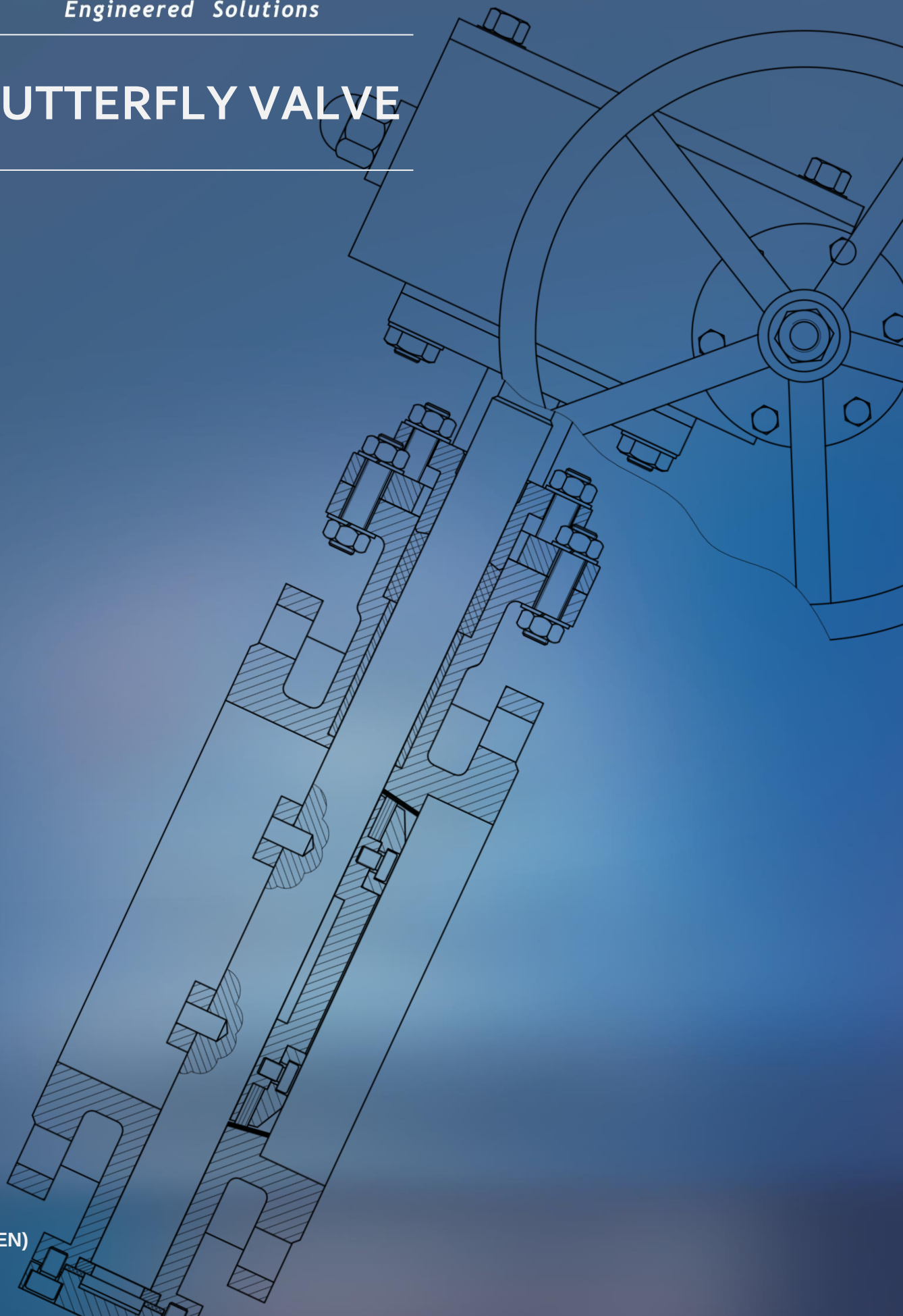
FBV INC.
Engineered Solutions

BUTTERFLY VALVE



BU-1601C(EN)

ABOUT US

FBV Inc. is an ISO 9001 certified company specializing in manufacturing industrial valves including ball valves, gate valves, globe valves, check valves, plug valves and butterfly valves in carbon steel, stainless steel, duplex stainless and alloy materials. Our products conform to the latest industry standards in accordance to ANSI, ASME and API.

FBV today has over 600,000 square feet of manufacturing facilities. Through its conviction to provide only the finest quality products and services to match the need of our customers, FBV has now established itself as a serious player in the valve business.

FBV INC has sold worldwide in North America, Europe, South America, South Asia, Africa and the Middle East. We consider product quality and customer satisfaction as our highest priority. We look forward to new customer relationships by providing value, quality, customer service, honesty, integrity and the commitment to maintain product consistency with each and every order.

MISSION STATEMENT

We at FBV, Inc. commit to taking ACTION:

- Adopt the latest technology to take the product quality to the next level;
- Consistently provide on-time services to our customers;
- Train and develop talented people with strong work ethics to deliver effective performance;
- Improve and enhance engineering designs to ensure product performance;
- Optimize management systems and increase productivity;
- Never forget our customer and employee needs.

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BUTTERFLY VALVE

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BUTTERFLY VALVE

Offset Metal Sealing Butterfly Valve

FBV Offset metal sealing butterfly valve uses the three eccentric structure with multi-layer metal seal or pure metal sealing ring, different sealing materials are being used according to the different temperature request from end user.

The structure of valve sealing ring that was formed after machining for triple eccentric butterfly valve is oblique cone type, the purpose of which is to let the disc open in a subtle angle and seat sealing surface can be completely separated from the sealing surface of disc, thus to reduce the friction of sealing surface during the open and close.

INTRODUCTION

Butterfly valve uses a stem through an approximate circular plate of the disc and the valve stem rotation to drive the rotation of the disc, in order to control the effect of fluid switch.

FBV produces triple offset metal sealing and concentric Lining butterfly valve.

Concentric Lining Butterfly Valve

Concentric Lining butterfly valve adopts lining on all the parts that contact with medium inside of body, the stainless steel which is resistance of corrosion is used as stem and disc to ensure the corrosion resistance of different strong corrosive medium.

The valve body and disc materials can be made of cast iron, carbon steel or stainless steel to ensure the bearing strength. Many kinds of soft sealing material such as NBR, EPDM or PTFE etc can be used as lining material to adapt to different corrosive medium or working temperature.

SCOPE OF PRODUCTS

Legends: **A** –Triple Offset & Concentric Lining Type **C**–Available in Concentric Lining Type Only
B–Available in Triple Offset Only

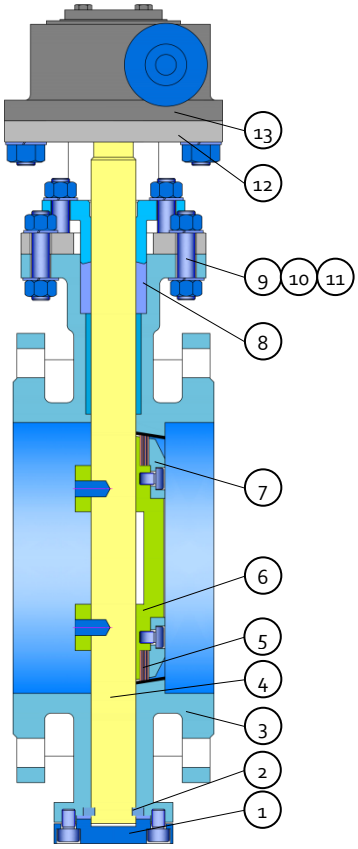
Size in/mm	Class 150 PN 20	Class 300 PN 50	Class 600 PN 100	Class 900 PN 150	Class 1500 PN 250
2 *50*	A	B	B	B	B
3 *65*	A	B	B	B	B
4 *80*	A	B	B	B	B
5 *100*	A	B	B	B	B
6 *150*	A	B	B	B	B
8 *200*	A	B	B	B	B
10 *250*	A	B	B	B	B
12 *300*	A	B	B	B	B
14 *350*	A	B	B	B	B
16 *400*	A	B	B	B	B
18 *450*	A	B	B	B	B
20 *500*	A	B	B	B	B
22 *550*	A	B	B	B	B
24 *600*	A	B	B	B	B
26 *650*	A	B	B	B	B
28 *700*	A	B	B	B	B
30 *750*	A	B	B	B	B
32 *800*	A	B	B	B	B
34 *850*	A	B	B	B	B
36 *900*	A	B	B	B	B
38 950	A	B	B	B	
40 1000	A	B	B	B	
42 1050	A	B	B	B	
48 1200	A	B	B	B	
56 1400	A	B	B	B	
60 1500	A	B	B	B	

1. Concentric Lining Butterfly valve is applicable to the pressure rating not higher than class 150, but not limit to CL150. CL125, CL75, PN10 and PN16 can be an option.

