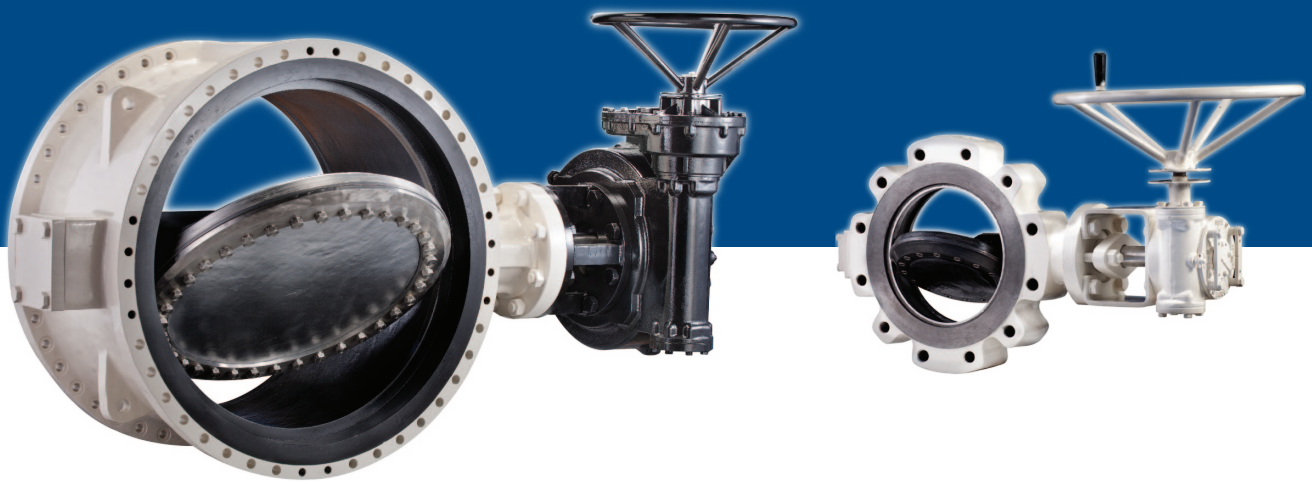
Triple-offset Butterfly Valves



ASME Class 150 to 600 | 3″ to 64″ (80 mm to 1600 mm)
API 609

L&T Valves

L&T Valves Limited (Formerly Audco India Limited) is a wholly owned subsidiary of Larsen & Toubro. Backed by an fifty-year track-record of excellence and world-leading innovation, the company provides engineered flow-control solutions for key sectors of the economy such as oil & gas, power, petrochemicals, chemicals, fertilizers and pharmaceuticals.

Product Range:

- Gate, Globe & Check Valves
- Valves for Power
- Pipeline & Process Ball Valves
- Triple-offset Butterfly Valves
- Flanged & Wafer-type Butterfly Valves
- Double Block & Bleed Plug Valves
- Control Valves
- Customised Solutions

Designs for the valves are created by an experienced team of valve experts who have a deep understanding of user-industry processes. An extensive manufacturing and quality assurance infrastructure ensure that world-class designs are transformed into high performance products. Every phase of manufacture is governed by an institutionalised environment, health and safety policy.

L&T Valves distribution network spans the globe, partnering some of the largest valve distribution companies in the world. In India, L&T Valves has a presence in every industrial centre through a network of offices, stockists, automation centres and service franchisees.

Triple-offset Butterfly Valves

L&T Valves offers a comprehensive range of Triple-offset Butterfly Valves in a variety of pressure classes, body styles and materials to address critical process requirements in diverse industries such as hydrocarbon, power, chemicals, fertiliser, etc.

The product range covers valves in ASME classes up to 600, in sizes up to 64" (1600 mm), in carbon steel, stainless steel, alloy steels, suitable for temperatures as high as 538°C (1000°F). Based on customer requirements, valves in higher pressure classes, larger sizes and other materials are offered. The range comprises valves for cryogenic services also.

The metal-seated valves conform to API 609. Triple-offset Butterfly Valves are truly bi-directional and offer high-integrity sealing. The valves have been certified to meet the requirements of SIL-3 ISO 15848 and Class A Fugitive Emission for systematic integrity as per IEC 61508.

All machining operations are carried out on 5-axis machining centres. Customised welding machines are also employed for the manufacture of these products.

