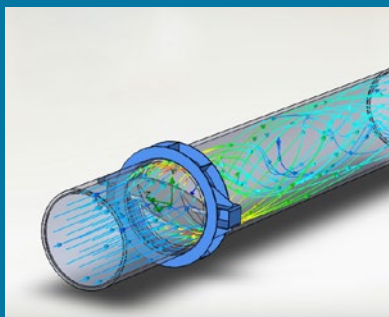
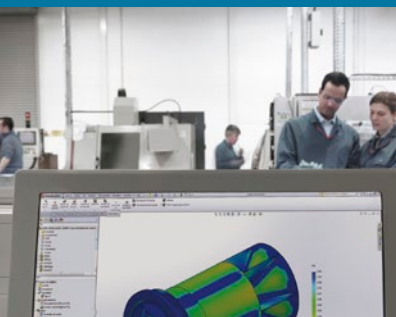
More and more customers trust our DNV certified solutions. **FCA** innovation-driven valves find solutions to any customer challenge or toughest application.

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.



## 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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- CLASS 600#

PRESSURE SEAL DESIGN SWING  
CHECK VALVES

- CLASS 600#
- CLASS 900#
- CLASS 1500#
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# SPECIFICATIONS AND STANDARDS

Check valves have an extended use in many industrial applications such as oil&gas, chemical and petrochemical plants, thermal applications, fertilizer plants, etc... **FCA** swing check valves are designed in accordance with API 6D and ASME B16.34. These valves allows fluid circulating in one direction, preventing reversal flow in horizontal pipelines. They have the ability to react quickly and automatically to direction changing.

These automatically actuated valves respond to the flow media (pressure and velocity) for opening and to the gravity force for closure. The disc, mounted on an arm that rotates on a hinge pin, is able to go through the body from side to side sealing the flow in the metal seat. Design prevents disc from being opened too high, thus causing failure to be closed down.

**RS** bolted bonnet design model ensures a perfect performance and sealing for pressure ratings up to ASME Class 1500#. For high sizes and pressure ratings up to 2500# **RPS** Pressure seal bonneted design model is available, performing a higher sealing force as internal pressure is increased.

**FCA** Check 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#. Butt welded ends can also be supplied, with schedule according to customer specifications.



## COVERING STANDARDS

**FCA** Check Valves are mainly designed and manufactured according to API 6D "Specification for pipeline valves" and considering standards such as ASME BPVC "Boiler and Pressure Vessel 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 "Butt welding 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

## HIGHLIGHTS

- Design and Manufacture according to API 6D and ASME B16.34.
- Full port design suitable for pigging operations.
- Lifting points.
- Suitable for horizontal & vertical upflow (not recommended) installation possibility.
- Optional bottom drain plug.
- Hardfacing coating with Stellite, ENP or Tungsten carbide.
- Wide range of body, bonnet and trim materials.
- Uni-directional flow.
- Bolted or Pressure seal bonnet configuration.

## SECTORS

- Oil & Gas.
- Mineral Processing.
- Petrochemical plants.
- Steel industry.
- Thermal Power plants.
- Water distribution.
- Water pump stations.
- etc...

## APPLICATIONS

- Natural Gas pipelines.
- Oil pipelines.
- Refineries.
- Steam isolation.
- High temperature.
- Corrosive fluids.
- etc...