2. Above are the dimensions that normally used, contact our sales representative if any other sizes are requested.

BUTTERFLY VALVE

OVERVIEW (Triple Offset Type)



Part List

1. Cover
2. Segment
3. Body
4. Stem
5. Seal Ring
6. Disc
7. Plate
8. Packing
9. Stud
10. Nut
11. Washer
12. Yoke
13. Gear

STANDARDS

Design & Manufacture	API 609,ASME b16.34
Face-to-face	API 609, ASME B16.10
End Dimension	ASME B16.5 (RF, RTJ), ASME B16.47 (RF,RTJ) MSS SP-44 (NPS 22 Only) ASME B16.25 (BW)
Test & inspection	API 598

TYPICAL MATERIALS

Body, Disc	A216 WCB,A217 WC6, WC9, A351 CF3, CF8, CF3M, CF8M, A995 4A, 5A, A352 LCB, LCC, LC2, Monel, Inconel, Hastelloy (Casting)
Seat	13Cr/SS304/SS316+Composite materials, P
Stem	A276 410, 304, 316, F51, AISI 4140+ENP, 17-4PH
Packing	Graphite, PTFE
O-ring	NBR, HNBR,FKM

Typical Triple Offset Butterfly Valve

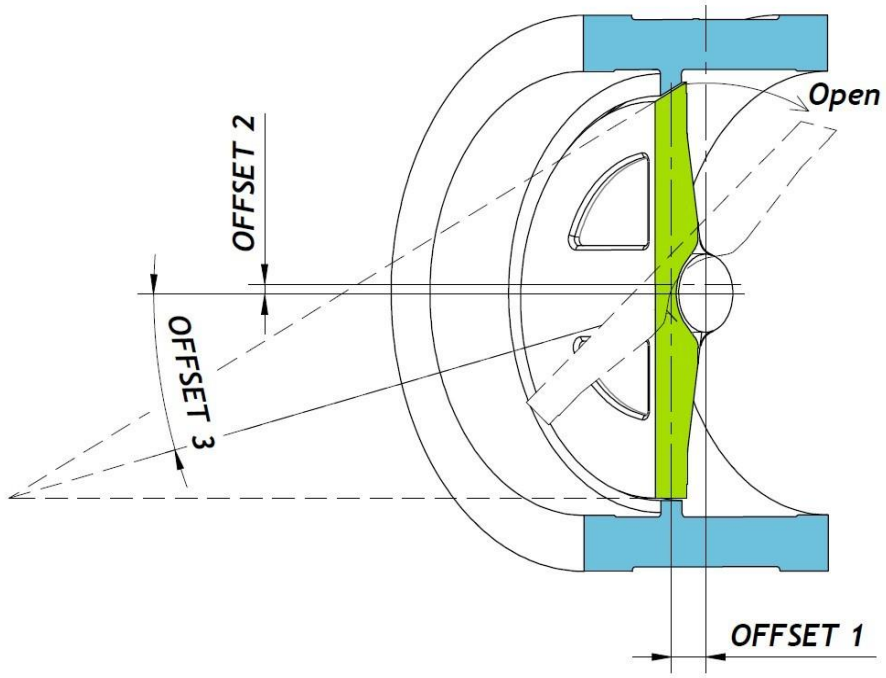
Wafer Type

Lug Type

Flange Type

Butt Welding Type

OVERVIEW (Triple Offset Type)



Offset 1: Offset for seat seal and the rotation center of stem.

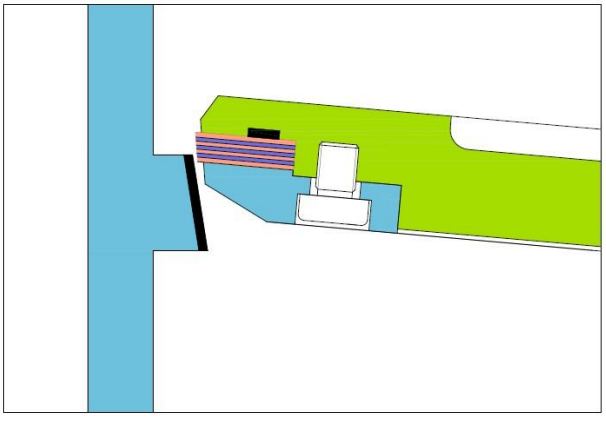
Offset 2: Center of pipe and disc.

Offset 3: Seat sealing angle center line and flow passage center.

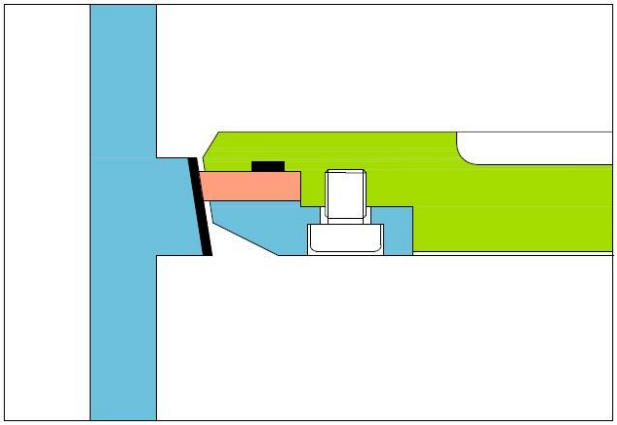
The triple offset of butterfly valve ensures the valve disc is completely separated from seat sealing surface while open in a slightly angle which could reduce the friction of sealing surface during open and close and opening torque as well as prolong the service life of the sealing surface.

FBV metal sealing butterfly valve adopts multi-layer sealing ring to achieve the valve seal, the multi-layer seal ring is generally made of stainless steel and graphite combination

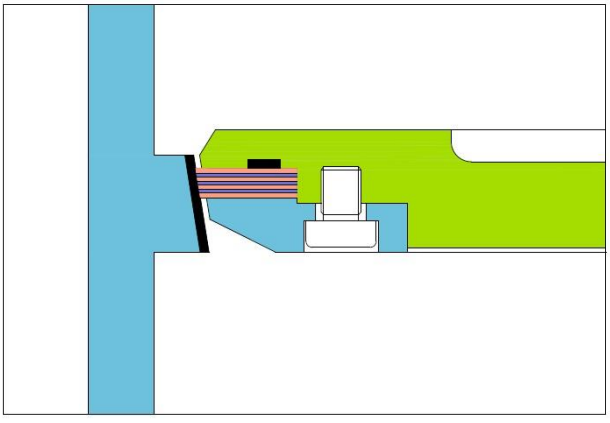
The pure metal sealing can be used for special medium or high temperature.



Disc Slightly open

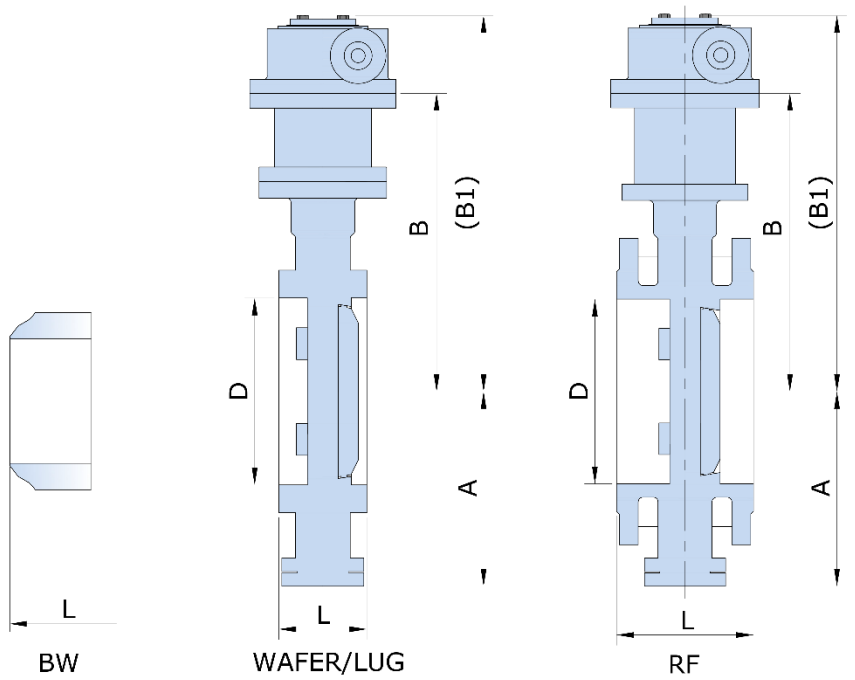


Disc closed: Pure metal seat ring



Disc closed: Multi-layer metal seat ring

DIMENSIONS AND WEIGHTS (Triple Offset Type) *ASME CLASS 150 (PN 20)*



ASME CLASS 150 (PN 20)

