



AIL METSEAL*
TRIPLE OFFSET METAL-SEATED
BUTTERFLY VALVES

WAFER ● WAFER LUGGED ● FLANGED

Class 150 ● Class 300

API 609
MSS SP-68



AUDCO INDIA LIMITED

The **AIL METSEAL Butterfly Valve** is a high performance valve which is used for positive isolation in Power Generation, Petroleum Refining, Oil and Gas Production, Chemical, Petrochemical and Gas Processing industries. The valves are manufactured to the latest international designs, using advanced manufacturing techniques and stringent quality control checks.

AUDCO INDIA LIMITED (AIL) is a leading valve manufacturer, with a strong presence in India and overseas.

AIL has four manufacturing facilities located in Southern India. Apart from the main plant located in Manapakkam, Chennai, two other plants are at Maraimalai Nagar, 40 kilometres south and at Kancheepuram, 70 kilometres west of the main plant. The fourth plant is located at Coimbatore, Tamil Nadu. These plants are equipped with modern manufacturing facilities with special-purpose machines, automatic welding equipment, heat treatment furnaces and testing equipment for total control of all manufacturing operations. In-house metallurgical and NDE and calibration facilities with modern equipment provide support to ensure the quality of products manufactured.

AIL manufactures a wide variety of industrial valves. The Quality Management System in all four plants is certified to ISO 9001:2000 System.



AIL METSEAL Manufacturing Programme

Body ends	ASME Class	in mm															
		80	100	150	200	250	300	350	400	450	500	600	700	750	800	900	
		in inches	3	4	6	8	10	12	14	16	18	20	24	28	30	32	36
Wafer	150		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	300		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Wafer-Lugged	150		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	300		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Flanged	150		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
	300		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●

NOTE : All valves are gear-operated.

Manufacturing Plant at Kancheepuram

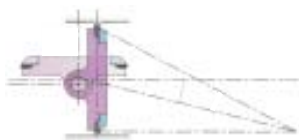


Salient Features

Triple Offset Geometry

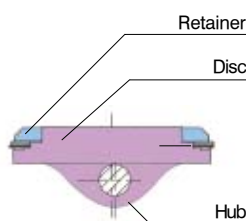
The triple offset geometry (see details on page 6) ensures a uniform compressive seal around the entire seat, and produces a wedging effect. The triple offset, combined with the resilient construction, ensures both zero leakage and bidirectionality.

The triple offset geometry also ensures contact between the body seat and disc seal only at the final shut-off position, thereby eliminating wear and enhancing life.



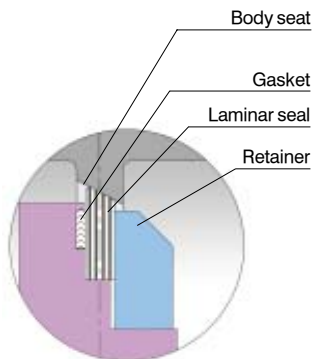
Special Disc Profile

The disc is designed for minimum obstruction to flow, and is made of high integrity casting with integrally cast hubs. The upper hub is attached to the shaft by means of a key for positive engagement. The disc seal is attached to the disc by means of a retainer ring.



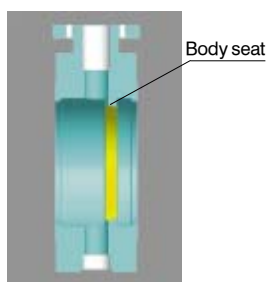
Laminar Resilient Disc Seal

The laminar seal is constructed with graphite layers sandwiched between metal layers bonded together. The seats are suitable to withstand temperatures up to 538°C (1000°F). The construction allows for resiliency of the seal material which flexes and energises according to the compressive forces generated. The resiliency of the seal allows the valve body and disc to contract or expand without the risk of jamming due to temperature changes. As a standard, the metal layers are of stainless steel. Alternate materials like monel and inconel are also available.



Raised conical Body Seat

The raised conical body seat prevents solid accumulation interfering with the seal. As a standard, the seat is hard faced to meet severe service conditions.



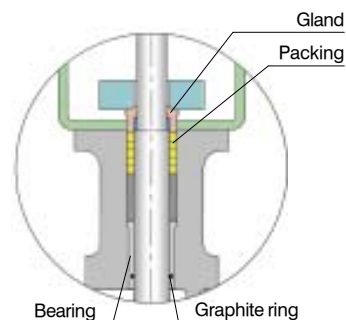
Fire-safe design

The valves being metal seated are intrinsically fire safe and are suitable for use in most critical applications. The valves are fire safe to API 607 Edition IV.