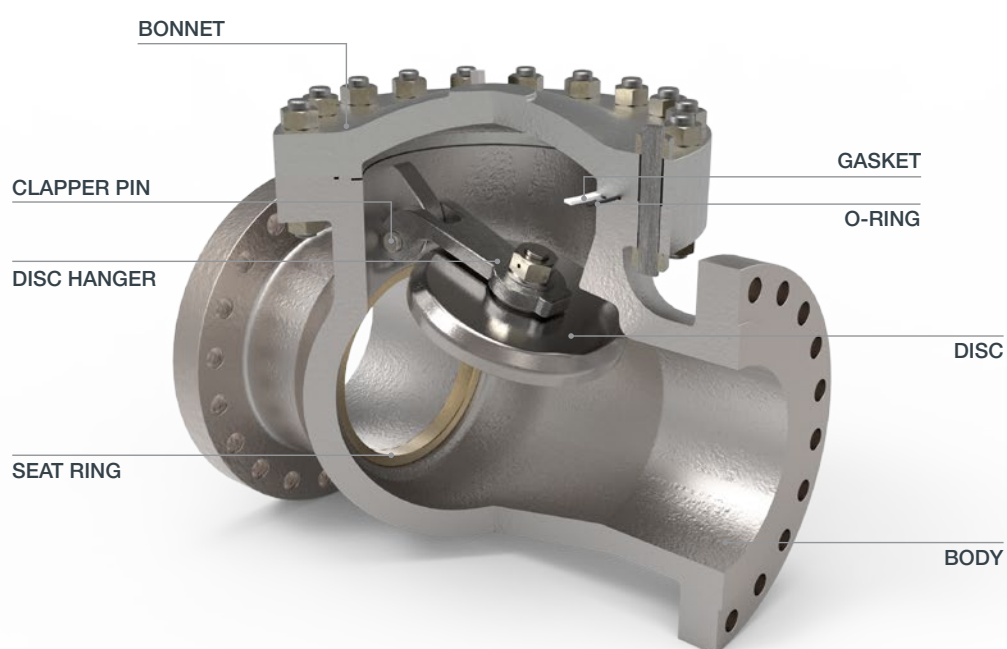
## MANUFACTURING PROGRAM

TYPE	CLASS	2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"	28"	30"	36"
Bolted bonnet design [RS Mod.]	150#	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	300#	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	600#	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Pressure seal design [RPS Mod.]	600#	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	900#	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	1500#	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	2500#	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

## GENERAL MATERIALS

<b>BODY</b>	WCB / WCC / A105 / LCB / LOC / WC6 / CF8M / CF3M / F316 / F51 / 4A
<b>DISC</b>	WCB / WCC / A105 / LCB / LOC / WC6 / CF8M / CF3M / F316 / F51 / 4A
<b>BONNET</b>	WCB / WCC / A105 / LCB / LOC / WC6 / CF8M / CF3M / F316 / F51 / 4A
<b>CLAPPER PIN</b>	SS316 / SS410
<b>SEAT RING</b>	A105 / F6A / SS316 / CF8M / CF3M / F51 / 17-4PH
<b>GASKET</b>	GRAPHITE / SS316+GRAPHITE
<b>DISC HANGER</b>	WCB / WCC / A105 / LCB / LOC / WC6 / CF8M / CF3M / F316 / F51 / 4A
<b>O-RING</b>	VITON
<b>BOLTING</b>	B7 / B7M / B8 / B8M / L7

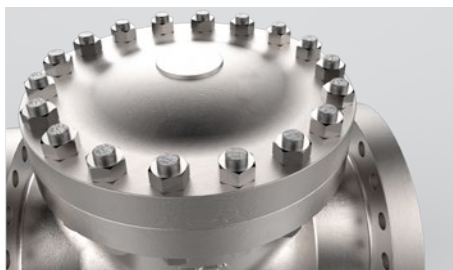
Stellite or tugnsten faced for seat ring availability.  
Special applications available under request.



## BODY AND BONNET

**FCA** designed various body-bonnet constructions such as bolted bonnet or pressure seal design. Bodies and bonnets are high quality with uniform section cast and then precisely machined, offering high performance and preventing stress concentrations.

The bodies provide a full port that ensures minimal turbulences, reduces erosion effect and minimizes resistance to flow.