Size *in/mm*	D	L			A	B	B1	Weight *(lb/kg)*			
		WAFER /LUG	RF(1)	BW				WAFER	*LUG*	*RF*	*BW*
2	2	*1.69*	*4.25*	-	*4.33*	*7.87*	*13.78*	*18*	*22*	*31*	
50	*50*	*43*	*108*		*110*	*200*	*350*	*8*	*10*	*14*	
2 ½	2 ½	*1.81*	*4.41*	-	*4.92*	*8.46*	*14.37*	*20*	*24*	*35*	
65	*65*	*46*	*112*		*125*	*215*	*365*	*9*	*11*	*16*	
3	3	*1.89*	*4.5*	*7.09*	*5.12*	*8.86*	*14.76*	*22*	*26*	*40*	*33*
80	*80*	*48*	*114*	*180*	*130*	*225*	*375*	*10*	*12*	*18*	*15*
4	4	*2.13*	*5*	*7.48*	*5.71*	*9.45*	*15.35*	*26*	*40*	*51*	*44*
100	*100*	*54*	*127*	*190*	*145*	*240*	*390*	*12*	*18*	*23*	*20*
6	6	*2.24*	*5.51*	*8.27*	*6.89*	*11.42*	*17.32*	*33*	*53*	*70*	*55*
150	*150*	*57*	*140*	*210*	*175*	*290*	*440*	*15*	*24*	*32*	*25*
8	8	*2.52*	*5.98*	*9.06*	*9.65*	*13.39*	*19.29*	*66*	*99*	*106*	*108*
200	*200*	*64*	*152*	*230*	*245*	*340*	*490*	*30*	*45*	*48*	*49*
10	10	*2.8*	*6.5*	*9.84*	*11.02*	*14.76*	*20.67*	*104*	*150*	*194*	*156*
250	*250*	*71*	*165*	*250*	*280*	*375*	*525*	*47*	*68*	*88*	*71*
12	12	*3.19*	*7*	*10.63*	*12.4*	*16.73*	*22.64*	*174*	*220*	*282*	*229*
300	*300*	*81*	*178*	*270*	*315*	*425*	*575*	*79*	*100*	*128*	*104*
14	14	*3.62*	*7.48*	*11.42*	*13.78*	*17.91*	*24.41*	*185*	*267*	*348*	*317*
350	*350*	*92*	*190*	*290*	*350*	*455*	*620*	*84*	*121*	*158*	*144*
16	16	*4.02*	*8.5*	*12.2*	*14.96*	*19.5*	*27.56*	*308*	*385*	*491*	*396*
400	*400*	*102*	*216*	*310*	*380*	*495*	*700*	*140*	*175*	*223*	*180*
18	18	*4.5*	*8.74*	*13*	*15.55*	*20.08*	*29.13*	*412*	*500*	*630*	*511*
450	*450*	*114*	*222*	*330*	*395*	*510*	*740*	*187*	*227*	*286*	*232*
20	20	*5*	*9.02*	*13.78*	*17.13*	*22.05*	*32.09*	*500*	*577*	*744*	*599*
500	*500*	*127*	*229*	*350*	*435*	*560*	*815*	*227*	*262*	*338*	*272*
24	24	*6.06*	*10.51*	*15.35*	*19.5*	*25*	*34.06*	*782*	*782*	*1126*	*914*
600	*600*	*154*	*267*	*390*	*495*	*635*	*865*	*355*	*355*	*511*	*415*
28	28	*6.5*	*11.5*	*16.93*	*19.69*	*25.59*	*35.83*	*1156*	*1156*	*742*	*1333*
700	*700*	*165*	*292*	*430*	*500*	*650*	*910*	*525*	*525*	*337*	*605*
32	32	*7.48*	*12.52*	*18.5*	*21.65*	*28.15*	*39.57*	*1542*	*1718*	*2562*	*1586*
800	*800*	*190*	*318*	*470*	*550*	*715*	*1005*	*700*	*780*	*1163*	*720*
36	36	*8*	*13*	*20.08*	*24.8*	*32.09*	*42.70*	*2379*	*2313*	*3450*	*2048*
900	*900*	*203*	*330*	*510*	*630*	*815*	*1110*	*1080*	*1050*	*1566*	*930*
40	40	*8.5*	*16.14*	*21.65*	*26.77*	*34.65*	*47.24*	*2907*	*3458*	*4692*	*3678*
1000	*1000*	*216*	*410*	*550*	*680*	*880*	*1200*	*1320*	*1570*	*2130*	*1670*
48	48	*10*	*18.5*	*24.8*	*31.3*	*39.17*	*52.56*	*4515*	*5066*	*7180*	*5727*
1200	*1200*	*254*	*470*	*630*	*795*	*995*	*1335*	*2050*	*2300*	*3260*	*2600*
56	56	*15.35*	*20.87*	-	*35.43*	*45.47*	*74.41*	*6825*	*7269*	*10352*	*8370*
1400	*1400*	*390*	*530*		*900*	*1155*	*1890*	*3100*	*3300*	*4700*	*3800*

1.The dimension and weights are for reference only and subject to change without notice.
2. For more size or dimensional information, please contact our sales representative.

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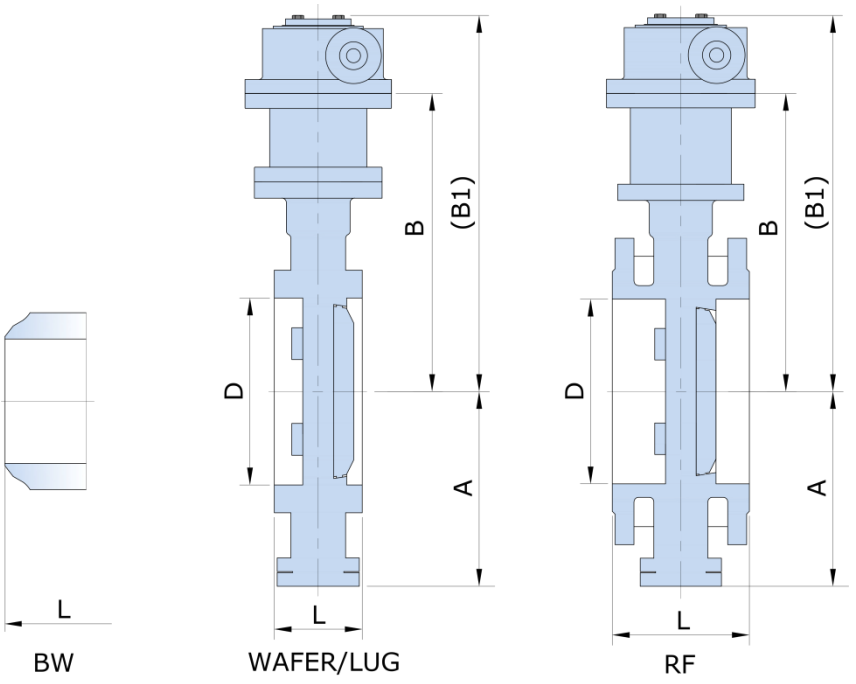
DIMENSIONS AND WEIGHTS (Triple Offset Type) *ASME CLASS 150 (PN 20)*



ASME CLASS 150 (PN 20) Continue

Size *in/mm*	D	L			A	B	B1	Weight *(lb/kg)*			
		WAFER /LUG	RF(1)	BW				WAFER	*LUG*	*RF*	*BW*
60 1500	60 1500	*15.35* *390*	*20.87* *530*	*20.87* *530*	*36.61* *930*	*46.46* *1180*	*75.6* *1920*	*9251* *4200*	*7489* *3400*	*10573* *4800*	*8590* *3900*
72 1800	72 1800	*28.14* *432*	*22.64* *575*	*22.64* *575*	*39.37* *1000*	*51.18* *1300*	*85.83* *2180*	*12555* *5700*	*11894* *5400*	*14317* *6500*	*11233* *5100*
76 1900	76 1900	*15.95* *456*	*24* *610*	*24* *610*	*45.67* *1160*	*52.36* *1330*	*92.52* *2350*	*14537* *6600*	*14978* *6800*	*18282* *8300*	*15859* *7200*
80 2000	80 2000	*20.08* *510*	*26.38* *670*	*26.38* *670*	*51.18* *1300*	*55.12* *1400*	*98.43* *2500*	*15859* *7200*	*16960* *7700*	*19383* *8800*	*16520* *7500*

