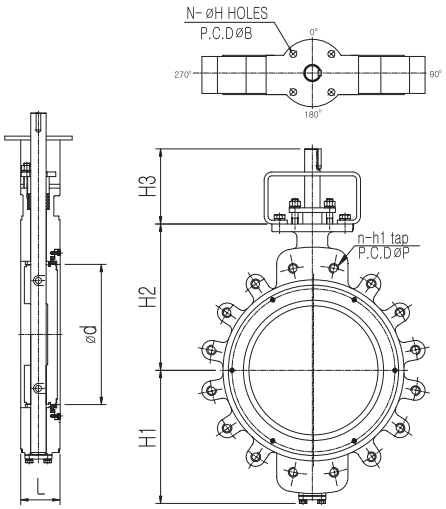
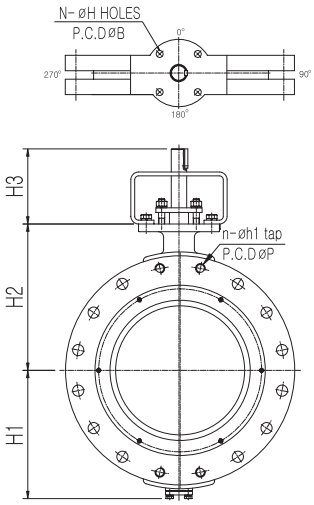
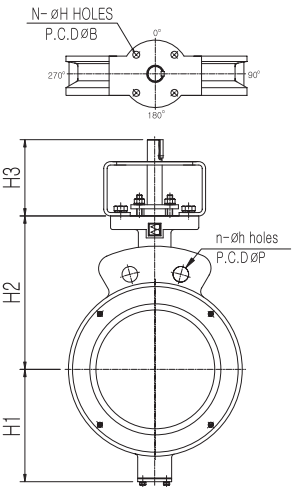
High Performance



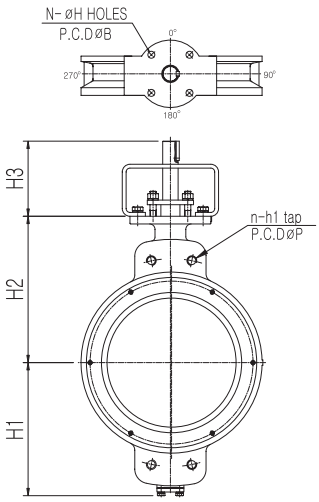
〔Lug Type〕



〔Flanged Type〕



〔Wafer Type〕



〔Semi-Lug Type〕

Dimensions

UNIT: mm

SIZE		L	ød	ØD	H1	H2	H3	TOP FLANGE ISO 5211			JIS 10K			ANSI 150LB		
mm	inch							ØB	N-ØH	TYPE	n-Øh	h1	ØP	n-Øh	h1	ØP
50	2"	43	45	95	68	124	108	70	4-10	F7	4-19	M16	120	4-19	5/8"	120.6
65	2.5"	46	52.5	108	71.5	140	108	70	4-10	F7	4-19	M16	140	4-19	5/8"	139.7
80	3"	48	66	121	79.5	158.5	108	70	4-10	F7	8-19	M16	150	4-19	5/8"	152.4
100	4"	52	88	155	95	173	108	70	4-10	F7	8-19	M16	175	8-19	5/8"	190.5
125	5"	56	114	180	110.5	190	108	70	4-10	F7	8-23	M20	210	8-22	3/4"	215.9
150	6"	56	139	205	126	205	108	70	4-10	F7	8-23	M20	240	8-22	3/4"	241.3
200	8"	60	193	256	155	243.5	130	102	4-12	F10	12-23	M20	290	8-22	3/4"	298.4
250	10"	70	235	321	210	272	150	102	4-12	F10	12-25	M22	355	12-25	7/8"	361.9
300	12"	78	287	367	250	301.5	150	102	4-12	F10	16-25	M22	400	12-25	7/8"	431.8
350	14"	78	323	413	275	340	150	102	4-12	F10	16-25	M22	445	12-28	1"	476.2
400	16"	102	364	470	309.5	362	195	140	4-18	F14	16-27	M24	510	16-28	1"	539.7
450	18"	114	409.5	534	347.5	377.5	210	140	4-18	F14	20-27	M24	565	16-32	1 1/8"	577.8
500	20"	127	458	584	375	405	180	165	4-22	F16	20-27	M24	620	20-32	1 1/8"	635
550	22"	154	512	643	421	458	210	165	4-22	F16	20-33	M30	680	20-35	1 1/4"	692.1
600	24"	154	560	692	432.5	462.5	210	165	4-22	F16	24-33	M30	730	20-35	1 1/4"	749.5
650	26"	165	620	749	527	560.5	240	165	4-22	F16	24-33	M30	780	24-35	1 1/4"	806.5
700	28"	165	673	796	583	618	240	254	8-18	F25	24-33	M30	840	28-35	1 1/4"	863.5
750	30"	190	728	851	634	665	240	254	8-18	F25	24-33	M30	900	28-35	1 1/4"	914.5
800	32"	190	779	902	687	720	270	254	8-18	F25	28-33	M30	950	28-42	1 1/2"	978
850	34"	203	831	957	746	777	270	254	8-18	F25	28-33	M30	1000	32-42	1 1/2"	1029
900	36"	203	885	1019	803	835	270	254	8-18	F25	28-33	M30	1050	32-42	1 1/2"	1086
1000	40"	216	941	1076	863	896	305	254	8-18	F25	28-39	M36	1160	36-42	1 1/2"	1200
1100	44"	241	1001	1139	908	949	305	350	8-23	F30	28-39	M36	1270	40-42	1 1/2"	1314.5
1200	48"	254	1057	1200	986	953	305	350	8-23	F30	32-39	M36	1380	44-42	1 1/2"	1422.4