High integrity Shaft Sealing

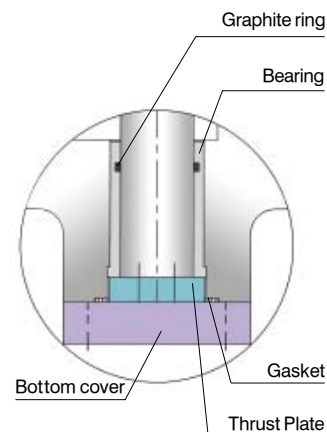
The shaft is of single-piece design which provides greater rigidity to the disc and imparts better resistance to bending. The shaft is keyed to the upper hub of the disc, which allows for differential expansion due to variation in temperature.

The main shaft seal is located at the top housing area in the form of a stuffing box arrangement which consists of graphite packings, gland and gland flange. The entire gland arrangement is asbestos-free in line with international norms. The shaft sealing at the bottom housing uses a gasket between the bottom cover and the bottom housing. Braided graphite rings are provided both at the top and bottom housing to prevent ingress of solid particles. Special packings can be provided to achieve low level of fugitive emission.



One-piece blowout-proof Shaft

The shaft bottom face is attached to the thrust plate, which is located between the bearing and the bottom cover plate. In addition, a step in the upper shaft area is held in place by the gland. These features provide full anti-blowout protection.

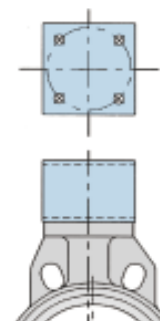


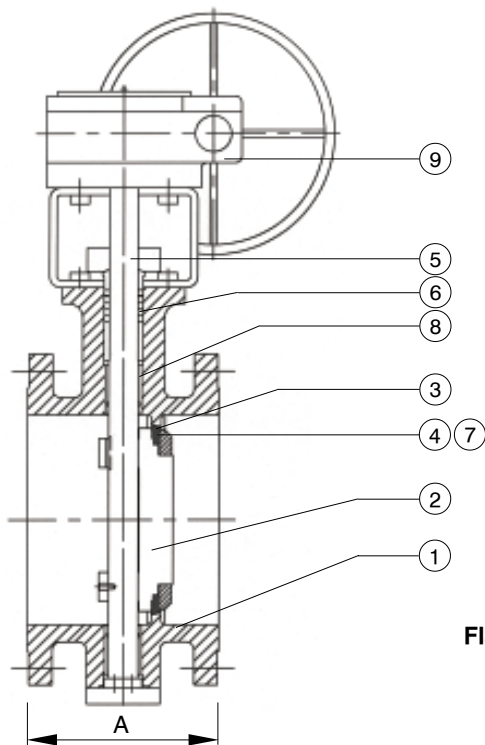
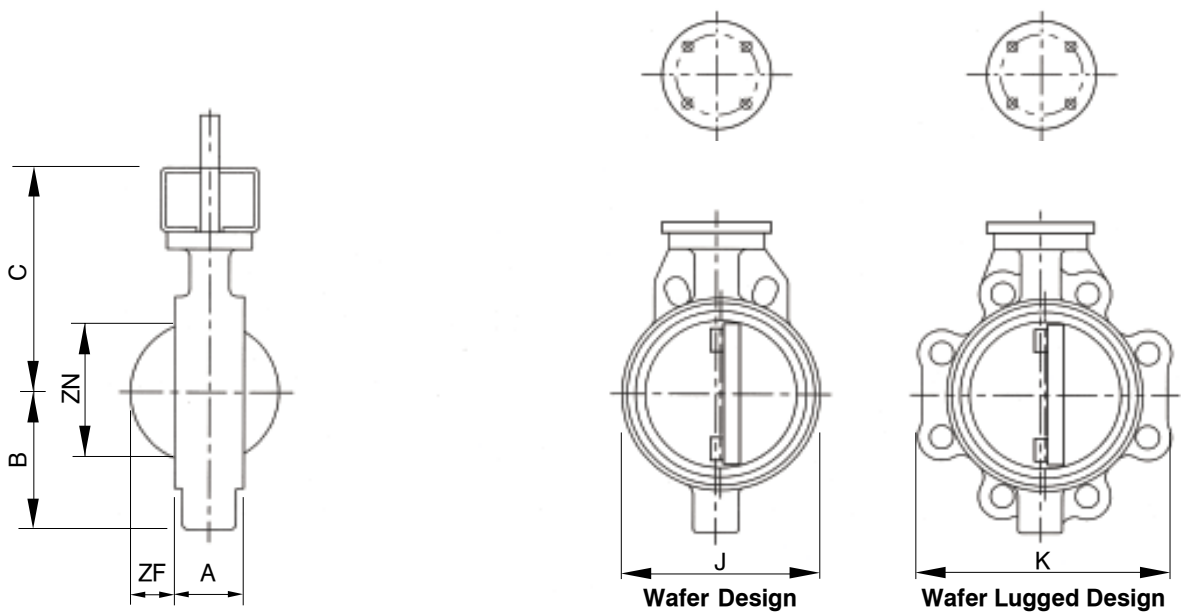
Shaft Bearings