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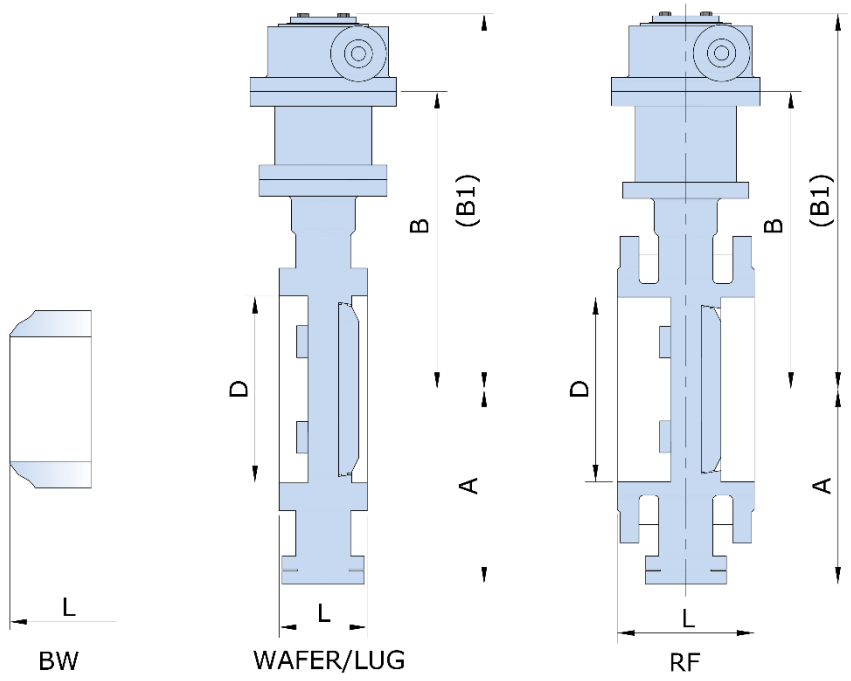
DIMENSIONS AND WEIGHTS (Triple Offset Type) *ASME CLASS 300 (PN 50)*

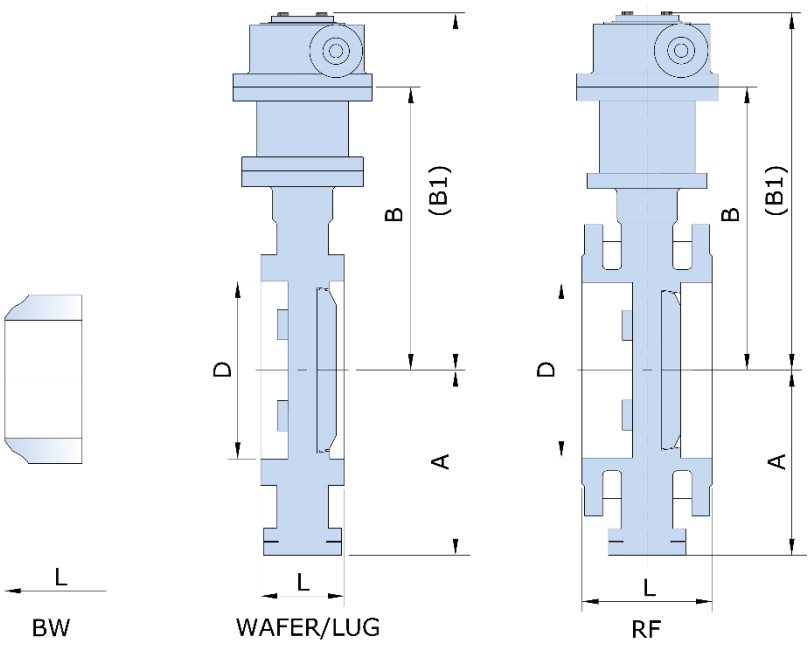


ASME CLASS 300 (PN 50)

Size *in/mm*	D	L			A	B	B1	Weight *(lb/kg)*			
		WAFER/ LUG	RF(1)	BW				WAFER	LUG	RF	BW
2	2	1.69	5.91	-	4.53	7.87	13.98	26	29	31	
50	50	43	150		115	200	355	12	13	14	
2 ½	2 ½	1.81	6.69	-	4.92	9.84	14.57	29	31	37	
65	65	46	170		125	250	370	13	14	17	
3	3	1.89	7.09	7.09	5.31	9.06	14.96	31	35	44	37
80	80	48	180	180	135	230	380	14	16	20	17
4	4	2.13	7.48	7.48	6.1	10.04	15.75	44	51	66	55
100	100	54	190	190	155	255	400	20	23	30	25
6	6	2.32	8.27	8.27	8.46	13	18.11	93	99	128	110
150	150	59	210	210	215	330	460	42	45	58	50
8	8	2.87	9.06	9.06	9.84	14.57	19.69	132	145	181	156
200	200	73	230	230	250	370	500	60	66	82	71
10	10	3.27	9.84	9.84	11.42	16.73	21.26	242	264	322	286
250	250	83	250	250	290	425	540	110	120	146	130
12	12	3.62	10.63	10.63	12.8	17.91	23.23	300	326	577	352
300	300	92	270	270	325	455	590	136	148	262	160
14	14	4.61	11.42	11.42	14.17	19.69	25.20	427	467	771	502
350	350	117	290	290	360	500	640	194	212	350	228
16	16	5.24	12.20	12.2	14.37	21.26	28.35	581	630	907	678
400	400	133	310	310	365	540	720	264	286	412	308
18	18	5.87	13	13	15.55	20.08	29.13	617	722	1222	789
450	450	149	330	330	395	510	740	280	328	555	358
20	20	6.26	13.78	13.78	18.5	25.59	22.86	914	991	1674	1068
500	500	159	350	350	470	650	860	415	450	760	485
24	24	7.13	15.35	15.35	21.46	28.94	35.43	1198	1317	2610	1346
600	600	181	390	390	545	735	900	544	598	1185	652
28	28	9.02	16.93	16.93	21.65	30.71	35.83	1861	2037	3282	2236
700	700	229	430	430	550	780	910	845	925	1490	1015
32	32	9.5	18.5	18.5	24.8	33.66	41.34	2621	2885	3678	3150
800	800	241	470	470	630	855	1050	1190	1310	1670	1430
36	36	9.5	20.08	20.08	26.97	35.83	45.28	3797	4137	5154	4471
900	900	241	510	510	685	910	1150	1724	1878	2340	2030
40	40	11.81	21.65	21.65	30.71	39.37	49.61	5339	5790	7137	6238
1000	1000	300	550	550	780	1000	1260	2424	2628	3240	2832
48	48	14.17	24.8	21.8	34.45	44.88	55.12	6436	7070	8998	7700
1200	1200	360	630	630	875	1140	1400	2922	3210	4085	3496

1. The dimension and weights are for reference only and subject to change without notice.
2. For more size or dimensional information, please contact our sales representative.

DIMENSIONS AND WEIGHTS (Triple Offset Type) — *ASME CLASS 600/900 (PN 100/150)*



ASME CLASS 600 (PN 100)

Size *in/mm*	D	L			A	B	B1	Weight *(lb/kg)*			
		WAFER / LUG	RF	BW				WAFER	LUG	RF	BW
6	6	*3.07*	*8.27*	*8.27*	*9.84*	*13.98*	*21.46*	*163*	*178*	*229*	*196*
150	*150*	*78*	*210*	*210*	*250*	*355*	*545*	*74*	*81*	*104*	*89*
8	8	*4.02*	*9.06*	*9.06*	*11.42*	*16.14*	*24.41*	*295*	*383*	*405*	*350*
200	*200*	*102*	*230*	*230*	*290*	*410*	*620*	*134*	*174*	*184*	*159*
10	10	*4.49*	*9.84*	*9.84*	*13.19*	*17.91*	*26.38*	*478*	*524*	*661*	*568*
250	*250*	*114*	*250*	*250*	*335*	*455*	*670*	*217*	*238*	*300*	*258*
12	12	*5.51*	*10.63*	*10.63*	*14.96*	*20.87*	*29.92*	*645*	*705*	*870*	*762*
300	*300*	*140*	*270*	*270*	*380*	*530*	*760*	*293*	*320*	*395*	*346*
14	14	*6.10*	*11.42*	*11.42*	*15.35*	*21.65*	*30.32*	*722*	*793*	*1007*	*866*
350	*350*	*155*	*290*	*290*	*390*	*550*	*770*	*328*	*360*	*457*	*393*
16	16	*7.01*	*12.20*	*12.20*	*17.52*	*24.61*	*35.04*	*1046*	*1145*	*1443*	*1244*
400	*400*	*178*	*310*	*310*	*445*	*625*	*890*	*475*	*520*	*655*	*565*
18	18	*7.87*	*13*	*13*	*18.7*	*26.18*	*38.19*	*1247*	*1374*	*1756*	*1502*
450	*450*	*200*	*330*	*330*	*475*	*665*	*970*	*566*	*624*	*797*	*682*
20	20	*8.5*	*13.78*	*13.78*	*20.47*	*28.15*	*39.76*	*1297*	*1963*	*2454*	*2126*
500	*500*	*216*	*350*	*350*	*520*	*715*	*1010*	*816*	*891*	*1114*	*965*
24	24	*9.13*	*15.35*	*15.35*	*23.03*	*32.09*	*45.28*	*2529*	*2780*	*3524*	*3029*
600	*600*	*232*	*390*	*390*	*585*	*815*	*1150*	*1148*	*1262*	*1600*	*1375*