Range

Body Style	ASME Class	3	4	6	8	10	12	14	16	18	20	24	26	28	30	32	34	36	38	40	42	48	54	64
		80	100	150	200	250	300	350	400	450	500	600	650	700	750	800	850	900	950	1000	1050	1200	1350	1600
Flanged Short-Pattern	150	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	300	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		
	600	•	•	•	•	•	•	•	•	•	•	•	•	•	•									
Flanged Long-Pattern	150	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	300	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		
	600	•	•	•	•	•	•	•	•	•	•	•												
Wafer-type	150	•	•	•	•	•	•	•	•	•	•	•												
	300	•	•	•	•	•	•	•	•	•	•	•												
	600	•	•	•	•	•	•	•	•	•	•	•												
Lug-type	150	•	•	•	•	•	•	•	•	•	•	•												
	300	•	•	•	•	•	•	•	•	•	•	•												
	600	•	•	•	•	•	•	•	•	•	•	•												
Butt-Weld	150	•	•	•	•	•	•	•	•	•	•	•												
	300	•	•	•	•	•	•	•	•	•	•	•												
	600	•	•	•	•	•	•	•	•	•	•	•												

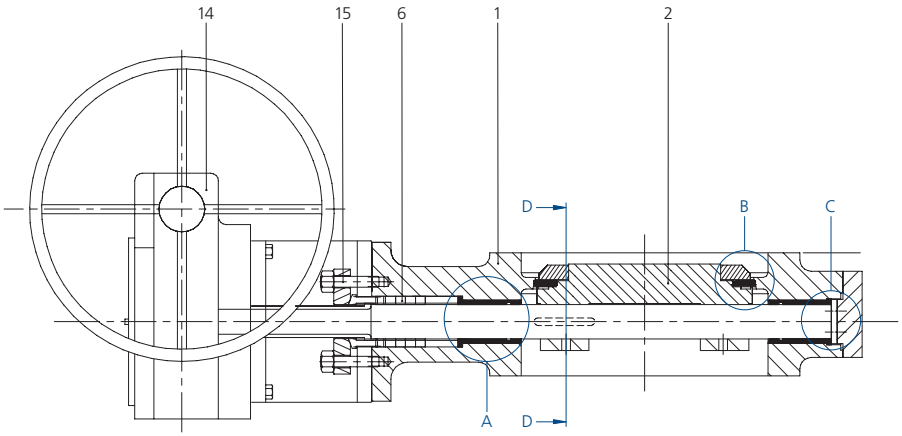
Compliance Standards

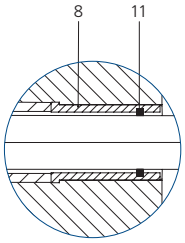
Triple-offset Butterfly Valves are designed in accordance with key international standards. They also meet the requirements of major oil & gas and power industry standards and customer specifications.

Parameter			Standard
Design			API 609 (Category B), ASME B16.34
Ends	Wafer/ Wafer Lugged	Face-to-face	API 609
		End Flange Dimensions	ASME B16.5
	Flanged	Face-to-face	API 609
		End Flange Dimensions	ASME B16.5/ ASME B16.47
	Butt-weld	Face-to-face	API 609
		End Dimensions	ASME B16.25
Testing			API 598
Pressure - Temperature Rating			ASME B16.34

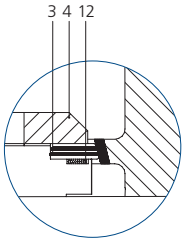
Materials of Construction

No.	Components	Materials			
		WCB/ WCC	LCB/ LCC	WC6/ WC9	C5
1	Body	A 216 Gr. WCB/ WCC	A 352 Gr. LCB/ LCC	A 217 Gr. WC6/ WC9	A 217 Gr. C5
2	Disc	A 216 Gr. WCB/ WCC	A 352 Gr. LCB/ LCC	A 217 Gr. WC6/ WC9	A 217 Gr. C5
3	Laminar Seal	UNS S31803 + Graphite/ UNS S20910 + Graphite		SS 410 + Graphite/ UNS S20910 + Graphite	
4	Retainer	A 516 Gr. 70	SS 316	SS 410	SS 410/ SS 316
5	Shaft	A 479 Type SS 410/ A 564 Type 630	A 479 Type XM-19/ A 564 Type 630	A 479 Type SS 410	A 479 Type SS 410/ A 479 Type XM-19
6	Packing	Graphite			
7	Key	SS 410/ UNS S17400	UNS S20910/ UNS S17400	SS 410	SS 410/ UNS S20910
8	Bearing	SS 316/ UNS S20910 Nitrided			
9	Thrust Plate	SS 316/ UNS S20910 Nitrided			
10	Bottom Cover	A 516 Gr. 70	SS 316	SS 410	SS 410/ SS 316
11	Bearing Seal	Graphite			
12	Gasket - Disc	SS 316 with Graphite			
13	Gasket - Cover	SS 316 with Graphite			
14	Gear Unit	Worm type (self-locking)			
15	Bolting	A 193 Gr. B7/ A 194 Gr. 2H	A 320 Gr. L7/ A 194 Gr. 7	A 193 Gr. B16/ A 194 Gr. 7	A 193 Gr. B16/ A 194 Gr. 7
Body seat hard-faced with Stellite 21 or 6					