※Dimension table could be flexible for product improvement reasons.

Torques required to operate valves

TORQUE REQUIREMENTS

Torque plays an important part in the cost, operation and life span of butterfly valves. The following explains why.

TORQUE CHARACTERISTICS	Bearing friction, seal or seating friction, and fluid dynamic effects on the disc are primary factors in determining torque requirements for a butterfly valve. These are described below.
BEARING FRICTION TORQUE	Any unbalanced pressure across the butterfly valve disc places a direct load on the shaft bearings. The projected area of the disc decreases with valve opening, thus bearing friction varies from a maximum as the disc rotates from the closed to the fully opened position.
SEAT FRICTION TORQUE	Seating friction is maximum during the first few degrees of opening (or the last few degrees of closing) and is the result of the valve disc edge action against the seat. The seating torque acts to oppose the rotation of the disc. The contact of the seat around the full periphery of the disc creates the bubble tight seal.
FLUID DYNAMIC TORQUE	From the dynamic standpoint, a butterfly valve disc is torque balanced only when totally closed or fully opened. In all intermediate positions, a fluid dynamic torque is presented because the fluid velocity over the disc surface is always higher on the trailing edge of the disc than on the leading edge. This torque acts in a valve "disc-closing" direction, tending to reach its highest point at about 70 degrees open.

Actuator torques can be calculated using the following formulas.

$Ta = Tb+Ts+Th = 1.2Tb \pm Td$

$Ts = CsD2$

$Tb = 4.17D2\ dfp$

$Td = CtD3P$

$Th = 3.06D4$

$V = CF\sqrt{P} = Q/0.785D2$

- Ta : The required actuator torque (lb-ft)
- Ts : Seat or unseating torque (lb-ft)
- Td : Dynamic torque (lb-ft)
- Q : Flow (cubic for per second)
- V : Velocity (feet per second)
- D : Diameter of valve (feet)
- d : Diameter of shaft (inch)
- P : Pressure drop across valve (psi)
- Cs : Coefficient of seating or unseating torque
- Ct : Coefficient of dynamic torque
- Cf : Coefficient of flow
- f : Bearing friction coefficient

Basic formulas to obtain Cv-value

Q : Volume rate of flow (liquid m^3/h, gas Nm^3/h)

W : Volume rate of flow (steam kg/h)

P_1 : Inlet pressure (liquid kgf/cm^2, gas/steam kgf/cm^2 abs)

P_2 : Outlet pressure (liquid kgf/cm^2, gas/steam kgf/cm^2 abs)

ΔP : Pressure drop P_1-P_2

G : Specific gravity of fluid

T : Temperature of fluid (°C)

K : Correction coefficient to superheat

1+0.0013xdeg.°C of superheat

Notes : When $P_2<\frac{P_1}{2}$, use $\frac{P_1}{2}$ instead of ΔP

To determine the valve nominal size, multiply the Cv-value gotten from these formulas by 1.25 and select the correct size from the Cv-value list under.