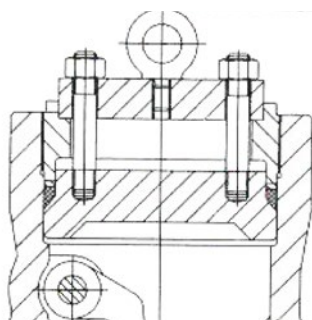


## BODY AND BONNET JOINT

Body and bonnet joints of **FCA** valves are designed with a more than adequate number of bonnet bolts. The standard joint varies, depending on valve Class. For Class 150# gate valves consist of a square joint or oval design depending on size. According to valve service it can be supplied flat-face gasket with graphite or PTFE. Class 300# and 600# valves consist of a circular spiral wound gasket. For class 900# and above consist of a ring type joint.

## PRESSURE SEAL BONNET DESIGN

In pressure seal bonnet designs the sealing is achieved through a graphite gasket that takes advantage of the internal pressure of the line. This configuration reduces the weight of the valve since avoids large diameter body bonnet connection flange and large size body-bonnet bolting.



## DISC ASSEMBLY

Robust one-piece disc has been designed to withstand severe shock operation of check valves. Disc sealing surface can be hardfaced by welding with metal material or inlaid with non-metal material according to customer requests. It provides enough intensity and rigidity and assures good sealing contact.

Disc is fastened securely to the hanger disc with a lock nut and cotter pin. The hinge pin connects it with the body and allows a long life valve operation.



## 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.

## MATERIAL SELECTION

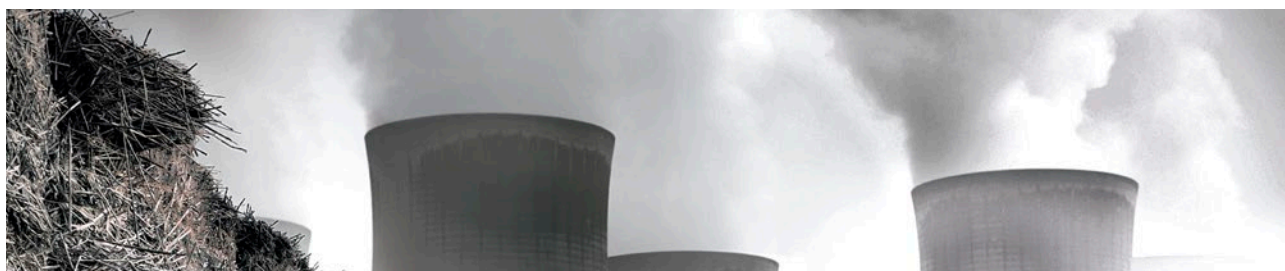
For material selection fluid type characteristic, pressure and working temperature shall be considered. FCA carries many years of experience with special materials such as duplex, superduplex, hastelloy, inconel, nickel alloys, etc... Moreover standard forged or casted steels are daily work standard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

For internal parts such as seat rings and disc, 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 gate 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.



## Cv FLOW COEFFICIENT VALUES

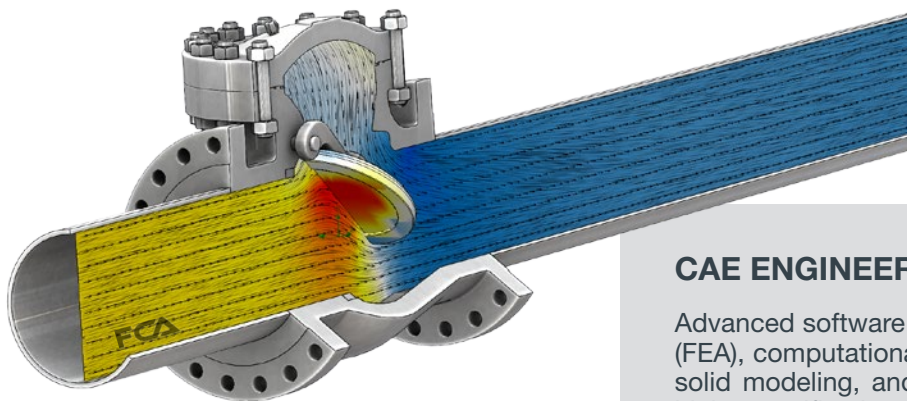
Cv is known as flow coefficient value of a valve. This coefficient Cv is related to the flow and pressure conditions by the following basic liquid equation:

$$C_v = Q \cdot (\text{SG} / \Delta P)^{1/2}$$

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"	28"	30"	36"
Full Bore Swing Check Valves	150#	110	250	450	1100	1950	3100	4600	6000	7800	12000	15500	24000	33000	39000	58000
	300#	110	250	450	1100	1950	3100	4600	6000	7800	12000	15500	24000	33000	39000	58000
	600#	100	230	410	1000	1800	3000	4400	5800	7500	11000	14800	22500	32000	37500	56000
	900#	100	230	410	1000	1800	3000	4400	5800	7500	11000	14800	22500	32000	37500	56000
	1500#	80	190	350	890	1700	2850	4150	5500	6800	9200	12500	20000	28000	34000	53000
	2500#	70	165	320	720	1550	2600	3700	5000	5900	7900	9800	16500	23500	30000	46000

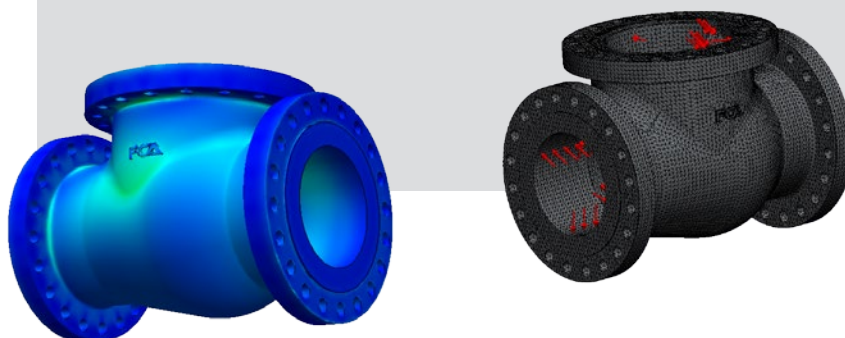
For reference only. Contact FCA for value confirmation.



## 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 RS and RPS gates 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.

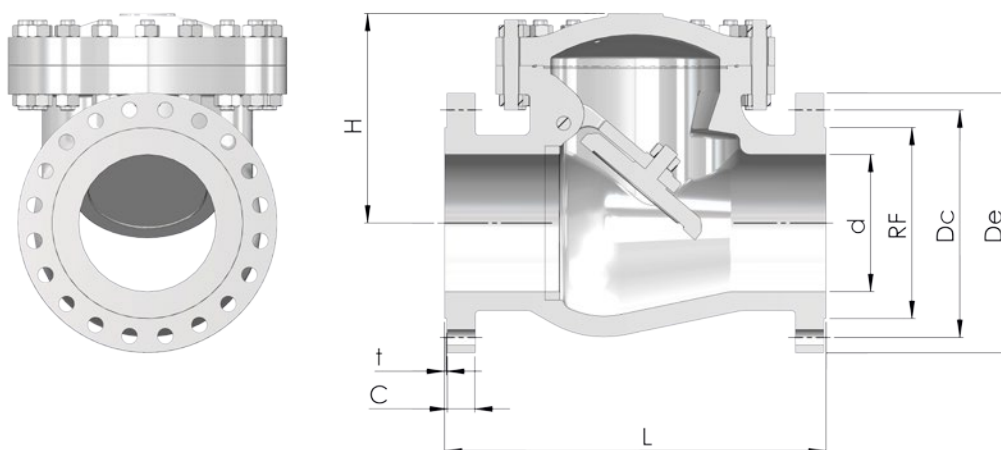


## BOLTED BONNET DESIGN SWING CHECK VALVES - RS MODEL

Standard version available from DN50/2" to DN900/36" and pressure rating up to Class 600#. Face to face according to API 6D.