ASME CLASS 900 (PN 150)

Size *in/mm*	D	L			A	B	B1	Weight*(lb/kg)*			
		WAFER / UG	RF	BW				WAFER	LUG	RF	BW
6	6	*4.02*	*10.51*	*10.51*	*10.63*	*15.75*	*25.98*	*196*	*269*	*341*	*264*
150	*150*	*102*	*267*	*267*	*270*	*400*	*660*	*89*	*122*	*155*	*120*
8	8	*5.51*	*11.5*	*11.5*	*12.4*	*19.69*	*29.53*	*414*	*449*	*555*	*485*
200	*200*	*140*	*292*	*292*	*315*	*500*	*750*	*188*	*204*	*252*	*220*
10	10	*6.1*	*13*	*13*	*14.37*	*19.88*	*31.5*	*513*	*566*	*720*	*617*
250	*250*	*155*	*330*	*330*	*365*	*505*	*800*	*233*	*257*	*327*	*280*
12	12	*7*	*14.02*	*14.02*	*15.75*	*22.83*	*35.83*	*740*	*815*	*1035*	*888*
300	*300*	*178*	*356*	*356*	*400*	*580*	*910*	*336*	*370*	*470*	*403*
14	14	*11.42*	*15*	*15*	*16.54*	*23.62*	*36.61*	*978*	*1064*	*1328*	*1101*
350	*350*	*290*	*381*	*381*	*420*	*600*	*930*	*444*	*483*	*603*	*500*
16	16	*12.2*	*15.98*	*15.98*	*17.91*	*27.17*	*38.98*	*1134*	*1222*	*1553*	*1300*
400	*400*	*310*	*406*	*406*	*455*	*630*	*990*	*515*	*555*	*705*	*590*
18	18	*13*	*17*	*17*	*19.88*	*27.17*	*41.93*	*1753*	*1910*	*2379*	*2048*
450	*450*	*330*	*432*	*432*	*505*	*690*	*1065*	*796*	*867*	*1080*	*930*
20	20	*13.78*	*18*	*18*	*21.06*	*28.74*	*42.5*	*2220*	*2416*	*3007*	*2599*
500	*500*	*350*	*457*	*457*	*535*	*730*	*1105*	*1008*	*1097*	*1365*	*1180*
24	24	*13.78*	*20*	*20*	*24.41*	*33.07*	*48.03*	*3916*	*4295*	*5425*	*4626*
600	*600*	*350*	*508*	*508*	*620*	*840*	*1220*	*1778*	*1950*	*2463*	*2100*

The dimension and weights are for reference only and subject to change without notice.

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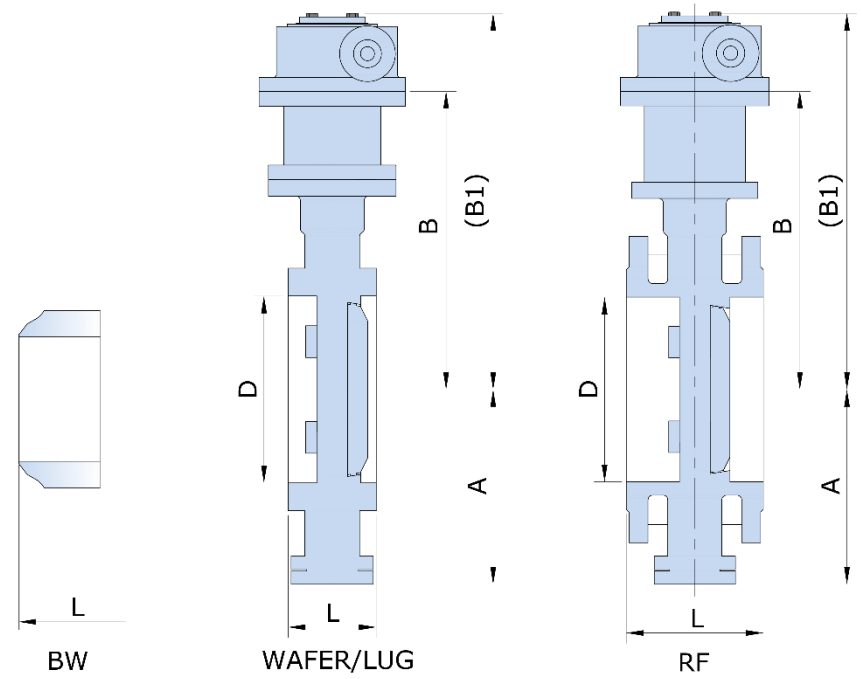
DIMENSIONS AND WEIGHTS (Triple Offset Type) *ASME CLASS 1500 (PN 250)*



ASME CLASS 1500 (PN 250)

Size *in/mm*	D	L			A	B	B1	Weight *(lb/kg)*			
		WAFER / UG	RF	BW				WAFER	LUG	RF	BW
8	8	8.27	12.2	12.2	13.78	14.17	22.05	520	427	654	507
200	200	210	310	310	350	360	560	236	194	297	230
10	10	9.06	14.57	14.57	15.75	18.5	26.38	835	683	1066	881
250	250	230	370	370	400	470	670	379	310	484	400
12	12	10.63	16.14	16.14	17.72	20.47	30.71	1273	1040	1626	1344
300	300	270	410	410	450	520	780	578	472	738	610
14	14	11.42	17.72	17.72	18.9	24.41	32.68	1579	1267	2048	1498
350	350	290	450	450	480	620	830	717	575	930	680
16	16	13	19.3	19.3	21.26	27.56	36.22	2500	1993	3249	2599
400	400	330	490	490	540	700	920	1135	905	1475	1180
18	18	23.78	20.87	20.87	22.83	28.35	38.19	3011	2445	3859	3194
450	450	350	530	530	580	720	970	1367	1110	1752	1450
20	20	14.57	22.44	22.44	24	31.5	41.34	4163	5650	5242	4515
500	500	370	570	570	610	800	1050	1890	2565	2380	2050
24	24	16.14	25.6	25.6	27.56	49.21	63	6108	6108	7659	6806
600	600	410	650	650	700	1250	1600	2773	2723	3477	3090

The dimension and weights are for reference only and subject to change without notice.

FLOW COEFFICIENT CV VALUE

Triple Offset Type

Class 150 (PN 20)

Size In mm	Disc Opening Angle								
	10°	20°	30°	40°	50°	60°	70°	80°	90°
3 80	5	11	17	22	33	50	72	99	110
4 100	12	25	38	50	76	113	164	227	252
6 150	44	96	142	191	287	430	621	860	956
8 200	75	163	244	326	488	733	1058	1465	1628
10 250	124	270	405	541	811	1216	1757	2433	2703
12 300	249	542	813	1084	1627	2440	3524	4880	5422
14 350	287	624	936	1247	1871	2807	4054	5613	6237
16 400	380	826	1239	1652	2478	3717	5368	7433	8259
18 450	482	1049	1573	2097	3146	4719	6817	9438	10487
20 500	556	1209	1814	2419	3628	5442	7860	10884	12093
24 600	839	1825	2737	3650	5474	8212	11861	16423	18248
28 700	1371	2980	4470	5960	8940	13410	19370	26820	29800
30 750	1642	3570	5355	7140	10710	16065	23205	32130	35700
32 800	1886	4100	6450	8200	12300	18450	26650	36900	41000
36 900	2466	5360	8040	10720	16080	24120	34840	48240	53600
40 1000	3031	6590	9885	13180	19770	29655	42835	59310	65900
42 1050	3307	7190	10785	14380	21570	32355	46735	64710	71900
48 1200	4476	9730	14955	19460	21919	43785	63245	87570	97300

Class 300 (PN 50)

Size In mm	Disc Opening Angle								
	10°	20°	30°	40°	50°	60°	70°	80°	90°
3 80	5	11	17	22	33	50	72	99	110
4 100	12	25	38	50	76	113	164	227	252
6 150	35	77	116	154	231	347	502	694	772
8 200	68	148	222	296	444	666	962	1332	1480
10 250	110	238	357	476	715	1072	1548	2144	2382
12 300	164	355	533	711	1066	1600	2310	3199	3555
14 350	217	472	708	945	1417	2125	3070	4251	4723
16 400	306	665	998	1330	1995	2993	4323	5985	6650
18 450	396	861	1291	1722	2582	3874	5595	7747	8608
20 500	486	1056	1584	2112	3168	4752	6864	9504	10560
24 600	775	1685	2528	3370	5055	7583	10953	15165	16850
28 700	1118	2430	3645	4860	7290	10935	15795	21870	24300
30 750	1426	3100	4650	6200	9300	13950	20150	27900	31000
32 800	1546	3360	5040	6720	10080	15120	21840	30240	33600
36 900	1969	4280	6420	8560	12840	19260	27820	38520	42800
40 1000	2420	5260	7890	10520	15780	23670	24190	47340	52600