For Liquid

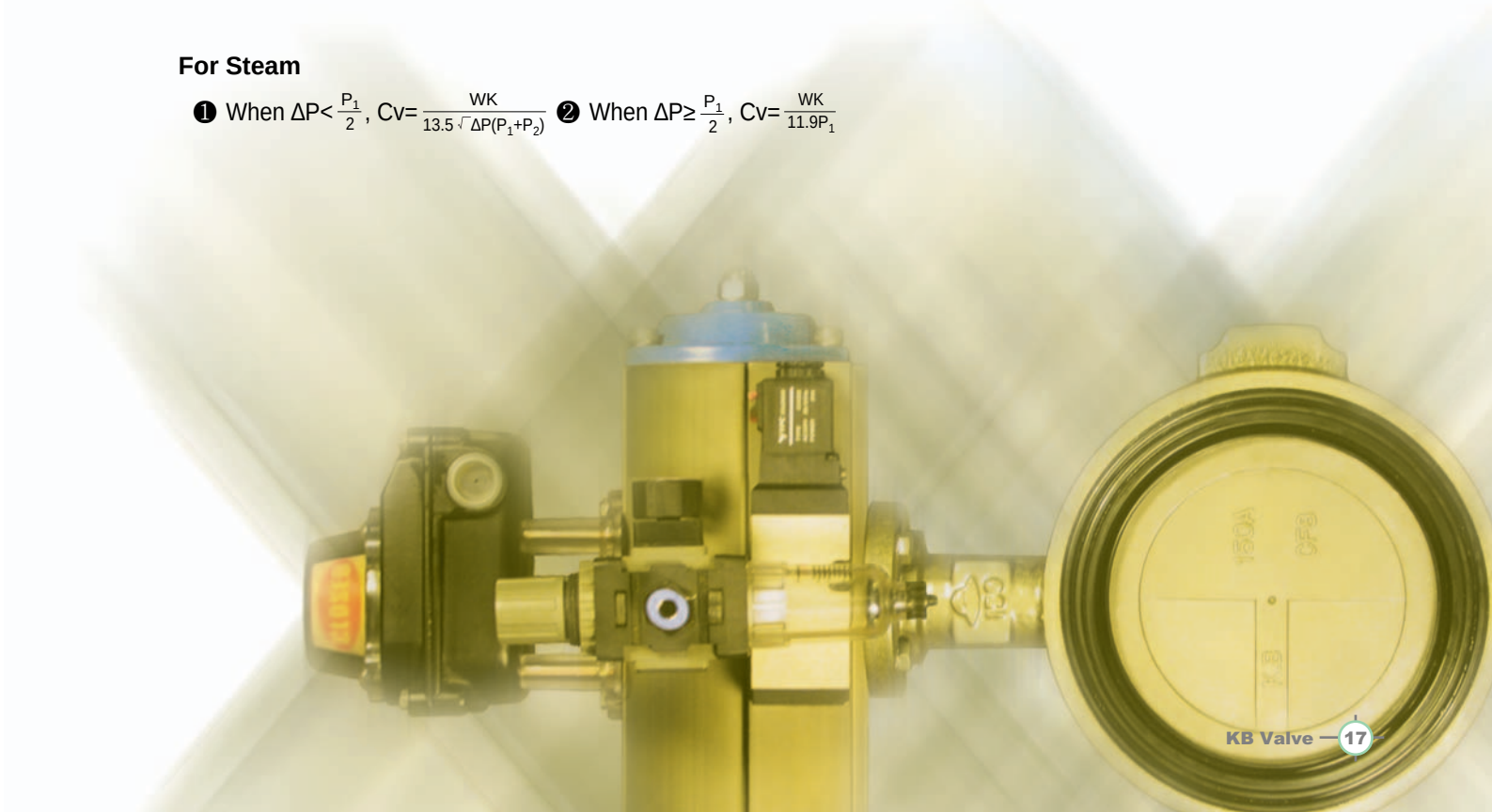
$$Cv=1.72Q\sqrt{\frac{G}{\Delta P}}$$

For Gas

❶ When $\Delta P<\frac{P_1}{2}$, $Cv=\frac{Q}{272}\sqrt{\frac{G(273+T)}{\Delta P(P_1+P_2)}}$ ❷ When $\Delta P\geq\frac{P_1}{2}$, $Cv=\frac{\sqrt{G(273+T)}}{236P_1}$

For Steam

❶ When $\Delta P<\frac{P_1}{2}$, $Cv=\frac{WK}{13.5\sqrt{\Delta P(P_1+P_2)}}$ ❷ When $\Delta P\geq\frac{P_1}{2}$, $Cv=\frac{WK}{11.9P_1}$



Torque value (Unit : kg-m/Nm)

SIZE		CONCENTRIC BUTTERFLY VALVE									
inch	mm	3bar		5bar		10bar		13bar		16bar	
		kg-m	Nm	kg-m	Nm	kg-m	Nm	kg-m	Nm	kg-m	Nm
2	50	0.58	5.64	0.72	7.06	0.90	8.82	1.08	10.58	1.26	12.35
2 1/2	65	0.72	7.06	0.90	8.82	1.26	12.35	1.51	14.81	1.76	17.20
3	80	0.94	9.17	1.17	11.47	1.62	15.88	1.94	19.05	2.21	21.61
4	100	1.08	10.58	1.35	13.23	1.80	17.64	2.16	21.17	2.30	22.49
5	125	1.66	16.23	2.07	20.29	2.70	26.46	3.24	31.75	3.60	35.28
6	150	2.02	19.76	2.52	24.70	3.42	33.52	4.10	40.22	4.46	43.66
8	200	5.13	50.27	6.42	62.85	14.72	144.21	17.66	173.05	22.86	224.03
10	250	10.08	98.78	13.32	130.54	23.13	226.67	27.76	272.01	34.65	339.57
12	300	17.64	172.87	22.05	216.09	31.50	308.70	37.80	370.44	43.65	427.77
14	350	29.52	289.30	36.90	361.62	52.20	511.56	62.64	613.87	65.25	639.45
16	400	36.72	359.86	45.90	449.82	64.80	635.04	77.76	762.05	76.50	749.70
18	450	47.34	463.93	57.33	561.83	88.65	868.77	106.38	1042.52	135.90	1331.82
20	500	60.84	596.23	76.05	745.29	124.20	1217.16	149.04	1460.59	166.50	1631.70
22	550	68.11	667.49	85.14	834.37	139.50	1367.10	167.40	1640.52	193.50	1896.30
24	600	97.20	952.56	121.50	1190.70	179.10	1755.18	214.92	2106.22	247.50	2425.50