Drawing double flanged end connection. Contact FCA for specialized drawing according to customer specifications.

Other end connections, sizes and pressures on request.



### DIMENSIONS - CLASS 150#

SIZE		L			d	H	De	Dc	ØRF	Drilling	C	t
NPS	DN	RF	RTJ	BW								
2"	50	292	295	292	50	151	152	120.7	91.9	4-Ø19.1	15.8	1.6
3"	80	356	359	356	76	178	191	152.4	127	4-Ø19.1	19.1	1.6
4"	100	406	410	406	100	190	229	190.5	157.2	8-Ø19.1	23.9	1.6
6"	150	495	498	495	150	228	279	241.3	215.9	8-Ø22.2	25.4	1.6
8"	200	597	600	597	200	292	343	298.5	269.7	8-Ø22.2	28.4	1.6
10"	250	673	676	673	250	304	406	362	323.9	12-Ø25.4	30.2	1.6
12"	300	762	765	762	300	342	483	431.8	381	12-Ø25.4	31.8	1.6
14"	350	889	892	889	336	406	533	476.2	412.8	12-Ø28.6	35.1	1.6
16"	400	902	905	902	387	508	597	539.8	469.9	16-Ø28.6	36.6	1.6
18"	450	1016	1019	1016	438	584	635	577.9	533.4	16-Ø31.8	39.6	1.6
20"	500	1054	1060	1054	488	622	699	635	584.2	20-Ø31.8	42.9	1.6
24"	600	1397	1407	1397	590	711	813	749.3	692.2	20-Ø34.9	47.8	1.6
28"	700	1600	1613	1600	685	838	927	863.6	800.1	28-Ø34.9	71.4	1.6
30"	750	1651	1664	1651	735	889	984	914.4	857.3	28-Ø34.9	74.7	1.6
36"	900	2083	-	2083	875	1092	1168	1085.9	1022.4	32-Ø41.3	90.4	1.6

Notes: Dimensions in (mm). Flange drilling according to ASME B16.5/B16.47

## DIMENSIONS - CLASS 300#

SIZE			L		d	H	De	Dc	ØRF	Drilling	C	t
NPS	DN	RF	RTJ	BW								
2"	50	267	283	267	50	161	165	127	91.9	8-Ø19.1	22.4	1.6
3"	80	318	333	318	76	203	210	168.3	127	8-Ø22.2	28.4	1.6
4"	100	356	371	356	100	228	254	200.2	157.2	8-Ø22.2	31.8	1.6
6"	150	445	460	445	150	279	318	269.8	215.9	12-Ø22.2	36.6	1.6
8"	200	533	549	533	200	342	381	330.2	269.7	12-Ø25.4	41.1	1.6
10"	250	622	638	622	250	381	445	387.4	323.9	16-Ø28.6	47.8	1.6
12"	300	711	727	711	300	431	521	450.9	381	16-Ø31.8	50.8	1.6
14"	350	838	854	838	336	482	584	514.4	412.8	20-Ø31.8	53.8	1.6
16"	400	864	879	864	387	508	648	571.5	469.9	20-Ø34.9	57.2	1.6
18"	450	978	994	978	438	584	711	628.7	533.4	24-Ø34.9	60.5	1.6
20"	500	1016	1035	1016	488	660	775	685.8	584.2	24-Ø34.9	63.5	1.6
24"	600	1346	1368	1346	590	762	914	812.8	692.2	24-Ø41.3	69.9	1.6
28"	700	1499	1524	1499	685	889	1035	939.8	800.1	28-Ø44.5	85.9	1.6
30"	750	1594	1619	1594	735	977	1092	991	857.3	28-Ø47.6	91.9	1.6
36"	900	2083	-	2083	875	1143	1270	1168.4	1022.4	32-Ø54	104.6	1.6