Class 600 (PN 100)

Size In mm	Disc Opening Angle								
	10°	20°	30°	40°	50°	60°	70°	80°	90°
3 80	5	11	17	22	33	50	72	99	110
4 100	12	25	38	50	76	113	164	227	252
6 150	44	96	142	191	287	430	621	860	956
8 200	75	163	244	326	488	733	1058	1465	1628
10 250	124	270	405	541	811	1216	1757	2433	2703
12 300	249	542	813	1084	1627	2440	3524	4880	5422
14 350	287	624	936	1247	1871	2807	4054	5613	6237
16 400	380	826	1239	1652	2478	3717	5368	7433	8259
18 450	482	1049	1573	2097	3146	4719	6817	9438	10487
20 500	556	1209	1814	2419	3628	5442	7860	10884	12093
24 600	839	1825	2737	3650	5474	8212	11861	16423	18248

CALCULATION OF FLOW COEFFICIENT

Flow coefficient Cv (Kv is the metric equivalent) is the rate of flow in gallon per minute with the pressure drop of 1 psi across the valve. The flow coefficients shown in the above table are determined with equations as follows:

For liquids:

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

Where:
Q_l = Flow of liquid (gallon/minute)
ΔP = Pressure drop in psi (P_1-P_2)
SG = Specific gravity (1 for liquid)

For gases (non-critical):

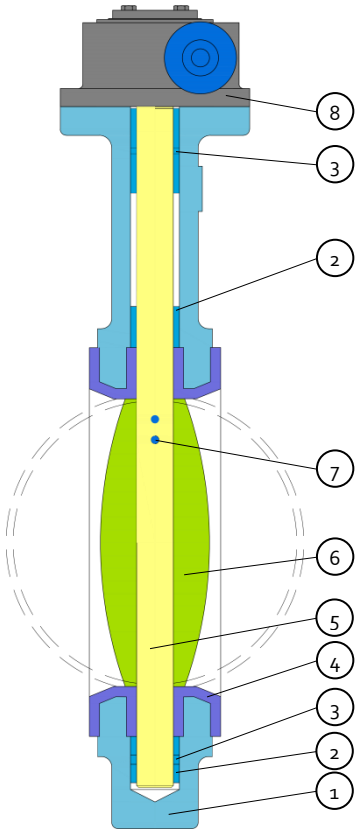
$$Q_g = 61 \cdot C_v(P_2 \cdot P_1 / SG)^{1/2}$$

Where:
Q_g = Flow of gases (SFH at STP)
P_2 = Outlet pressure (psi)
P_1 = Inlet pressure (psi)
SG = Specific gravity (1 for gas)

Engineered Solutions

BUTTERFLY VALVE

OVERVIEW (Concentric Lining Type)



Part List

1. Body
2. Bushing
3. O-ring
4. Lining
5. Stem
6. Disc
7. Pin
8. Gear

STANDARDS

Design & Manufacture	API 609,AWWA C504, ASME b16.34
Face-to-face	API 609, ASME B16.10
End Dimension	ASME B16.5 (RF) ASME B16.47 (RF) MSS SP-44 (NPS 22 Only) AWWA A207
Test & inspection	API 598

TYPICAL MATERIALS

Body	Cast iron, A216 WCB, A351 CF3, CF8, CF3M, CF8M, A995 4A, 5A,Monel, Inconel, Hastelloy
Disc	Cast Iron+ENP, Carbon steel +ENP, A351 CF3, CF8, CF3M, CF8M, A995 4A, 5A,Monel, Inconel, Hastelloy
Lining	NBR, HNBR, EPDM,FKM, PTFE
Stem	A276 410, 304, 316, F51, AISI 4140+ENP, 17-4PH
Packing	NBR, HNBR, PTFE
O-ring	NBR, HNBR, FKM

Typical Concentric Lining Type Butterfly Valve

Wafer Type,
Rubber Liner

Wafer Type,
PTFE Liner

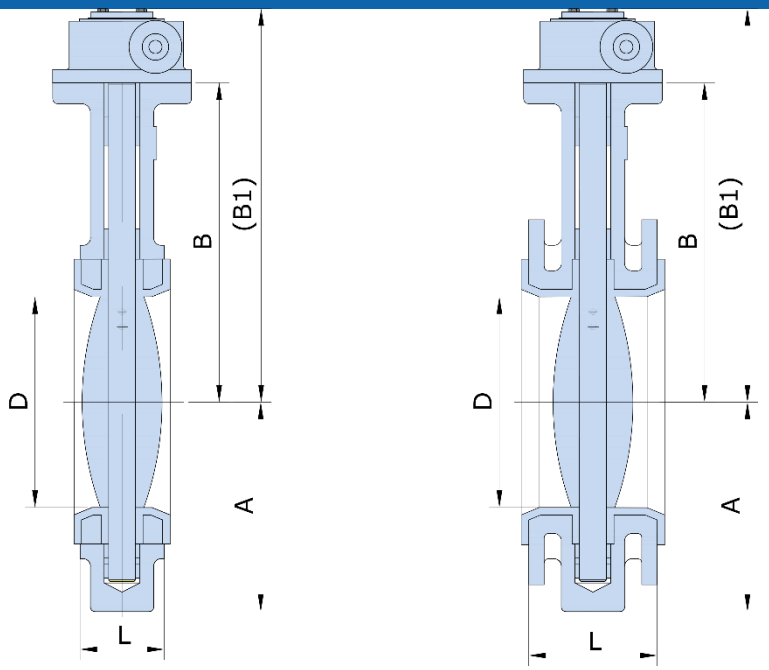
Lug Type,
Rubber Liner

Double Flange Type,
Rubber Liner

Mono-Flange Type
Rubber Liner

Rubber Concentric lined valve can be Bonded or Replaceable Liner.

DIMENSIONS AND WEIGHTS (Concentric Lining Type) *ASME CLASS 150 (PN 20)*



ASME CLASS 150 (PN 20)

Size *in/mm*	D	L		A	B	B1	Weight *(lb/kg)*	
		WAFER / LUG	RF				WAFER	*RF*
2 *50*	*1.97* *50*	*1.69* *43*	*4.25* *108*	*3.27* *83*	*4.72* *120*	*8.66* *220*	*11.45* *5.2*	*25* *11.2*
2 ½ *65*	*2.52* *64*	*1.81* *46*	*4.41* *112*	*3.66* *93*	*5.12* *130*	*13* *330*	*12.11* *5.5*	*29* *13.3*
3 *80*	*3* *76*	*1.89* *48*	*4.49* *114*	*3.94* *100*	*9.65* *245*	*13.98* *355*	*13.22* *6*	*31* *14.2*
4 *100*	*3.94* *100*	*2.05* *52*	*5* *127*	*4.5* *114*	*6.1* *155*	*10.63* *270*	*15.42* *7*	*38* *17.4*
6 *150*	*5.91* *150*	*2.2* *56*	*5.51* *140*	*5.63* *143*	*7.48* *190*	*11.81* *300*	*24.23* *11*	*56* *25.5*
8 *200*	*7.87* *200*	*2.36* *60*	*5.98* *152*	*6.69* *170*	*8.07* *205*	*12.6* *320*	*39.65* *18*	*87* *39.5*
10 *250*	*9.84* *250*	*2.68* *68*	*6.5* *165*	*7.8* *198*	*9.25* *235*	*15.75* *400*	*52.86* *24*	*117* *53*
12 *300*	*11.81* *300*	*3.07* *78*	*7.01* *178*	*8.78* *223*	*11.02* *280*	*17.72* *450*	*74.89* *34*	*148* *67*
14 *350*	*13.11* *333*	*3.07* *78*	*7.48* *190*	*11.02* *280*	*12.2* *310*	*19.69* *500*	*101.32* *46*	*200* *91*
16 *400*	*15.31* *389*	*4.02* *102*	*8.5* *216*	*11.81* *300*	*13.39* *340*	*20.87* *530*	*191.63* *87*	*311* *141*
18 *450*	*17.05* *433*	*4.5* *114*	*8.74* *222*	*13.58* *345*	*14.76* *375*	*22.83* *580*	*226.87* *103*	*401* *182*
20 *500*	*19.33* *491*	*5* *127*	*9.02* *229*	*19.98* *355*	*16.93* *430*	*24.8* *630*	*323.79* *147*	*441* *200*
24 *600*	*23.31* *592*	*6.06* *154*	*10.5* *267*	*16.14* *410*	*19.69* *500*	*30.71* *780*	*482.38* *219*	*639* *290*
28 *700*	*27.36* *695*	*6.5* *165*	*11.5* *292*	*18.82* *478*	*22.05* *560*	*31.5* *800*	*742.29* *337*	*943* *428*
32 *800*	*31.26* *794*	*7.48* *190*	*12.52* *318*	*20.83* *529*	*24.41* *620*	*31.89* *810*	*909.69* *413*	*1244* *565*
36 *900*	*34.02* *864*	*7.87* *200*	*13* *330*	*23* *584*	*26.18* *665*	*33.86* *860*	*1612.33* *732*	*1758* *798*
40 *1000*	*38* *965*	*9.88* *251*	*16.14* *410*	*24.5* *622*	*28.94* *735*	*36.22* *920*	*1911.89* *868*	*2026* *920*
48 *1200*	*45.67* *1160*	*10.87* *276*	*18.5* *470*	*31.5* *800*	*36.10* *917*	*43.7* *1110*	*2246.7* *1020*	*3084* *1400*
56 *1400*	*54.84* *1393*	*15.35* *390*	*20.87* *530*	*36.22* *920*	*48.43* *1230*	*59.06* *1500*	*4075* *1850*	*4405* *2000*

1. The dimension and weights are for reference only and subject to change without notice.
2. The outline dimension for pressure rating PN16 is equal to dimension for class 150 as described above.
3. For more dimensional information, please contact our sales representative.