SIZE		DOUBLE ECCENTRIC BUTTERFLY VALVE								
inch	mm	5bar			10bar			16bar		
		kg-m	Nm	ft-lb	kg-m	Nm	ft-lb	kg-m	Nm	ft-lb
2	50	0.86	8.38	6.18	1.04	10.24	7.55	1.62	15.89	114.91
2 1/2	65	1.26	12.36	9.12	1.70	16.68	12.30	2.08	20.39	147.47
3	80	1.85	18.09	13.35	2.57	25.25	18.62	3.63	35.57	257.27
4	100	3.33	32.65	24.08	4.38	42.98	31.70	5.74	56.31	407.29
5	125	5.85	57.37	42.31	7.18	70.43	51.95	9.45	92.67	670.30
6	150	9.90	97.08	71.60	13.99	137.15	101.16	18.90	185.35	1340.60
8	200	22.05	216.23	159.49	25.70	252.07	185.91	31.75	311.38	2252.21
10	250	28.80	282.43	208.31	40.07	392.93	289.81	49.14	481.90	3485.56
12	300	39.15	383.93	283.17	54.43	533.79	393.71	82.40	808.10	5845.01
14	350	55.80	547.21	403.61	77.87	763.62	563.22	115.67	1134.32	8204.46
16	400	74.70	732.56	540.31	104.33	1023.10	754.61	155.74	1527.25	11046.53
18	450	89.10	873.77	644.46	135.32	1327.07	978.80	207.14	2031.38	14692.95
20	500	116.10	1138.55	839.75	189.00	1853.45	1367.04	269.89	2646.73	19143.74
24	600	200.70	1968.18	1451.66	295.60	2898.79	2138.04	446.80	4381.56	31691.74

SIZE		HIGH PERFORMANCE BUTTERFLY VALVE								
inch	mm	5bar			10bar			16bar		
		kg-m	Nm	ft-lb	kg-m	Nm	ft-lb	kg-m	Nm	ft-lb
2	50	0.86	8.38	6.18	1.04	10.19	7.55	1.62	15.89	114.91
2 1/2	65	1.26	12.35	9.12	1.70	16.67	12.30	2.08	20.39	147.47
3	80	1.85	18.08	13.35	2.57	25.19	18.62	3.63	35.57	257.27
4	100	3.33	32.63	24.08	4.38	42.98	31.70	5.74	56.31	407.29
5	125	5.85	57.33	42.31	7.18	70.38	51.95	9.45	92.67	670.30
6	150	9.90	97.02	71.60	13.99	137.06	101.16	18.90	185.35	1340.60
8	200	22.05	216.09	159.49	25.70	251.90	185.91	31.75	311.38	2252.21
10	250	28.80	282.24	208.31	40.07	392.67	289.81	49.14	481.90	3485.56
12	300	39.15	383.67	283.17	54.43	533.43	393.71	82.40	808.10	5845.01
14	350	55.80	546.84	403.61	77.87	763.11	563.22	115.67	1134.32	8204.46
16	400	74.70	732.06	540.31	104.33	1022.45	754.61	155.74	1527.25	11046.53
18	450	89.55	877.59	644.46	135.32	1326.18	978.80	207.14	2031.38	14692.95
20	500	116.10	1137.78	839.75	189.00	1852.20	1367.04	269.89	2646.73	19143.74
24	600	200.70	1966.86	1451.66	295.60	2896.84	2138.04	446.80	4381.56	31691.74