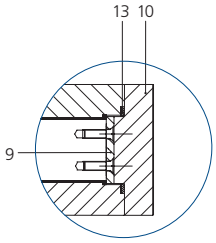




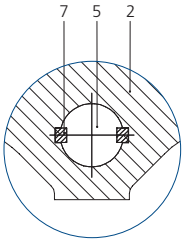
Detail A



Detail B



Detail C



Section D-D

No.	Components	Materials		
		CF3/ CF8	CF3M/ CF8M	4A/ 5A
1	Body	A 351 Gr. CF3/ CF8	A 351 Gr. CF3M/ CF8M	A 995 Gr. 4A/ 5A
2	Disc	A 351 Gr. CF3/ CF8	A 351 Gr. CF3M/ CF8M	A 995 Gr. 4A/ 5A
3	Laminar Seal	UNS S31803 + Graphite/ UNS S20910 + Graphite	UNS S31803 + Graphite/ UNS S20910 + Graphite	UNS S31803 + Graphite/ UNS S32750 + Graphite
4	Retainer	SS 316/ 304/ 304L	SS 316/ 316L	UNS S31803/ UNS S32750
5	Shaft	UNS N07718/ A 479 Type XM-19	UNS N07718/ A 479 Type XM-19	UNS S32750/ UNS N07718
6	Packing	Graphite		
7	Key	UNS N07718/ UNS S20910	UNS N07718/ UNS S20910	UNS S32750/ UNS N07718
8	Bearing	SS 316/ UNS S20910/ UNS S32750 Nitrided		
9	Thrust Plate	SS 316/ UNS S20910/ UNS S32750 Nitrided		
10	Bottom Cover	SS 304L/ 304/ 316	SS 316L/ 316	UNS S31803/ UNS S32750
11	Bearing Seal	Graphite		
12	Gasket - Disc	SS 316 with Graphite	SS 316 with Graphite	UNS S32750 with Graphite
13	Gasket - Cover	SS 316 with Graphite	SS 316 with Graphite	UNS S32750 with Graphite
14	Gear Unit	Worm type (self-locking)		
15	Bolting	A 193 Gr. B8/ A 194 Gr. 8	A 193 Gr. B8M/ A 194 Gr. 8M	A 193 Gr. B8M/ A 194 Gr. 8M/ UNS S32750
Body seat hard-faced with Stellite 21 or 6				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Kancheepuram, Tamil Nadu
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American Petroleum Institute
Director of Global Industry Services

Our expertise in Butterfly Valves that spans three decades forms the core of our world-class Triple-offset range. The designs for these valves are created in a 3D environment using the latest design and analysis software. Finite Element Analysis (FEA) and Computational Fluid Dynamics (CFD) are extensively used to fine-tune product designs.

The valves conform to API 609 and can be offered with the API Monogram. The valves also meet the requirements of Fugitive Emission (Class A) as per ISO 15848. In addition, Triple-offset Butterfly Valves are certified Fire Safe as per API 607 (6th Edition).

In-house Test Facilities:

- Fire Test
- Fugitive Emission Test
- Cryogenic Tests
- Endurance & Cycle tests

The valves are truly bi-directional and provide reliable performance in critical services. Customer confidence in this product is further enhanced by its SIL-3 (Safety Integrity Level - 3) certification for systematic integrity as per IEC 61508.

Manufacturing

We leverage world-class manufacturing infrastructure and systems to produce Triple-offset Butterfly Valves that set global benchmarks.

State-of-the-art manufacturing facilities include:

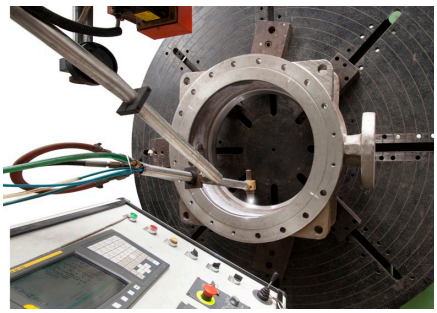
- 5-axis Machining Centres
- Special Purpose CNC Machines
- Customised Welding Machines

The quality management systems have been certified to comply with:

- ISO 9001: 2008
- API Spec Q1
- CE PED 97/ 23/ EC

Quality is built into each and every valve through a meticulously implemented QAP. Established processes control all stages of manufacture to ensure quality consistent with international standards and customer requirements.

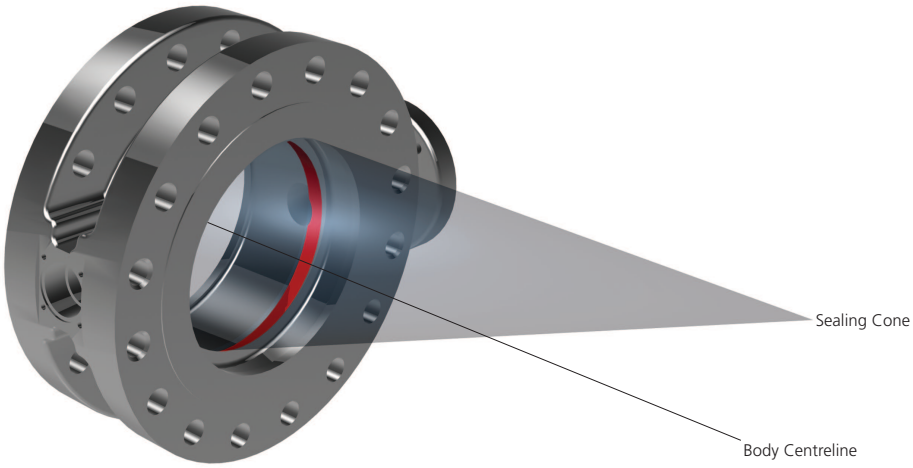
Occupational health and safety as well as environmental protection are accorded prime significance and guide all aspects of manufacturing at the plant.