Notes: Dimensions in (mm). Flange drilling according to ASME B16.5/B16.47

## DIMENSIONS - CLASS 600#

SIZE			L		d	H	De	Dc	ØRF	Drilling	C	t
NPS	DN	RF	RTJ	BW								
2"	50	292	295	292	50	295	165	127	91.9	8-Ø19.1	25.4	6.4
3"	80	356	569	356	76	359	210	168.3	127	8-Ø22.2	31.8	6.4
4"	100	432	435	432	100	435	273	215.9	157.2	8-Ø25.4	38.1	6.4
6"	150	559	562	559	150	562	356	292.1	215.9	12-Ø28.6	47.8	6.4
8"	200	660	664	660	200	664	419	349.2	269.7	12-Ø31.8	55.6	6.4
10"	250	787	791	787	250	791	508	431.8	323.9	16-Ø34.9	63.5	6.4
12"	300	838	841	838	300	841	559	489	381	20-Ø34.9	66.5	6.4
14"	350	889	892	889	336	892	603	527.1	412.8	20-Ø38.1	69.9	6.4
16"	400	991	994	991	387	994	686	603.2	469.9	20-Ø41.3	76.2	6.4
18"	450	1092	1095	1092	438	1095	743	654.1	533.4	20-Ø44.5	82.6	6.4
20"	500	1194	1200	1194	488	1200	813	723.9	584.2	24-Ø44.5	88.9	6.4
24"	600	1397	1407	1397	590	1407	940	838.2	692.2	24-Ø50.8	101.6	6.4
28"	700	1600	1613	1600	685	1613	1073	965.2	800.1	28-Ø54	111.3	6.4
30"	750	1651	1664	1651	735	1664	1130	1022.4	857.3	28-Ø54	114.3	6.4

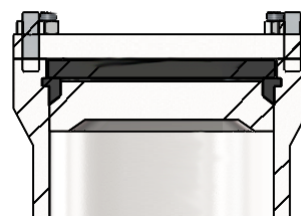
Notes: Dimensions in (mm). Flange drilling according to ASME B16.5/B16.47

# PRESSURE SEAL DESIGN SWING CHECK VALVES - RPS MODEL

Standard version available from DN50/2" to DN750/30" and pressure rating up to Class 2500#. Face to face according to API 6D.

Drawing double flanged end connection. Contact FCA for specialized drawing according to customer specifications.

Other end connections, sizes and pressures on request.



## DIMENSIONS - CLASS 600#

SIZE		L			d	H	De	Dc	ØRF	Drilling	C	t
NPS	DN	RF	RTJ	BW								
2"	50	292	295	292	50	225	165	127	91.9	8-Ø19.1	25.4	6.4
3"	80	356	569	356	76	254	210	168.3	127	8-Ø22.2	31.8	6.4
4"	100	432	435	432	100	279	273	215.9	157.2	8-Ø25.4	38.1	6.4
6"	150	559	562	559	150	368	356	292.1	215.9	12-Ø28.6	47.8	6.4
8"	200	660	664	660	200	393	419	349.2	269.7	12-Ø31.8	55.6	6.4
10"	250	787	791	787	250	457	508	431.8	323.9	16-Ø34.9	63.5	6.4
12"	300	838	841	838	300	584	559	489	381	20-Ø34.9	66.5	6.4
14"	350	889	892	889	336	609	603	527.1	412.8	20-Ø38.1	69.9	6.4
16"	400	991	994	991	387	685	686	603.2	469.9	20-Ø41.3	76.2	6.4
18"	450	1092	1095	1092	438	736	743	654.1	533.4	20-Ø44.5	82.6	6.4
20"	500	1194	1200	1194	488	762	813	723.9	584.2	24-Ø44.5	88.9	6.4
24"	600	1397	1407	1397	590	889	940	838.2	692.2	24-Ø50.8	101.6	6.4
28"	700	1600	1613	1600	685	1066	1073	965.2	800.1	28-Ø54	111.3	6.4
30"	750	1651	1664	1651	735	1168	1130	1022.4	857.3	28-Ø54	114.3	6.4