Cv-value

Concentric Butterfly Valve

SIZE		DISC OPENING															
inch	mm	20		30		40		50		60		70		80		90	
		Kv	Cv	Kv	Cv	Kv	Cv	Kv	Cv	Kv	Cv	Kv	Cv	Kv	Cv	Kv	Cv
2	50	10.0	11.6	15.1	17.5	23.5	27.3	38.4	44.6	62.1	72	100	116	154.3	179	184.5	214
2 1/2	65	16.9	19.6	25.5	29.6	39.7	46	64.7	75	105.2	122	169.8	197	260.3	302	312.1	362
3	80	25.6	29.7	38.6	44.8	60.3	70	98.3	114	158.6	184	256.9	298	394.8	458	472.4	548
4	100	39	45	60	70	94	109	153	178	249	289	402	466	616	715	738	856
5	125	63	73	94	109	147	171	240	278	387	449	628	728	964	1118	1153	1338
6	150	90	104	136	158	212	246	346	401	560	650	903	1048	1388	1610	1661	1927
8	200	160	186	241	280	377	437	615	713	996	1155	1606	1863	2467	2862	2953	3426
10	250	250	290	378	438	588	682	960	1114	1556	1805	2509	2911	3855	4472	4615	5353
12	300	360	418	543	630	847	983	1383	1604	2241	2599	3614	4192	4689	5439	6645	7708
14	350	491	569	740	858	1153	1338	1882	2183	3037	3523	4918	5705	7555	8764	9044	10491
16	400	641	743	966	1121	1506	1747	2459	2852	3983	4620	6424	7452	9868	11447	11813	13703
18	450	810	940	1222	1418	1906	2211	3111	3609	5041	5847	8130	9431	12490	14488	14951	17343
20	500	1001	1161	1509	1751	2353	2730	3841	4456	6223	7219	10038	11644	15419	17886	18458	21411
22	550	1211	1405	1827	2119	2847	3303	4647	5391	7501	8701	12146	14089	18657	21642	22334	25907
24	600	1441	1672	2174	2522	3389	3931	5531	6416	8961	10395	14454	16767	22203	25756	26579	30832

High Performance Butterfly Valve

SIZE		DISC OPENING															
inch	mm	10		20		30		40		50		60		70		80		90	
		Kv	Cv	Kv	Cv	Kv	Cv	Kv	Cv	Kv	Cv	Kv	Cv	Kv	Cv	Kv	Cv	Kv	Cv
2	50	1.7	2	9.5	11	12.9	15	27.6	32	41.4	48	50.9	59	56.0	65	61.2	71	71.6	83
2 1/2	65	3.4	4	11.2	13	18.1	21	29.3	34	45.7	53	69.0	80	95.7	111	120.7	140	131.9	153
3	80	6.0	7	15.5	18	30.2	35	50.0	58	77.6	90	118.1	137	155.2	180	203.4	236	225.0	261
4	100	12	14	30	35	54	63	95	110	145	168	191	222	254	295	341	395	397	460
5	125	19	22	50	58	91	105	151	175	227	263	345	400	461	535	569	660	647	750
6	150	28	32	95	110	155	180	241	280	353	410	500	580	690	800	875	1015	948	1100
8	200	50	58	138	160	250	290	379	440	603	700	858	995	1207	1400	1595	1850	1810	2100
10	250	73	85	198	230	379	440	578	670	905	1050	1293	1500	1879	2180	2457	2850	2802	3250
12	300	103	120	276	320	500	580	819	950	1293	1500	1897	2200	2629	3050	3466	4020	3879	4500
14	350	161	187	414	480	845	980	1155	1340	1983	2300	2543	2950	3724	4320	4397	5100	5216	6050
16	400	207	240	534	620	1138	1320	1569	1820	2491	2890	3586	4160	5198	6030	6991	8110	8190	9500
18	450	260	302	690	800	1345	1560	2060	2390	3259	3780	4603	5340	6681	7750	8603	9980	10328	11980
20	500	328	380	849	985	1722	1997	2505	2906	3966	4600	5626	6526	8326	9658	11276	13080	13879	16100
24	600	457	530	1207	1400	2310	2680	3569	4140	5759	6680	8293	9620	11121	12900	15862	18400	18819	21830

Elastomer seat table

Elastomer seat table

Elastomer seats have been chosen to satisfy every service need. Application suggested derive from recommendation given by the elastomers manufactures and are purely indicative. Since many factors influence corrosion and abrasion (type of fluid, concentration, temperature, turbulence, impurities etc.), the final choice is to be taken by the customer, based on characteristics and specific application.

COMMON NAME	Composition (Chemical Type)	General application	Temperature limit	Other limits	Availabiliyt
EPDM (EPT) (EPR)	Ethylene-Propylene Diene monomer	Water-steam Sea water Brine Esters Ketone Alkalis Caustic Soda	-35°C ~ +110°C -30°F ~ +230°F	Hydrocarbons- oils-fats	On stork for immediate delivery
BUNA-N (Nitrile) (NBR)	Nitrile Butadiene	Hydrocarbons Natural Gas Oils and fat Air Gasoline	-18°C ~ +100°C 0°F ~ +212°F	Solvents- Benzene-Xylo	On stock for Immediate delivery
Neoprene	Chloro Butadiene	Fats Oils Diluted mineral acids Alkalis	-18°C ~ +90°C 0°F ~ +194°F	Solvents- Benzene-Xylol	On stock in limited quantities
Hypalon	Chloro sulfonated Polyethylene	Mineral acids Organic acids Oxidising substances Fats	-18°C ~ +100°C 0°F ~ +212°F	Nitric acid- Steam Ketones	On stock in limited quantities
Viton	Fluorocarbon polyme	Acids Oils Hydrocarbons	-10°C ~ +160°C +14°F ~ +320°F	Steam-Freon 22 Solvents-Ketones- Esters-Alkalis	On stock in limited quantities
Natural rubber	Latex (vegetable)	Abrasive products	-35°C ~ +150° -22°F ~ +300°F	Steam Oils- Hydrocarbons	On stock in limited quantities
Silicone	Organic sillcone Polymer	Food & Beverage	-30°C ~ +150° -22°F ~ +300°F	Steam Solvents-Hydrocarbons	On stock in limited quantities
P T F E	-	Solvents Corrosive products Ketones	-50°C ~ +200°C	Fluid containing powders Alkakine Gaseaus Fluorme	On stock in limited quantities