The two bearings provided assure concentric stem rotation, allowing stem packing to provide maximum sealing effectiveness. As a standard, the bearings are made from nitrided stainless steel.

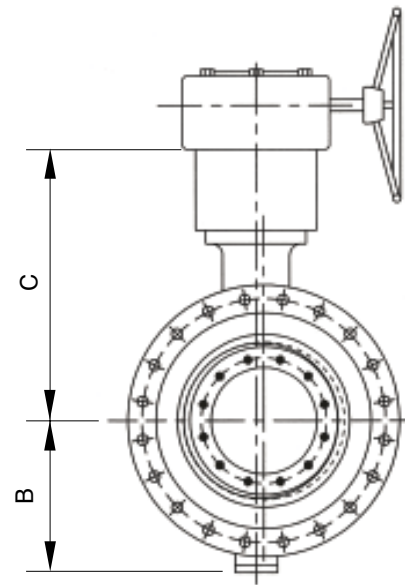
Actuator mounting Bracket

All valves are provided with brackets for easy on-site mounting of actuator. These brackets have actuator mounting holes conforming to ISO 5211.





Double Flanged Design



Materials of Construction

Item No	Description	Carbon Steel	Stainless Steel
1	Body	ASTM A216 Gr. WCB*, Seat hard faced with stellite	ASTM A351 Gr. CF8M, Seat hard faced with stellite
2	Disc	ASTM A216 Gr. WCB	ASTM A351 Gr. CF8M
3	Seal	UNS S31803 (Duplex) + Graphite	UNS S31803 (Duplex) + Graphite
4	Retainer	ASTM A516 Gr. 70	ASTM A240 Type 316
5	Shaft	ASTM A479 Type 410	FERRALIUM / 17-4PH / XM 19
6	Packing	Graphite	Graphite
7	Fasteners	Stainless steel	Stainless steel
8	Bearing	SS 316 Nitrided	SS 316 Nitrided
9	Gear Unit	Worm type	Worm type

For other materials of construction, please refer Ordering Information.

* For service temperatures up to 427°C (800°F).

Suggested valve shaft orientation is horizontal or inclined from vertical.

Dimensional Details

Wafer/Wafer Lugged Class 150 (in mm)

Valve Size	A	B	C	J	K	ZN	ZF
80 (3")	48	128	218	127	148	62	18
100 (4")	54	138	227	158	215	83	27
150 (6")	57	158	251	216	264	134	52
200 (8")	64	190	276	270	320	175	70
250(10")	71	240	370	324	406	223	85
300(12")	81	273	395	381	483	280	110
350(14")	92	312	462	413	541	348	147
400(16")	102	338	500	470	597	362	153
450(18")	114	350	523	534	648	399	165
500(20")	127	389	566	584	699	387	157
600(24")	154	456	636	692	813	530	220
700(28")	229	497	721	762	837	-	-
750(30")	230	565	815	813	888	626	226
800(32")	241	605	875	864	941	700	262
900(36")	241	640	930	972	1057	768	292

Wafer/Wafer Lugged Class 300 (in mm)