Engineered Solutions

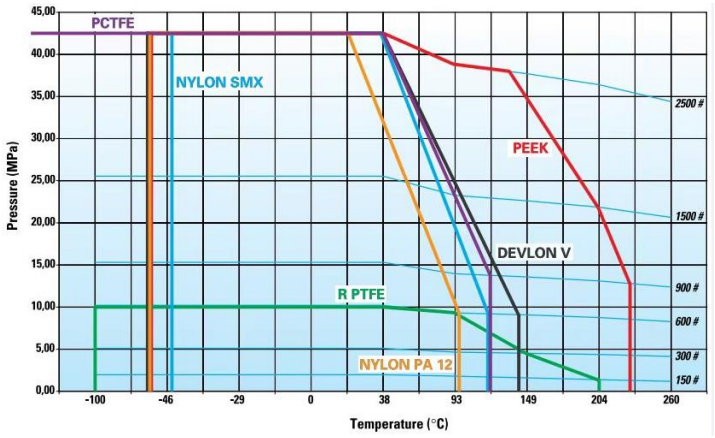
FLOW COEFFICIENT CV VALUE

Concentric Lining Type

Class 150 (PN 20)

Size In mm	Disc Opening Angle								
	10°	20°	30°	40°	50°	60°	70°	80°	90° Full open
2 *50*	0.1	5	12	24	45	64	90	125	135
2 1/2 65	0.2	8	20	37	65	98	144	204	220
3 *80*	0.3	12	22	39	70	116	183	275	302
4 *100*	0.5	17	36	78	139	230	364	546	600
5 125	0.8	29	61	133	237	292	320	930	1022
6 *150*	2	45	95	205	366	605	958	1437	1579
8 *200*	3	89	188	408	727	1202	1903	2854	3136
10 *250*	4	151	320	694	1237	2047	3240	4859	5340
12 *300*	5	234	495	1072	1911	3162	5005	7507	8250
14 *350*	6	338	715	1549	2761	4568	7230	10844	11917
16 *400*	8	464	983	2130	3797	6282	9942	14913	16388
18 *450*	11	615	1302	2822	5028	8320	13168	19752	21705
20 *500*	14	971	1674	3628	6465	10698	16931	25396	27908
24 *600*	22	1222	2857	5605	9989	16528	26157	29236	43116
28 *700*	30	1633	3522	7630	12599	20036	30482	46899	58696
32 *800*	45	2387	4791	8736	13786	20613	31395	48117	68250
36 *900*	60	3021	6063	11055	17449	26086	39731	60895	86375
40 *1000*	84	4183	8395	15307	24159	36166	55084	84425	119750
48 *1200*	102	4651	10365	17010	27242	43853	70431	108968	132888
60 *1500*	148	6400	14500	24500	39400	63200	102000	154000	190000
72 *1800*	190	8220	18600	31500	50700	81200	131000	198000	244000

Seat Material Pressure-Temperature Rating (Operating)



SEAT MATERIALS

Material Name	Description	Operating Temperature	Operating Pressure	Service Application
PTFE	Virgin PTFE is the most widely used sealing material with excellent characteristics suitable for most services. It has excellent chemical resistance throughout valve industries and low coefficient of frication.	-20°F – 400°F *-29°C– 205°C*	Class 150 *PN 20*	General chemicals, low pressure services.
RPTFE	RPTFE (Reinforced PTFE) is typically produced by adding 15% fiber glass to virgin PTFE. It has better pressure-temperature properties than virgin PTFE, better resistance to wear and deformation under load. **NOT to be used in hydrofluroic acid**	-20°F – 400°F *-29°C– 205°C*	Class 150 – 600 *PN 20 – 100*	For low and medium pressure services.
PCTFE	PCTFE is a homopolymer of chlorotrifluoroethylene, featuring high compressive strength and low deformation under load.	-320°F – 248°F -196°C– 120°C	Class 150 – 300 PN 20 – 50	For low temperature low pressure services.
Nylon	Nylon is a common seat material for Class 600 valves. It is highly resistance to many chemicals and abrasions, and can be used in air, oil and other gas media. **It is NOT suitable for strong oxidization agents.**	-20°F – 176°F *-29°C– 80°C*	Class 150 –1500 *PN 20 –250*	For high pressure, low temperature services.
Devlon®	Devlon® is a high molecular weight polyamide that is specifically tailored for high temperature/pressure applications in the offshore oil and gas sector.It is low moisture absorption.	-58°F – 300°F *-50°C– 149°C*	Class 150 –1500 *PN 20 –250*	For high pressure high temperature offshore services.
Nylon+MoS2	Molon (Nylon+MoS2) is a modified Nylon, the characteristics are similar to Devlon with it is cheaper than Devlon.	-20°F – 266°F *-29°C– 130°C*	Class 150 – 1500 *PN 20 – 250*	For high pressure, low temperature services.
PEEK	PEEK is a high performance engineered thermoplastic. It is excellent in water/chemical resistance andit is unaffected by continuous exposure to hot water/steam	-148°F – 428°F *-100°C– 220°C*	Class 150 – 2500 *PN 20 – 420*	For high pressure high temperature services.
PPL	PPL (Polyparaphenylene) is an excellent seat material with low coefficient of friction, highly resistant to pressure and temperature.	-50°F –482°F *-46°C– 250°C*	Class 150 – 300 *PN 20 – 50*	For high temperature low pressure services.
Delrin®	Delrin® (Acetal Resin) possesses high tensile strength, creep resistance and toughness. It exhibits low moisture absorption. It is chemically resistant to hydrocarbons, solvents and neutral chemicals.**DO NOT use it on oxygen service or steam.**	-50°F –194°F *-46°C– 90°C*	Class 150 – 600 *PN 20 –100*	For extreme pressure services.
TFM	TFM (modified PTFE) is a chemically modified PTFE that offers enhanced properties while retaining all the proven advantages of a conventional PTFE.	-112°F – 248°F *-80°C– 120°C*	Class 150 *PN 20*	For services requiring high purity.
Metal	Metal (typically stellite) seats are used in severe conditions where flashing, hydraulic shock, abrasive media or trapped metal may exist in the line.	Varies	Varies	For severe services.

O-RING MATERIALS

Material Name	Description	Operating Temperature	Operating Pressure
NBR	Buna-N (NBR) is an all purpose polymer with good resistance to water, solvents, oil and hydraulic fluids.	-50°F –176°F *-46°C– 80°C*	Class 150 – 600 *PN 20 –100*
HNBR	HNBR (Hydrogenated NBR) has similar media stability to NBR but with significantly better heat and oxidization stability.	-67°F – 337°F *-55°C–170°C*	Class 150 – 600 *PN 20 – 100*
Viton	Viton (fluorocarbon) is a fluorocarbon elastomer that is compatible with a broad range of chemicals. It performs well in mineral acids, salt solutions, chlorinated hydrocarbons and petroleum oils	-49°F – 320°F *-22°C– 204°C*	Class 150 – 600 *PN 20 – 100*
EPDM	EPDM has good abrasion and tear resistance with excellent chemical resistance to a variety of acids and alkalines. It is susceptible to attack by oil, strong acids and strong alkalines and should not be used in compressed air lines.	-50°F – 302°F *-46°C– 150°C*	Class 150 – 600 *PN 20 – 100*
FVMQ	Fluorosilcione is a silicone polymer chain with fluorinated side-chains for improved oil and fuel resistance. The mechanical and physical properties are very similar to those of silicone.	-50°F – 320°F *-46°C– 177°C*	Class 150 – 600 *PN 20 – 100*
AFLAS®	AFLAS® is highly resistant to a wide range of chemicals	-49°F – 428°F *-29°C– 220°C*	Class 150 – 600 *PN 20 – 100*

BUTTERFLY VALVE

VALVE FIGURE NUMBER — *HOW TO ORDER*

	Nominal Size		Valve Type		Pressure Rating	End Conn.	Construct-ion	Body Material		Trim Material		Seat	O-ring	Operation Mode
	A		B		C	D	E	F		G		H	I	J
e.g.	1	6	B	U	3	W	3	C	4	0	1	M	1	G

is a NPS 16 Class 300, Butterfly Valve, Wafer Type, Triple Offset, A216 WCB body, 13Cr Trim, Viton O-ring, Gear Operated.