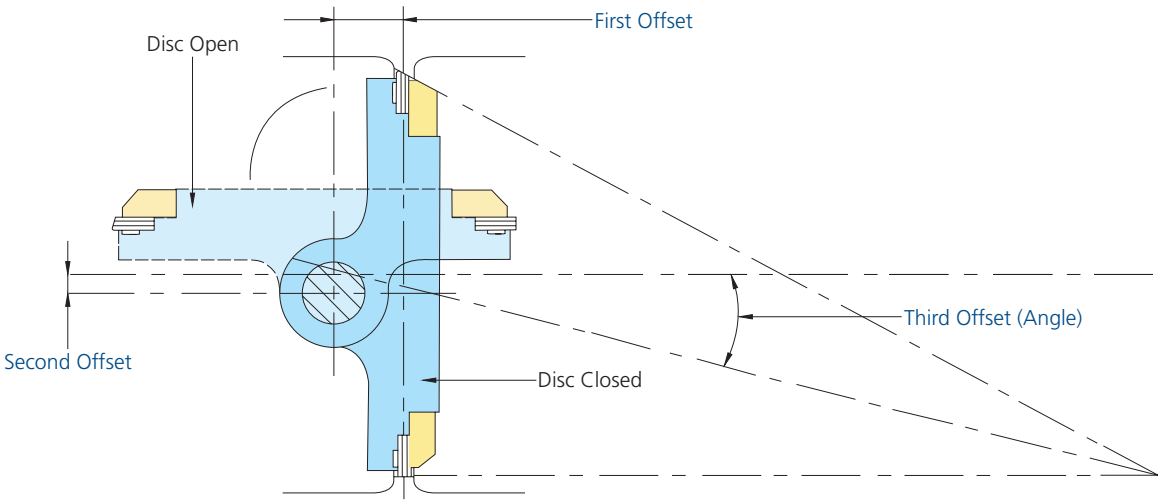


Triple-offset Geometry

In Triple-offset Butterfly Valves, the stem is offset from the sealing surface and body centreline. Further the sealing cone is rotated away from the bore centreline to create a third offset.

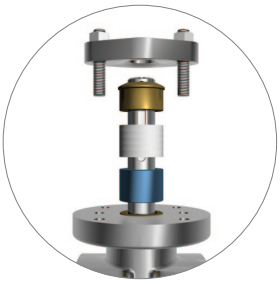
The triple-offset geometry ensures that the body and disc come into contact only at the final shut-off position. This eliminates wear and tear due to interference, reduces operating torque and enhances product life.





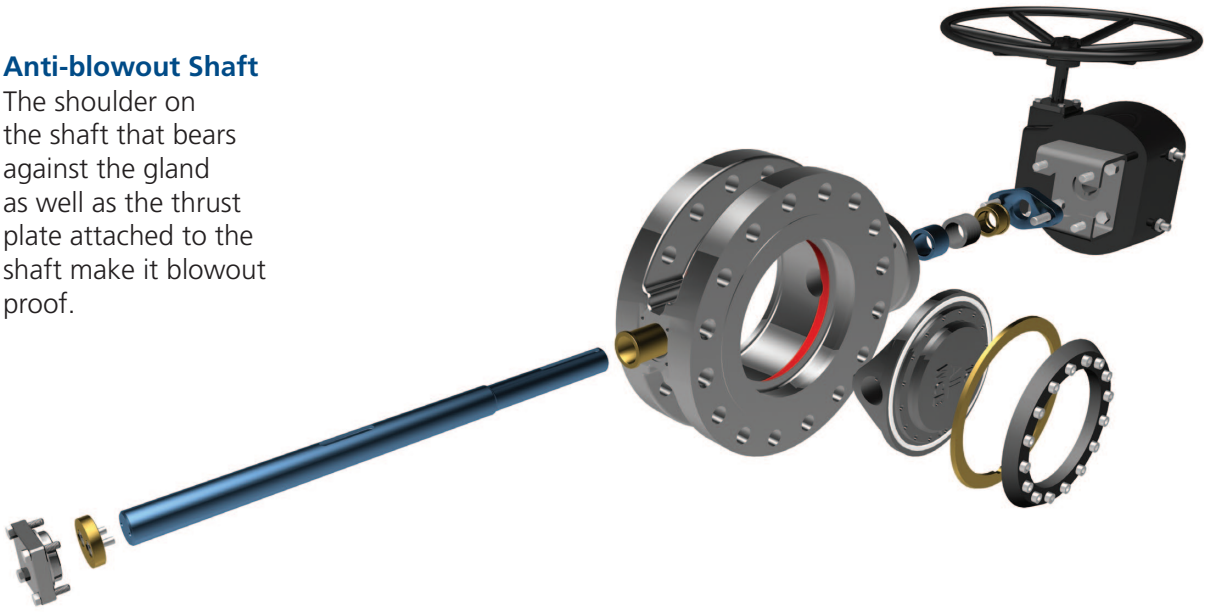
Assured Sealing to Atmosphere

Triple-offset Butterfly Valves meet the Fugitive Emission Test requirement of ISO 15848. This is achieved by employing high-integrity graphite gland packing and a gasket between bottom cover and body.