Valve Size	A	B	C	J	K	ZN	ZF
80 (3")	48	128	218	127	148	62	18
100 (4")	54	138	227	157	215	81	27
150 (6")	57	193	316	216	264	134	52
200 (8")	73	216	345	270	320	170	70
250(10")	83	232	370	324	406	223	85
300(12")	92	284	459	381	483	285	110
350(14")	117	330	525	425	541	330	147
400(16")	133	375	580	470	597	360	153
450(18")	149	415	620	533	648	393	165
500(20")	159	453	665	584	699	429	157
600(24")	181	530	808	692	813	520	220
700(28")	229	-	-	788	921	-	-
750(30")	230	595	880	845	991	626	226
800(32")	241	-	-	902	1054	-	-
900(36")	241	695	974	1010	1172	-	-

Flanged - Class 150 (in mm)

Valve Size	A	B	C
80 (3")	114	128	218
100 (4")	127	138	227
150 (6")	140	158	251
200 (8")	152	190	276
250(10")	165	240	370
300(12")	178	273	395
350(14")	190	312	462
400(16")	216	338	500
450(18")	222	350	523
500(20")	229	389	566
600(24")	267	456	636
700(28")	292	497	721
750(30")	318	565	815
800(32")	318	605	875
900(36")	330	640	930

For other sizes contact AIL/L&T

Flanged - Class 300 (in mm)

Valve Size	A	B	C
80 (3")	114	128	218
100 (4")	127	138	227
150 (6")	140	193	316
200 (8")	152	216	345
250(10")	165	232	370
300(12")	178	284	459
350(14")	190	330	525
400(16")	216	375	580
450(18")	222	415	620
500(20")	229	453	665
600(24")	267	530	808
700(28")	292	-	-
750(30")	318	595	880
800(32")	318	-	-
900(36")	330	695	974

For other sizes contact AIL/L&T

Triple Offset Geometry

First Offset

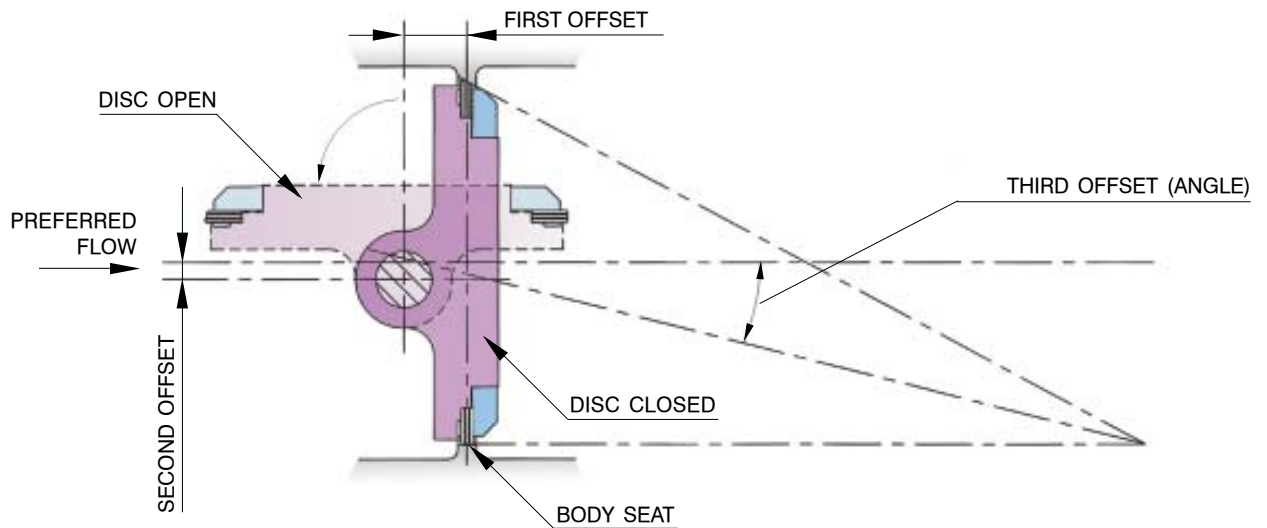
The centre of rotation of the disc is moved away from the seat. This allows complete sealing contact around the entire seal.