Notes: Dimensions in (mm). Flange drilling according to ASME B16.5/B16.47

## DIMENSIONS - CLASS 900#

SIZE		L			d	H	De	Dc	ØRF	Drilling	C	t
NPS	DN	RF	RTJ	BW								
2"	50	368	371	368	47	225	216	165.1	91.9	8-Ø25.4	38.1	6.4
3"	80	381	384	381	72	254	241	190.5	127	8-Ø25.4	38.1	6.4
4"	100	457	460	457	98	279	292	235	157.2	8-Ø31.8	44.5	6.4
6"	150	610	613	610	146	381	381	317.5	215.9	12-Ø31.8	55.6	6.4
8"	200	737	740	737	190	533	470	393.7	269.7	12-Ø38.1	63.5	6.4
10"	250	838	841	838	238	558	546	469.9	323.9	16-Ø38.1	69.9	6.4
12"	300	965	968	965	282	609	610	533.4	381	20-Ø38.1	79.2	6.4
14"	350	1029	1038	1029	311	736	641	558.8	412.8	20-Ø41.3	85.9	6.4
16"	400	1130	1140	1130	355	462	705	616	469.9	20-Ø44.5	88.9	6.4
18"	450	1219	1232	1219	400	863	787	685.8	533.4	20-Ø50.8	101.6	6.4
20"	500	1321	1334	1321	444	939	857	749.3	584.2	20-Ø54	108	6.4
24"	600	1549	1568	1549	533	1066	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#

SIZE			L		d	H	De	Dc	ØRF	Drilling	C	t
NPS	DN	RF	RTJ	BW								
2"	50	368	371	368	47	225	216	165.1	91.9	8-Ø25.4	38.1	6.4
3"	80	470	473	470	69	254	267	203.2	127	8-Ø31.8	47.8	6.4
4"	100	546	549	546	92	279	311	241.3	157.2	8-Ø34.9	53.8	6.4
6"	150	705	711	705	136	381	394	317.5	215.9	12-Ø38.1	82.6	6.4
8"	200	832	841	832	177	533	483	393.7	269.7	12-Ø44.5	91.9	6.4
10"	250	991	1000	991	222	558	584	482.6	323.9	12-Ø50.8	108	6.4
12"	300	1130	1146	1130	263	609	673	571.5	381	16-Ø54	124	6.4
14"	350	1257	1276	1257	288	736	749	635	412.8	16-Ø60.3	133.4	6.4
16"	400	1384	1407	1384	330	462	826	704.9	469.9	16-Ø66.7	146.1	6.4
18"	450	1537	1559	1537	371	863	914	774.7	533.4	16-Ø73	162.1	6.4
20"	500	1664	1686	1664	415	939	984	831.9	584.2	16-Ø79.4	177.8	6.4
24"	600	1943	1972	1943	498	1066	1168	990.6	692.2	16-Ø92	203.2	6.4

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

## DIMENSIONS - CLASS 2500#

SIZE			L		d	H	De	Dc	ØRF	Drilling	C	t
NPS	DN	RF	RTJ	BW								
2"	50	451	545	451	42	225	235	171.5	91.9	8-Ø28.6	50.8	6.4
3"	80	578	584	578	62	254	305	228.6	127	8-Ø34.9	66.5	6.4
4"	100	673	683	673	87	279	356	273.1	157.2	8-Ø41.3	76.2	6.4
6"	150	914	927	914	131	420	483	368.3	215.9	8-Ø54	108	6.4
8"	200	1022	1038	1022	179	570	552	438.2	269.7	12-Ø54	127	6.4
10"	250	1270	1292	1270	223	1010	673	539.7	323.9	12-Ø66.7	165.1	6.4
12"	300	1422	1445	1422	265	1170	762	619.2	381	12-Ø73	184.2	6.4

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



# NOTES

#### HEADQUARTERS

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