Anti-blowout Shaft

The shoulder on the shaft that bears against the gland as well as the thrust plate attached to the shaft make it blowout proof.



Bi-directional bubble-tight sealing

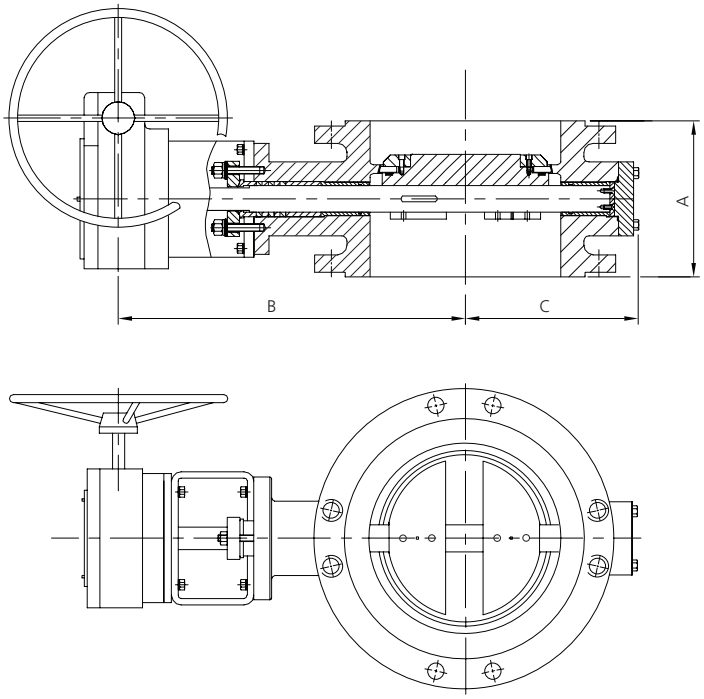
Triple-offset Butterfly Valves are torque-seated valves where bubble-tight sealing is achieved when the laminar seal flexes and generates a compressive force all around the hard-faced body seat.

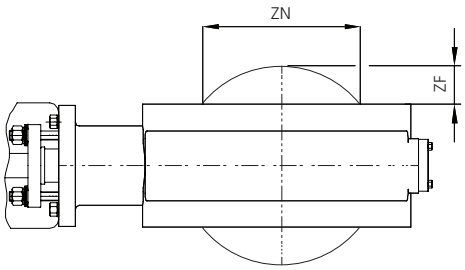
Replaceable Metal-to-Metal Seats

The laminar seal of Triple-offset Butterfly Valves are designed to be replaceable at site. Spare seals can be ordered by providing valve details such as size, class and valve serial number. It is also possible to renew the integral hard-faced body seat of TOBV by re-depositing Stellite.

Triple-offset Butterfly Valves - Short Pattern

Triple-offset Butterfly Valves are offered in Flanged Short - Pattern design as a standard. The end connections conform to ISO 5752.





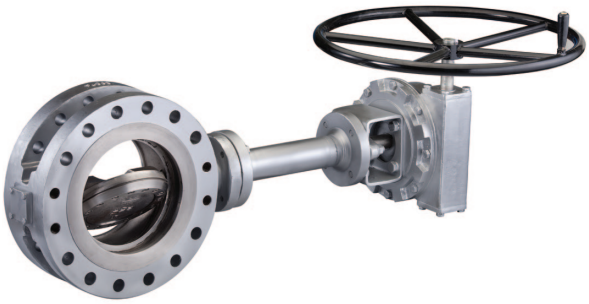
Dimensions

Size		Class 150						Class 300					
DN	NPS	A	B	C	ZN	ZF	Wt.	A	B	C	ZN	ZF	Wt.
3	80	114	263	120			30	114	258	122			40
4	100	127	272	132			35	127	267	142			71
6	150	140	296	150			45	140	368	185			76
8	200	152	314	182	197	22	65	152	433	212	188	16	126
10	250	165	457	232	249	38	110	165	433	232	242	38	156
12	300	178	458	259	299	56	150	178	522	284	292	57	216
14	350	190	525	295	331	70	190	190	607	320	324	71	305
16	400	216	563	326	381	75	250	216	642	356	375	74	380
18	450	222	586	343	432	94	280	222	665	385	422	94	420
20	500	229	670	377	483	109	385	229	756	437	472	116	530
24	600	267	725	440	578	141	550	267	920	510	562	146	1020
26	650	292	757	462	596	144	590	292	920	512	575	151	1020
28	700	292	812	481	647	170	650	292	952	548	622	175	1440
30	750	318	932	565	686	181	710	318	980	600	667	181	1440
32	800	318	997	625	737	217	860	318	1042	652	737	208	1698
34	850	330	1030	638	788	226	1060	330	1092	685	788	225	1957
36	900	330	1042	665	838	244	1100	330	1125	695	838	248	2034
38	950	410	1060	675	889	226	1235	410	1178	762	889	232	2460
40	1000	410	1119	722	940	241	1657	410	1190	740	940	248	3250
42	1050	410	1164	773	991	279	1871	410	1210	790	991	282	3650
48	1200	470	1364	876	1143	314	2858	470	1500	938	1143	315	3765
54	1350	530	1481	972	1238	355	3576						
64	1600	600	1700	1125	1543	409	6080						