Body materials and Working temperature

ANSI Class	150		300		600	
Temperature	Carbon steel	316SS	Carbon steel	316SS	Carbon steel	316SS
℃(°F)	MPa(psl)	MPa(psl)	MPa(psl)	MPa(psl)	MPa(psl)	MPa(psl)
-29(-20) to 38 (100)	2.0 (285)	1.9 (275)	5.2 (740)	5.0 (720)	10.4 (1480)	10.1 (1440)
100 (212)	1.8 (260)	1.7 (240)	4.7 (675)	4.3 (620)	9.5 (1350)	8.7 (1240)
150 (302)	1.6 (230)	1.5 (215)	4.6 (655)	3.9 (560)	9.2 (1315)	7.8 (1120)
200 (392)	1.4 (205)	1.4 (205)	4.4 (635)	3.6 (515)	8.9 (1270)	7.2 (1030)
260 (500)	1.2 (170)	1.2 (170)	4.2 (600)	3.3 (480)	8.4 (1200)	6.7 (955)
320 (608)	1.0 (140)	1.0 (140)	3.9 (560)	3.2 (450)	7.7 (1100)	6.3 (905)
340 (644)	0.87 (125)	0.87 (125)	3.7 (535)	3.1 (445)	7.5 (1075)	6.2 (890)
370 (698)	0.77 (110)	0.77 (110)	3.7 (535)	3.0 (430)	7.5 (1075)	6.1 (865)
400 (752)	0.66 (95)	0.66 (95)	3.5 (505)	3.0 (430)	7.1 (1010)	5.9 (845)
430 (806)	0.56 (80)	0.56 (80)	2.9 (415)	2.9 (415)	5.8 (830)	5.8 (830)
450 (842)	0.46 (65)	0.46 (65)	1.9 (275)	2.8 (405)	3.7 (535)	5.7 (810)
480 (896)	0.35 (50)	0.35 (50)	1.2 (170)	2.8 (395)	2.4 (345)	5.5 (790)
510 (950)	0.25 (35)	0.25 (35)	0.74 (105)	2.7 (385)	1.4 (205)	5.1 (775)
540 (1004)	0.14 (20)	0.14 (20)	0.35 (50)	2.6 (365)	0.74 (105)	5.1 (774)
570 (1058)	-	-	-	2.5 (360)	-	5.0 (720)
590 (1094)	-	-	-	2.3 (325)	-	4.5 (645)
620 (1148)	-	-	-	1.9 (275)	-	3.9 (560)
650 (1202)	-	-	-	1.4 (205)	-	2.9 (415)

Corrosion Data

This corrosion table is intended to give only a general indication of how various materials will react when in contact with certain fluids. The recommendations cannot be absolute because concentration, temperature, pressure and other conditions may alter the suitability of a particular material, There are also economic considerations that may influence material selection. Use this table as a guide only.

