ECCENTRIC BUTTERFLY VALVES CATALOGUE

DOUBLE AND TRIPLE ECCENTRIC FCA MD AND MT MODEL BUTTERFLY VALVES



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FCA - WORKING CLOSELY WITH YOU TO ACHIEVE EXCELLENCE

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

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

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

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

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

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







WORLDWIDE THERE WHERE OUR CUSTOMER IS

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

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

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





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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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 machinned 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 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". 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.

 \cdot Double flanged, wafer or Lug type and buttwelded configurations.

 \cdot Handwheel, gearbox, electric, pneumatic or hidraulic actuation.

- \cdot Wide range of body, bonnet and trim materials.
- · Extended stem availability.

SECTORS

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

APPLICATIONS

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

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.



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 PRESSUR	RE (bar)	150#	300#	600#
	Shell Test	30	75	150
IESI PRESSURE	Seal Test	22	55	110



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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
ВОТТОМ САР	WCB / A105 / CF8 / CF8M / SS316
BUSHING	SS410 / SS316 / F51 (+PTFE)
YOKE	WCB
BOLTING	B7 / B7M / B8 / B8M / F51

Oher 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 certerline of sealing face. The second, to the deviation from centerline of pipe and valve as in double eccentric butterflye 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 operationg 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 minimun torque value. Flow coefficient of the valve is closely associated with the structure of it.

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

TOP FLANGE

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

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 red	quest.	

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:

- \cdot 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.

SIZE	SIZE (mm)		ol 100 000 "	01 4 0 0 0 0 0 1
DN	inch	CLASS 150#	CLASS 300#	CLASS 600#
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

FLOW COEFFICIENT TABLE - Cv Value

CAE ENGINEERING TOOLS

Advanced software applications including Finite Element Analysis (FEA), computational fluid dynamics (CFD) and three-dimensional solid modeling, and our proven knowhow, 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 form DN50/2'' to DN1200/48'' and pressure rating up to Class 600#. Other sizes and pressure on request.

ACCESORIES AND OPTIONS

- \cdot Double or triple eccentric design.
- · Wafer, Lug, Buttwelded or Double Flanged configurations.
- \cdot Fire safe design.
- · Design and Manufacturing according to API 609.

 \cdot Lever, Handwheel, gearbox, electric, pneumatic or hidraulic actuation.

- \cdot Wide range of body and disc materials.
- · Extended stem availability.
- · By-pass valves.
- \cdot Superior sizes and pressure.

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



DIMENSIONS - CLASS 150#

SI	SIZE L					~ .						
NPS	DN	WF	LG	RF	BW	H	De	Dc	ØRF	n-Ød	С	t
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

SIZ	ZE		L	-	N		D.	ODE	D. III.	0		
NPS	DN	WF	LG	RF	BW	н	De	DC	ØRF	Drilling	C	t
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

DIMENSIONS - CLASS 300#

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

DIMENSIONS - CLASS 600#

SI	ZE		1	_		D.				D		
NPS	DN	WF	LG	RF	BW	н	De	Dc	ØRF	Drilling	С	t
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

Pol. Ind. Apatta-Erreka, Parc. E3, Nave 8 20400 IBARRA (Gipuzkoa) Spain Tel.: + 34 943 216 148 Fax: + 34 943 210 438 fca@fcavalves.com www.fcavalves.com