Face-to-face dimensions for valves in sizes above 36" are as per manufacturer's standard

All dimensions in mm and weights in kg

Cryogenic Valves



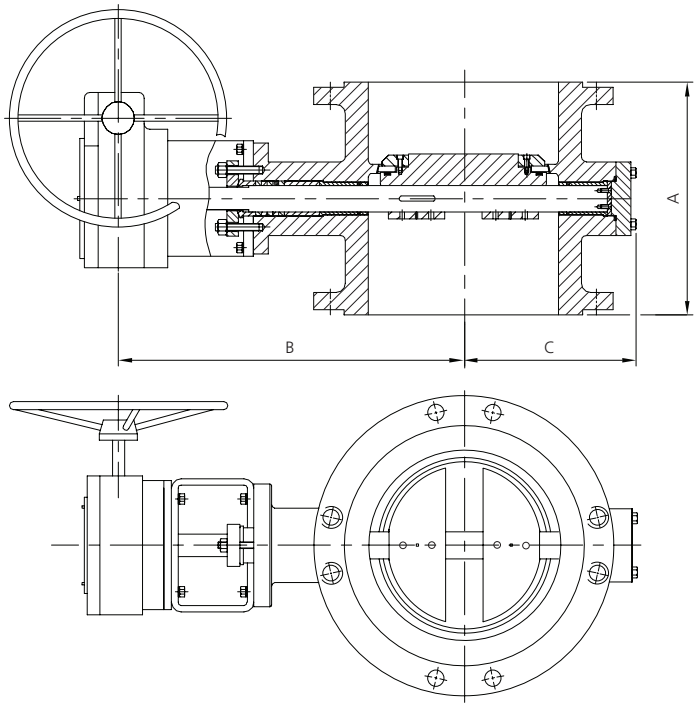
We manufacture a range of Triple-offset Butterfly Valves in austenitic stainless steels suitable for temperatures as low as -196°C. The valves are offered with extended bonnets to ensure that cryogenic line fluids do not impair the performance of gland packings. The cryogenic range conforms to BS 6364 and is available in classes 150 to 600 in a variety of body styles and end-connections.

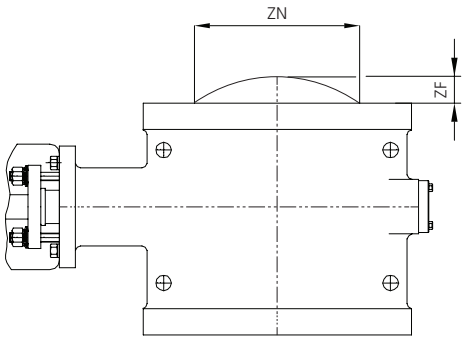
Size		Class 600					
DN	NPS	A	B	C	ZN	ZF	Wt.
3	80	180	371	141			48
4	100	190	372	157			60
6	150	210	410	182			95
8	200	230	471	224			200
10	250	250	590	280			365
12	300	270	610	300			408
14	350	290	671	345	302	17	425
16	400	310	757	393	348	23	820
18	450	330	825	408	392	36	910
20	500	350	830	455	437	46	1100
24	600	390	865	520	519	53	1520

All dimensions in mm and weights in kg

Triple-offset Butterfly Valves - Long Pattern

Face-to-face dimensions of Flanged - Long Pattern valves conform to ASME B16.10 and are same as that of API 600 Gate Valves.





Dimensions

Size		Class 150						Class 300			
DN	NPS	A	B	C	ZN	ZF	Wt.	A	B	C	Wt.
3	80	203	263	120			35	282	258	122	50
4	100	229	272	132			40	305	267	142	81
6	150	267	296	150			55	403	368	185	96
8	200	292	314	182			80	418	433	212	151
10	250	330	457	232			130	457	433	232	186
12	300	356	458	259			175	502	522	284	261
14	350	381	525	295			220	762	607	320	420
16	400	406	563	326			290	838	642	356	520
18	450	432	586	343			330	914	665	385	625
20	500	457	670	377			445	991	756	437	796
24	600	508	725	440	578	21	620	1143	920	510	1360
26	650	559	757	462	596	10	670	1245	920	512	1530
28	700	610	812	481	647	11	765	1346	952	548	2120
30	750	610	932	565	686	35	830	1397	980	600	2125
32	800	660	997	625	737	46	1025	1524	1042	652	2475
34	850	711	1030	638	788	36	1265	1727	1092	685	3100
36	900	711	1042	665	838	54	1315	1727	1125	695	3249
38	950	762	1060	675	889	50	1450	1930	1178	762	4065
40	1000	762	1119	722	940	65	1875	1930	1250	790	4050
42	1050	787	1164	773	991	90	2120	1981	1290	840	5100
48	1200	864	1364	876	1143	117	3210	2235	1500	938	6545
54	1350	1067	1481	972	1238	87	4205				
64	1600	1372	1700	1125	1543	23	7495				