Second Offset

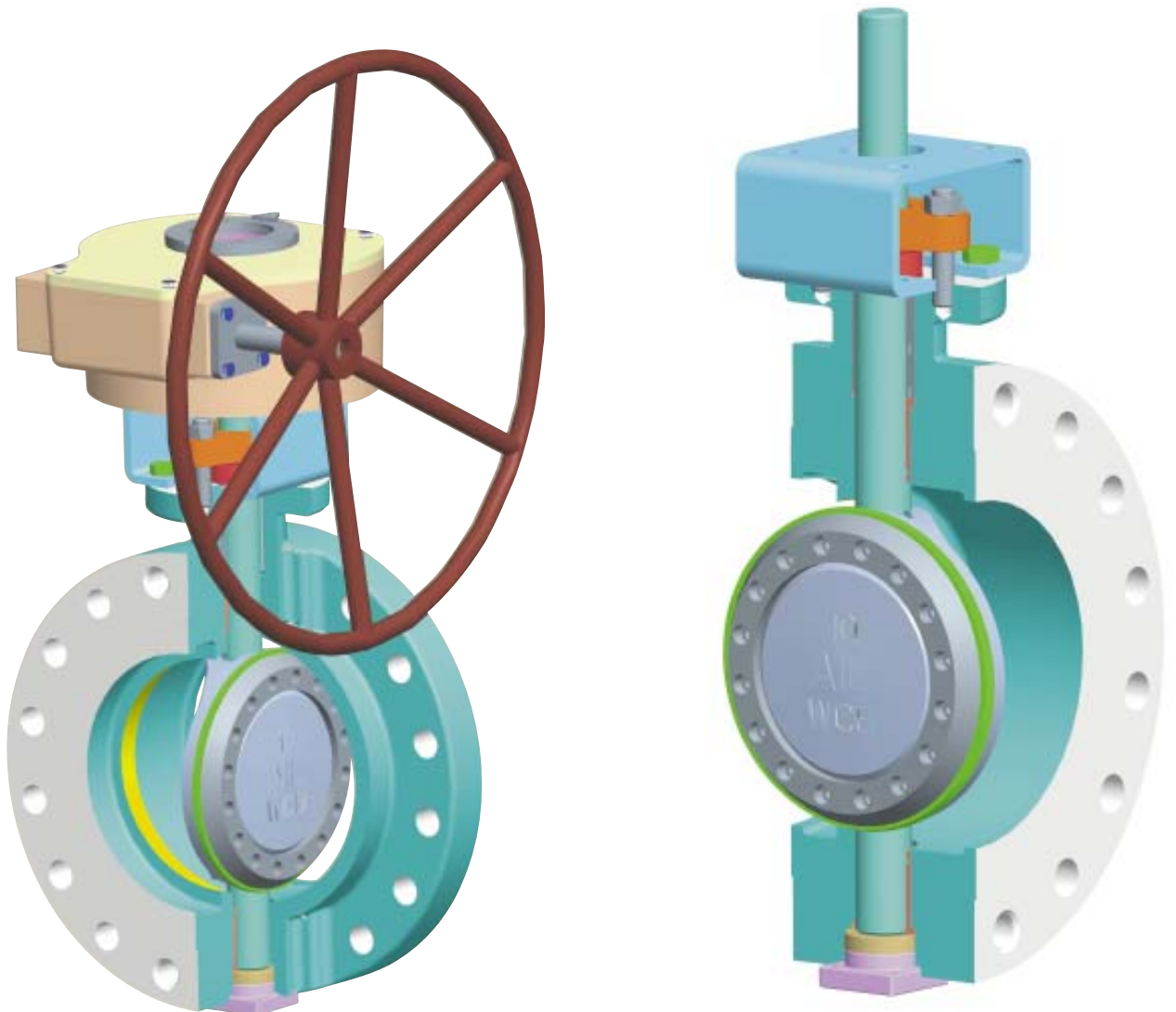
The centre of rotation of the disc is shifted from the valve body centre line. The extent of interference is reduced resulting in greater seal life.

Third Offset

The centre line of the sealing cone is tilted away from the bore centre line resulting in an ellipsoidal profile. The result is a **frictionless seal with uniform compressive sealing** around the entire seat.



The triple offset geometry is best suited for metal seated valves to provide bubble-tight shut-off on high temperature, high pressure and fire safe applications.