FLUID	MATERIAL											
	Carbon Steel	Cast Iron	304 Stainless Steel	316 Stainless Steel	Bronze	Monel	Hastelloy C	Titanium	Cobalt Base Alloy 6	416 Stainless Steel	440C Hard Stainless Steel	TEF/FEP
Acetaldehyde	A	A	A	A	A	A	A	-	-	A	A	A
Acetic Acid, Air Free	C	C	B	B	B	B	A	A	A	C	C	A
Acetic Acid, Aerated	C	C	A	A	A	A	A	A	A	C	C	A
Actic Acid Vapors	C	C	A	A	B	B	A	A	A	C	C	A
Acetone	A	A	A	A	A	A	A	A	A	A	A	A
Acetylene	A	A	A	A	-	A	A	-	A	A	A	A
Alcohols	A	A	A	A	A	A	A	A	A	A	A	A
Aluminum sulfate	C	C	A	A	B	B	A	A	-	C	C	A
Ammonia	A	A	A	A	C	A	A	A	A	A	A	A
Ammonium Chloride	C	C	B	B	B	B	A	A	B	C	C	A
Ammonium Nitrate	A	C	A	A	C	C	A	A	A	C	B	A
Ammonium Phosphate (Mono-Basic)	C	C	A	A	B	B	A	A	A	B	B	A
Ammonium Sulfate	C	C	B	A	B	A	A	A	A	C	C	A
Ammonium Sulfite	C	C	A	A	C	C	A	A	A	B	B	A
Aniline	C	C	A	A	C	B	A	A	A	C	C	A
Asphalt	A	A	A	A	A	A	A	-	A	A	A	A
Beer	B	B	A	A	B	A	A	A	A	B	B	A
Benzene (Benzol)	A	A	A	A	A	A	A	A	A	A	A	A
Benzoic Acid	C	C	A	A	A	A	A	A	-	A	A	A
Boric Acid	C	C	A	A	A	A	A	A	A	B	B	A
Butane	A	A	A	A	A	A	A	-	A	A	A	A
Calcium Chloride (Alkaline)	B	B	C	B	C	A	A	A	-	C	C	A
Calcium Hypochlorite	C	C	B	B	B	B	A	A	-	C	C	A
Carbolic Acid	B	B	A	A	A	A	A	A	A	-	-	A
Carbon Dioxide, Dry	A	A	A	A	A	A	A	A	A	A	A	A
Carbon Dioxide, Wet	C	C	A	A	B	A	A	A	A	A	A	A
Carbon Disulfide	A	A	A	A	C	B	A	A	A	B	B	A
Carbon Tetrachloride	B	B	B	B	A	A	A	A	-	C	A	A
Carbonic Acid	C	C	B	B	B	A	A	-	-	A	A	A
Chlorine Gas, Dry	A	A	B	B	B	A	A	C	B	C	C	A
Chlorine Gas, Wet	C	C	C	C	C	C	B	A	B	C	C	A
Chlorine, Liquid	C	C	C	C	B	C	A	C	B	C	C	A
Chromic Acid	C	C	C	B	C	A	A	A	B	C	C	A
Citric Acid	-	C	B	A	A	B	A	A	-	B	B	A
Coke Oven Gas	A	A	A	A	B	B	A	A	A	A	A	A
Copper Sulfate	C	C	B	B	B	C	A	A	-	A	A	A
Cottonseed Oil	A	A	A	A	A	A	A	A	A	A	A	A
Creosote	A	A	A	A	C	A	A	-	A	A	A	A
Ethane	A	A	A	A	A	A	A	A	A	A	A	A
Ether	B	B	A	A	A	A	A	A	A	A	A	A
Ethyl Chloride	C	C	A	A	A	A	A	A	A	B	B	A
Ethylene	A	A	A	A	A	A	A	A	A	A	A	A
Ethylene Glycol	A	A	A	A	A	A	-	-	A	A	A	A
Ferric Chloride	C	C	C	C	C	C	B	A	B	C	C	A
Formaldehyde	B	B	A	A	A	A	A	A	A	A	A	A
Formic Acid	-	C	B	B	A	A	A	C	B	C	C	A
Freon, Wet	B	B	B	A	A	A	A	A	A	-	-	A
Freon, Dry	B	B	A	A	A	A	A	A	A	-	-	A

● A - Excellent B - Good C - Fair Blank - Insufficient Data

(The data citation)