Face-to-face dimensions for valves in sizes above 36" are as per manufacturer's standard

All dimensions in mm and weights in kg

Remote-operated Shut-off Valves (ROSOV)

The bi-directional bubble-tight sealing capability of Triple-offset Butterfly Valve has made it the valve of choice in the oil & gas industry worldwide. We offer Remote-operated Shut-off Valves (ROSOV) built on TOBVs leveraging our in-house capability in valve automation and system integration. The valves meet critical oil industry requirements and enhance operational excellence and safety.

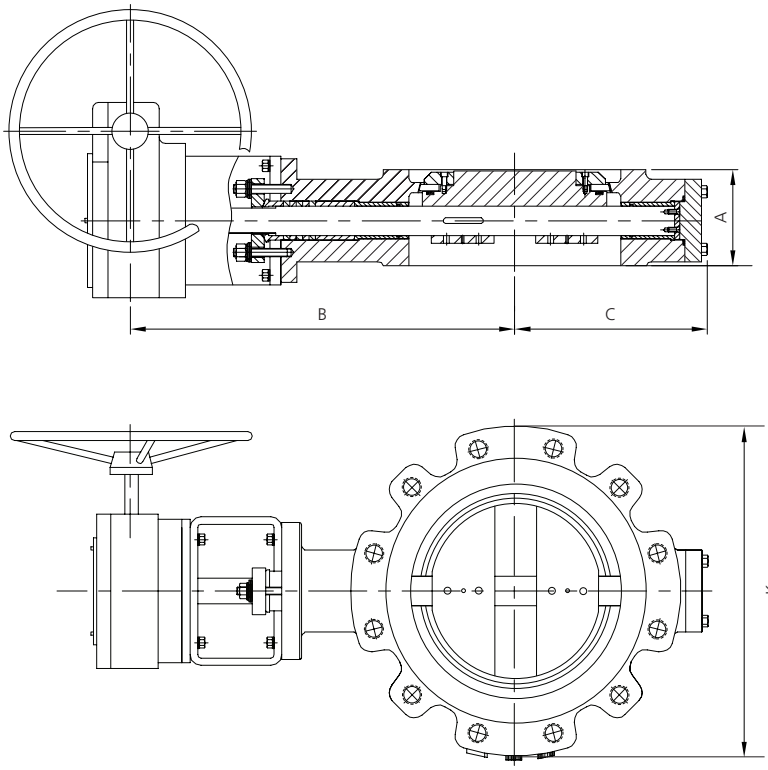
Size		Class 600			
DN	NPS	A	B	C	Wt.
3	80	356	371	141	58
4	100	432	372	157	75
6	150	559	410	182	120
8	200	660	471	224	250
10	250	787	590	280	465
12	300	838	610	300	528
14	350	889	671	345	590
16	400	991	757	393	1070
18	450	1092	825	408	1265
20	500	1194	830	455	1560
24	600	1397	865	520	2260

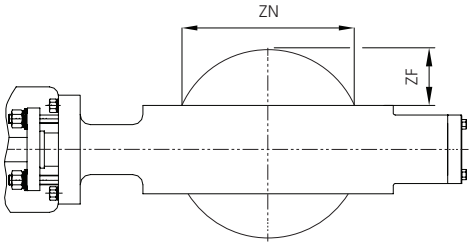
All dimensions in mm and weights in kg

Triple-offset Butterfly Valves - Lug and Wafer-type

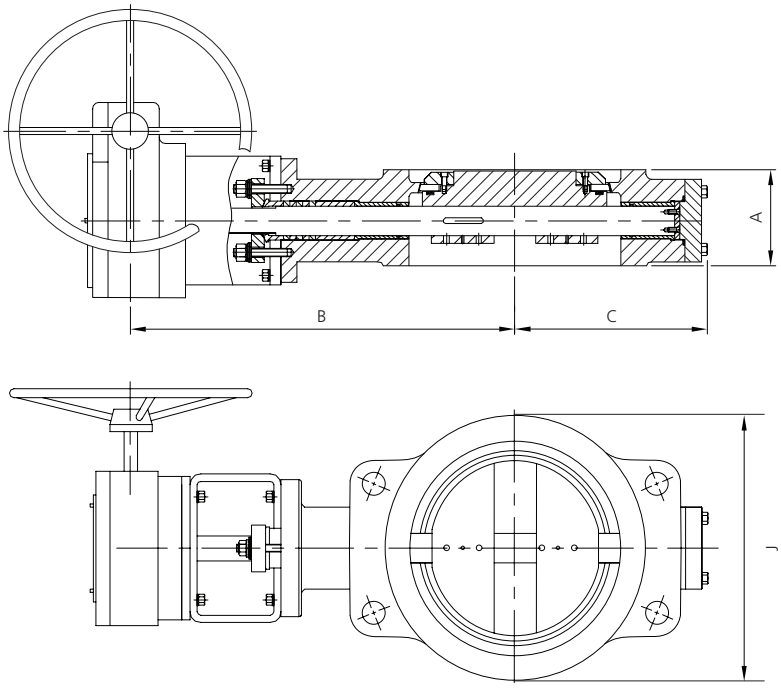
Face-to-face dimensions of Triple-offset Butterfly Valves in Wafer Lugged and Wafer Flangeless constructions conform to API 609. The valves are compact in design and significantly lighter than comparable gate valves.