Standards of Conformance

Parameter	Compliance
Valve Design	ASME B16.34, API 609
Face-to-Face	Wafer/Wafer lugged Valves - API 609 Flanged Valves (Short Pattern) - ISO 5752 Table1, Col13 Flanged Valves (Long Pattern) - ASME B16.10
End Flanges	ASME B16.5, ASME B16.47
Pressure Test	API 598
Fire-safe Design	API 607 Edition IV

Pressure Testing

Valve Rating	Maximum CWP in kg/cm ²	Shell (Hydro) in kg/cm ²	Seat (hydro) in kg/cm ²	Seat (air) optional in kg/cm ²
Class 150	20 (285 psi)	32 (450 psi)	22 (315 psi)	5.6 (80 psi)
Class 300	52 (740 psi)	79 (1125 psi)	58 (815 psi)	5.6 (80 psi)

Pressure-Temperature Ratings ASME B16.34, 1996

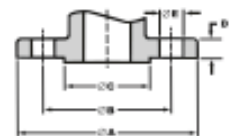
Temp. in °F	Working Pressure in psig														
	WCB		WCC / LCC		LCB		WC6		WC9		CF3 / CF8		CF3M / CF8M		
	Cl. 150	Cl. 300	Cl. 150	Cl. 300	Cl. 150	Cl. 300	Cl. 150	Cl. 300	Cl. 150	Cl. 300	Cl. 150	Cl. 300	Cl. 150	Cl. 300	
-20 to 100	285	740	290	750	265	695	290	750	290	750	275	720	275	720	
200	260	675	260	750	250	655	260	750	260	750	230	600	235	620	
300	230	655	230	730	230	640	230	720	230	730	205	540	215	560	
400	200	635	200	705	200	620	200	695	200	705	180	495	195	515	
500	170	600	170	665	170	585	170	665	170	665	170	465	170	480	
600	140	550	140	605	140	535	140	605	140	605	140	435	140	450	
650	125	535	125	590	125	525	125	590	125	590	125	430	125	445	
700	110	535	110	570	110	520	110	570	110	570	110	425	110	430	
750	95	505	95	505	95	475	95	530	95	530	95	415	95	425	
800	80	410	80	410	80	390	80	510	80	510	80	405	80	420	
850	65	270	65	270	65	270	65	485	65	485	65	395	65	420	
900	50	170	50	170	50	170	50	450	50	450	50	390	50	415	
950	35	105	35	105	35	105	35	320	35	375	35	380	35	385	
1000	20	50	20	50	20	50	20	215	20	260	20	320	20	350	
1050	-	-	-	-	-	-	-	20*	145	20	175	20*	-	20*	345
1100	-	-	-	-	-	-	-	20*	95	20	110	20*	255	20*	305
1150	-	-	-	-	-	-	-	20*	60	20	70	20*	200	20*	235
1200	-	-	-	-	-	-	-	15*	40	20	40	20*	155	20*	185
1250	-	-	-	-	-	-	-	-	-	-	-	20*	115	20*	145
1300	-	-	-	-	-	-	-	-	-	-	-	20*	85	20*	115
1350	-	-	-	-	-	-	-	-	-	-	-	20*	60	20*	95
1400	-	-	-	-	-	-	-	-	-	-	-	20*	50	20*	75
1450	-	-	-	-	-	-	-	-	-	-	-	15*	35	20*	60
1500	-	-	-	-	-	-	-	-	-	-	-	10*	25	20*	40

*For welding end valves only - Flanged end ratings terminate at 1000°F

End Flange Dimensions - ASME B16.5, 2003

Valve Size	Class 150 Raised Face (in mm)						Class 300 Raised Face (in mm)							
	ØA	ØB	ØC	D	ØE	Bolt		ØA	ØB	ØC	D	ØE	Bolt	
						No.	Dia						No.	Dia
80 (3")	190	152.4	127.0	22.3	19.05	4	5/8"	210	168.3	127.0	27.0	22.23	8	3/4"
100 (4")	230	190.5	157.2	22.3	19.05	8	5/8"	255	200.0	157.2	30.2	22.23	8	3/4"
150 (6")	280	241.3	215.9	23.9	22.23	8	3/4"	320	269.9	215.9	35.0	22.23	12	3/4"
200 (8")	345	298.5	269.9	27.0	22.23	8	3/4"	380	330.2	269.9	39.7	25.40	12	7/8"
250 (10")	405	362.0	323.8	28.6	25.40	12	7/8"	445	387.4	323.8	46.1	28.58	16	1"
300 (12")	485	431.8	381.0	30.2	25.40	12	7/8"	520	450.8	381.0	49.3	31.75	16	1 1/8"
350 (14")	535	476.3	412.8	33.4	28.58	12	1"	585	514.4	412.8	52.4	31.75	20	1 1/8"
400 (16")	595	539.8	469.9	35.0	28.58	16	1"	650	571.5	469.9	55.6	34.93	20	1 1/4"
450 (18")	635	577.9	533.4	38.1	31.75	16	1 1/8"	710	628.6	533.4	58.8	34.93	24	1 1/4"
500 (20")	700	635.0	584.2	41.3	31.75	20	1 1/8"	775	685.8	584.2	62.0	34.93	24	1 1/4"
600 (24")	815	749.3	692.2	46.1	34.93	20	1 1/4"	915	812.8	692.2	68.3	41.28	24	1 1/2"