A Nominal Size

00	Modified	**02**	2 (DN 50)	**07**	8 RB	**19**	20 RB	**31**	32 RB
F1	3/8 (DN 10)	**R2**	2 RB	**08**	8 (DN 200)	**20**	20 (DN 500)	**32**	32 (DN 800)
F2	1/2 (DN 15)	**F6**	2 ½ (DN 65)	**09**	10 RB	**21**	22 RB	**33**	34 RB
0R	1/2 RB	**3R**	2 ½ RB	**10**	10 (DN 250)	**22**	22 (DN 550)	**34**	34 (DN 850)
F3	3/4 (DN 20)	**03**	3 (DN 80)	**11**	12 RB	**23**	24 RB	**35**	36 RB
R0	3/4 RB	**R3**	3 RB	**12**	12 (DN 300	**24**	24 (DN 600)	**36**	36 (DN 900)
01	1 (DN 25)	**04**	4 (DN 100)	**13**	14 RB	**25**	26 RB	**37**	38 RB
R1	1 RB	**R4**	4 RB	**14**	14 (DN 350)	**26**	26 (DN 650)	**38**	38 (DN 950)
F4	1 ¼ (DN 32)	**05**	5 (DN 125)	**15**	16 RB	**27**	28 RB	**39**	40 RB
1R	1 ¼ RB	**R5**	5 RB	**16**	16 (DN 400)	**28**	28 (DN 700)	**40**	40 (DN 1000)
F5	1 ½ (DN 40)	**06**	6 (DN 150)	**17**	18 RB	**29**	30 RB	**41**	42 RB
2R	1 ½ RB	**R6**	6 RB	**18**	18 (DN 450)	**30**	30 (DN 750)	...	More as such

B Valve Type

BU	Butterfly Valve

C Pressure Rating

0	Modified	**7**	Class 2500
1	Class 150	**9**	Class 900
3	Class 300	**8**	Class 800
5	Class 1500	**2**	Class 125
6	Class 600	**4**	Class 400

D End Connection

X	Other	**B**	Butt-Weld (BW)
R	RF Flanged	**S**	Socket-Weld (SW)
J	RTJ Flanged	**W**	Wafer
F	FF Flanged	**L**	Lug
T	FNPT	**N**	SW x FNPT

E Construction

1	Concentric
2	Double Offset
3	Triple Offset

F Body Material

Xo	Other	**E7**	A182 F91	**S6**	A351 CF8M	**A1**	B564 No4400(Monel 400）
C1	A105N	**E8**	A217 C12A	**S7**	A182 F316L	**A2**	A494 M-35-1
C2	A216 WCA	**L1**	A350 LF1	**S8**	A351 CF3M	**A3**	B865 No5500(Monel K500）
C4	A216 WCB	**L2**	A352 LCA	**S9**	A182 F347	**A4**	B462 No8020(Alloy 20）
C6	A216 WCC	**L3**	A350 LF2	**So**	A351 C F8C	**A5**	A351 CN7M(Cast Alloy 20）
M1	A182 F1	**L4**	A352 LC2	**SA**	A182 F317	**A6**	A990 CN3MCU(Cast Alloy 20）
M2	A217 WC1	**L5**	A350 LF3	**SB**	A182 F321	**A7**	B462 N10276 (Hastelloy C276)
M3	A182 F2	**L6**	A352 LC3	**SC**	A182 F304H	**A8**	A494 CW12MW(Cast Hastelloy Alloy C276）
M4	A217 WC4	**L7**	A350 LF5	**SD**	A351 CF10	**B1**	B564 No6625 (Alloy Inconel 625)
M5	A182 F12 CL 2	**L8**	A352 LCB	**SE**	A182 F316H	**B2**	A494 CW6MC(Cast Inconel Alloy 625）
M6	A217 WC5	**L9**	A350 LF6	**SF**	A351 CF10M	**B3**	B564 No8825 (Alloy Inconel 825)
M7	A182 F11 CL 2	**LA**	A350 LF9	**SG**	A182 F304(L) Dual	**B4**	A494 CW5MCUC(Cast Inconel Alloy 825）
M8	A217 WC6	**LB**	A352 LC9	**SH**	A182 F316(L) Dual	**H1**	B62 C83600 Composition Bronze Casting
M9	A182 F22 CL 3	**LD**	A352 LCC	**D1**	A182 F51	**H2**	B148 C95400 Al-Bronze Casting
Mo	A217 WC9	**S1**	A182 F304	**D2**	A995 4A	**H3**	B148 C95800 Al-Bronze Casting
E1	A182 F5	**S2**	A351 CF8	**D3**	A182 F53	**H4**	B150 C63000 Al-Bronze Rod, Bar
E2	A217 C5	**S3**	A182 F304L	**D4**	A995 5A	**H5**	B150 C63200 Al-Bronze Rod, Bar
E5	A182 F9	**S4**	A351 CF3	**D5**	A182 F55	**F1**	A395 65-45-15 Ductile Iron
E6	A217 C12	**S5**	A182 F316	**D6**	A995 6A	**F2**	A536 65-45-12 Ductile Iron

BUTTERFLY VALVE

VALVE FIGURE NUMBER — *HOW TO ORDER*

	Nominal Size	Valve Type	Pressure Rating	End Conn.	Construct-ion	Body Material	Trim Material	Seat	O-ring	Operation Mode
	A	B	C	D	E	F	G	H	I	J
e.g.	16	BU	3	W	3	C4	01	M	1	G

is a NPS 16 Class 300, Butterfly Valve, Wafer Type, Triple Offset, A216 WCB body, 13Cr Trim, Viton O-ring, Gear Operated.

G Trim Material

00	Other	08	317/317	16	5A/F53
01	13Cr/410	09	321/321	17	6A/F55
02	304/410	10	347/347	18	A395 65-45-15 /431
03	316/410	11	304H/304H（ASTM A479）	19	A536 65-45-12 /431
04	304/304	12	316H/316H（ASTM A479）	20	A395 65-45-15 /17-4PH
05	316/316	13	304(L) Dual/304(L) Dual	21	A395 65-45-12 /17-4PH
06	316/17-4PH	14	316(L) Dual/316(L) Dual		
07	316/XM-19	15	4A/F51		

H Seat

E	EPDM	G	SS316+Graphite
B	BUNA-N (Lining - Concentric)	F	SS316+Graphite
V	FKM(VITON) (Lining - Concentric)	L	INCONEL 625+Graphite
T	PTFE	P	SS304+PTFE
R	RPTFE	Q	SS316+PTFE
C	13Cr+Graphite	H	S31803+PTFE
S	SS304+Graphite	N	INCONEL 625+PTFE

I O-Ring

0	No o-ring	A	ELGILOY+PCTFE(<-46 deg C)
1	FKM(Viton)	B	SS316+PTFE(<-46 deg C)
2	TEFLON(PTFE)	5	Other
3	HNBR		
4	NBR		
6	EPDM		
7	FVMQ		
8	FFKM		
9	AFLAS		

J Operation

L	Lever
D	Lever w/ locking device
G	Gearbox
F	Gearbox w/ locking device
C	Gear w/chain
B	Bare stem
P	Pneumatic
N	Pneumatic-Hydraulic
E	Electric
Q	Other

HOW THE FIGURE NUMBER SYSTEM WORKS

Introduction. Figure number system uses a code consisting 14 digits of letters and numbers to represent the specification of a valve of certain specification. Among 14 digits, they are separated into 10 groups identified by letters from A to J. Each group represents a parameter of a valve, together they contain almost all the essential parameters of the valve.

Uses. Using the figure number system to generate a code is easy. Under each group, the code is shown on the left while on the right is the meaning of the code. Start by selecting a code from group A, through group J. If the specification of the valve is not listed, select the code for "Special ". The total length of the figure number shall be exactly 14 digits.

Cautions. It is advised that you have as detailed the specification as possible to generate a figure number, which means eliminating "Specials". If you don't have enough specification or information about the valve you are ordering, or you're not sure how to use the system to generate a figure number, contact one of our sales representatives for help.

Note: FBV reserves the right to make any modifications without notice.

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Refinery

IMPORTANT NOTICE

- All dimensions in inches not listed in standards are converted from millimeters. Weights in lbs (pounds) are converted from kilograms.
- Data listed in the catalog, including dimensions, weights, specifications and other valve related data are intended to provide general information and guidance only.
- FBV Inc. assumes no responsibility for errors or inadequacy relevant to any information provided in this catalog. Any information provided in this catalog is subject to change without notice.

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