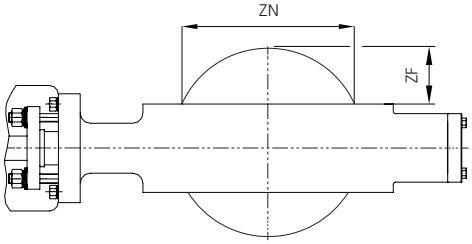
Lug-type





Wafer-type

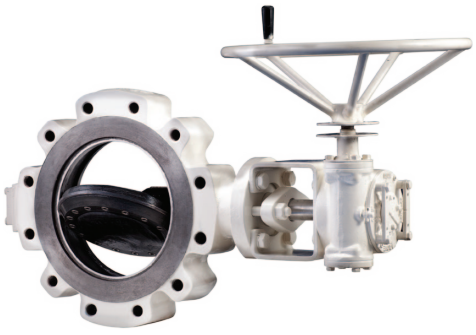




Dimensions

Size		Class	A	B	C	ZN	ZF	Lug-type		Wafer-type	
DN	NPS							K	Wt.	J	Wt.
3	80	150	48	263	120	75	18	190	30	127	27
		300	48	258	122	71	18	210	40	127	31
		600	54	371	141	71	15	210	48	127	35
4	100	150	54	272	132	99	27	230	35	158	31
		300	54	267	142	94	27	255	71	158	55
		600	64	372	157	94	16	275	60	158	44
6	150	150	57	296	150	151	52	280	45	216	40
		300	59	368	185	143	52	320	76	216	58
		600	78	410	182	143	30	355	95	216	70
8	200	150	64	314	182	197	70	345	65	270	58
		300	73	433	212	188	70	380	126	270	97
		600	102	471	224	183	41	420	200	270	147
10	250	150	71	457	232	249	85	405	110	324	98
		300	83	433	232	242	85	445	156	324	120
		600	117	590	280	231	64	510	365	324	268
12	300	150	81	458	259	299	110	485	150	381	134
		300	92	522	284	292	110	520	216	381	166
		600	140	610	300	275	64	560	408	381	300
14	350	150	92	525	295	331	147	535	190	413	170
		300	117	607	320	324	147	585	305	413	235
		600	155	671	345	302	85	605	425	413	313
16	400	150	102	563	326	381	153	595	250	470	223
		300	133	642	356	375	153	650	380	470	292
		600	178	757	393	348	89	685	820	470	603
18	450	150	114	586	343	432	165	635	280	534	250
		300	149	665	385	422	165	710	420	534	323
		600	200	825	408	392	101	745	910	534	669
20	500	150	127	670	377	483	157	700	385	585	344
		300	159	756	437	472	157	775	530	585	408
		600	216	830	455	437	113	815	1100	585	809
24	600	150	154	725	440	578	220	815	550	693	491
		300	181	920	510	562	220	915	1020	693	785
		600	232	865	520	519	132	940	1520	693	1118

All dimensions in mm and weights in kg



Ordering Information

Body Style	Class Rating	Face-to-face	End Detail	Operator
1 - Wafer-type	1 - Class 150	1 - API 609, Lug and Wafer-type	1 - ASME B16.5 Class 150	BS - Bare Shaft
2 - Lug-type	2 - Class 300	2 - ISO 5752 Table 1, Col. 13	2 - ASME B16.5 Class 300	GU - Gear Unit
3 - Short Pattern (Double-flanged)	3 - Class 600	3 - ISO 5752 Table 1, Col. 14	3 - ASME B16.47 Sr. A Class 150	EA - Electrical Actuator
4 - Long Pattern (Double-flanged)		4 - ISO 5752 Table 1, Col. 16	4 - ASME B16.47 Sr. A Class 300	EH - Electro-Hydraulic Actuator
5 - Short Pattern (Butt-weld)		5 - ASME B16.10, Long Pattern	5 - ASME B16.47 Sr. B Class 150	DA - Pneumatic Actuator, Double Acting
6 - Long Pattern (Butt-weld)			6 - ASME B16.47 Sr. B Class 300	SR - Pneumatic Actuator, Spring Return
			7 - ASME B16.5 Class 600	
			W - Butt-weld as per ASME B16.25	

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