Height of raised face is 2.0mm (0.08").



Ordering Information

Valve Type	Ends	Class Rating	Face-to-face	End detail	Body	Disc	Laminar Seal	Shaft	Operator
M - Metal-seated Butterfly Valve	1 - Wafer Flangeless	1 - Class 150	1 - API 609 Wafer	1 - ASME B16.5 Class 150	1 - ASTM A216 Gr.WCB, Stellite	1 - ASTM A216 Gr.WCB	1 - SS 304+ Graphite	1 - ASTM A479 Gr.410	GU - Gear Unit BS - Bare Shaft
	2 - Wafer Lugged	2 - Class 300	2 - ISO 5752 Table 1, Col. 13	2 - ASME B16.5 Class 300	2 - ASTM A216 Gr.WCC, Stellite	2 - ASTM A216 Gr.WCC	2 - SS 316+ Graphite	2 - ASTM A479 Gr.XM 19	
J - Metal-seated Butterfly Valve, jacketed	3 - Double Flanged (Short-Pattern)	3 - Class 600	3 - ISO 5752 Table 1, Col. 14	3 - ASME B16.47 SR.A Class 150	3 - ASTM A351 Gr.CF8, Stellite	3 - ASTM A351 Gr.CF8	3 - Duplex + Graphite	3 - ASTM A564 Gr.630	EA - Electrical Actuator SR - Pneumatic Actuator - Spring Return DA - Pneumatic Actuator - Double Acting
	4 - Double Flanged (Long-Pattern)*		4 - ISO 5752 Table 1, Col. 16	4 - ASME B16.47 SR.B Class 300	4 - ASTM A351 Gr.CF8M, Stellite	4 - ASTM A351 Gr.CF8M	4 - SS 410+ Graphite	4 - ASTM A479 Gr.S3250	
	5 - Butt-weld end		5 - ASME B16.10 Long-pattern	5 - ASME B16.47 SR.B Class 150	5 - ASTM A351 Gr.CF3, Stellite	5 - ASTM A351 Gr.CF3	Z - Special	Z - Special	
				6 - ASME B16.47 SR.B Class 300	5 - ASTM A351 Gr.CF3, Stellite	6 - ASTM A351 Gr.CF3M			
				7 - ASME B16.5 Class 600	6 - ASTM A351 Gr.CF3M, Stellite	7 - ASTM A217 Gr.WC6			
				W-Butt-welded as per ASME B16.25	7 - ASTM A217 Gr.WC6, Stellite	8 - ASTM A217 Gr.WC9			
					8 - ASTM A217 Gr.WC9, Stellite	A - ASTM A352 Gr.LCB			
					A - ASTM A352 Gr.LCB, Stellite	B - ASTM A352 Gr.LCC			
					B - ASTM A352 Gr.LCC, Stellite	Z - Special			

Note:

Valve sizes to be separately mentioned.

*Short-pattern valve mounted with spool piece to match the long face-to-face.

e.g. : **DN100M31211131GU** would mean

Valve Size : 100mm (4")
 Valve Type : Metal-seated Butterfly Valve
 Ends : Double-flanged (short-pattern)
 Class Rating : Class 150
 Face-to-face : ISO 5752 Table1, Col. 13
 End Detail : ASME B16.5 Class 150
 Body : ASTM A216 Gr. WCB, Stellite
 Disc : ASTM A216 Gr. WCB
 Laminar Seal : Duplex + Graphite
 Shaft : ASTM A479 Gr. 410
 Operator : Gear Unit