FLUID	MATERIAL											
	Carbon Steel	Cast Iron	304 Stainless Steel	316 Stainless Steel	Bronze	Monel	Hastelloy C	Titanium	Cobalt Base Alloy 6	416 Stainless Steel	440C Hard Stainless Steel	TEF/FEP
Furfural	A	A	A	A	A	A	A	A	A	B	B	A
Gasoline, Refined	A	A	A	A	A	A	A	A	A	A	A	A
Glucose	A	A	A	A	A	A	A	A	A	A	A	A
Hydrochloric Acid (Aerated)	C	C	C	C	C	C	B	C	B	C	C	A
Hydrochloric Acid (Air Free)	C	C	C	C	C	C	B	C	B	C	C	A
Hydrofluoric Acid (Aerated)	B	C	C	B	C	C	A	C	B	C	C	A
Hydrofluoric Acid (Air Free)	A	C	C	B	C	A	A	C	-	C	C	A
Hydrogen	A	A	A	A	A	A	A	A	A	A	A	A
Hydrogen Peroxide	-	A	A	A	C	A	B	A	-	B	B	A
Hydrogen Sulfide, Liquid	C	C	A	A	C	C	A	A	A	C	C	A
Magnesium Hydroxide	A	A	A	A	B	A	A	A	A	A	A	A
Mercury	A	A	A	A	C	B	A	A	A	A	A	A
Methanol	A	A	A	A	A	A	A	A	A	A	B	A
Methyl Ethyl Ketone	A	A	A	A	A	A	A	-	A	A	A	A
Milk	C	C	A	A	A	A	A	A	A	C	C	A
Natural Gas	A	A	A	A	A	A	A	A	A	A	A	A
Nitric Acid	C	C	A	B	C	C	B	A	C	C	C	A
Oleic Acid	C	C	A	A	B	A	A	A	A	A	A	A
Oxalic Acid	C	C	B	B	B	B	A	B	B	B	B	A
Oxygen	A	A	A	A	A	A	A	A	A	A	A	A
Petroleum Oils, Refined	A	A	A	A	A	A	A	A	A	A	A	A
Phosphoric Acid (Aerated)	C	C	A	A	C	C	A	B	A	C	C	A
Phosphoric Acid (Air Free)	C	C	A	A	C	B	A	B	A	C	C	A
Phosphoric Acid Vapors	C	C	B	B	C	C	-	B	C	C	C	A
Picric Acid	C	C	A	A	C	C	A	-	-	B	B	A
Potassium Chloride	B	B	A	A	B	B	A	A	-	C	C	A
Potassium Hydroxide	B	B	A	A	B	A	A	A	-	B	B	A
Propane	A	A	A	A	A	A	A	A	A	A	A	A
Rosin	B	B	A	A	A	A	A	-	A	A	A	A
Silver Nitrate	C	C	A	A	C	C	A	A	B	B	B	A
Sodium Acetate	A	A	B	A	A	A	A	A	A	A	A	A
Sodium Carbonate	A	A	A	A	A	A	A	A	A	B	B	A
Sodium Chloride	C	C	B	B	A	A	A	A	A	B	B	A
Sodium Chromate	A	A	A	A	A	A	A	A	A	A	A	A
Sodium Hydroxide	A	A	A	A	C	A	A	A	A	B	B	A
Sodium Hypochloride	C	C	C	C	C	C	A	A	-	C	C	A
Sodium Thiosulfate	C	C	A	A	C	C	A	A	-	B	B	A
Stannaus Chloride	B	B	C	A	C	B	A	A	-	C	C	A
Stearic Acid	A	C	A	A	B	B	A	A	B	B	B	A
Sulfate Liquor (Black)	A	A	A	A	C	A	A	A	A	-	-	A
Sulfur	A	A	A	A	C	A	A	A	A	A	A	A
Sulfur Dioxide Dry	A	A	A	A	A	A	A	A	A	B	B	A
Sulfur Trioxide Dry	A	A	A	A	A	A	A	A	A	B	B	A
Sulfuric Acid (Aerated)	C	C	C	C	C	C	A	B	B	C	C	A
Sulfuric Acid (Air Free)	C	C	C	C	B	B	A	B	B	C	C	A
Sulfurous Acid	C	C	B	B	B	C	A	A	B	C	C	A
Tar	A	A	A	A	A	A	A	A	A	A	A	A
Trichloroethylene	B	B	B	A	A	A	A	A	A	B	B	A
Turpentine	B	B	A	A	A	B	A	A	A	A	A	A
Vinegar	C	C	A	A	B	A	A	-	A	C	C	A
Water, Boiler Feed	B	C	A	A	C	A	A	A	A	B	A	A
Water, Distilled	A	A	A	A	A	A	A	A	A	B	B	A
Water, Sea	B	B	B	B	A	A	A	A	A	C	C	A
Whiskey and Wines	C	C	A	A	A	B	A	A	A	C	C	A
Zinc Chloride	C	C	C	C	C	C	A	A	B	C	C	A
Zinc Sulfate	C	C	A	A	B	A	A	A	A	B	B	A

KB Products

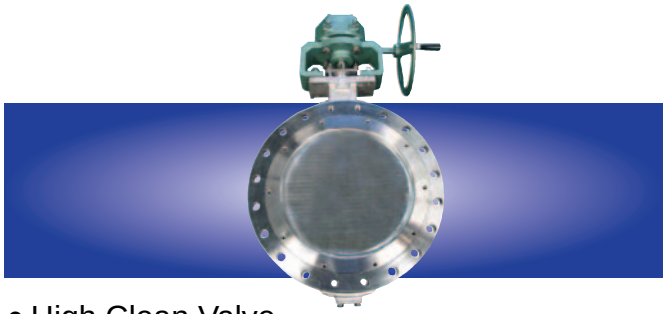
High Performance



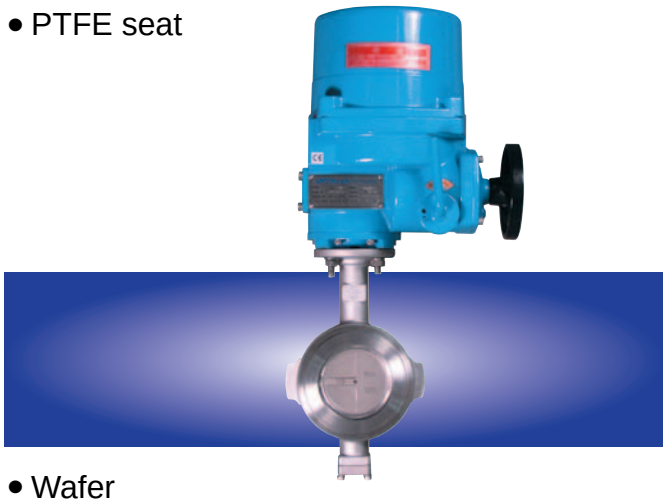
- Wafer
- Pneumatic actuator
- PTFE seat



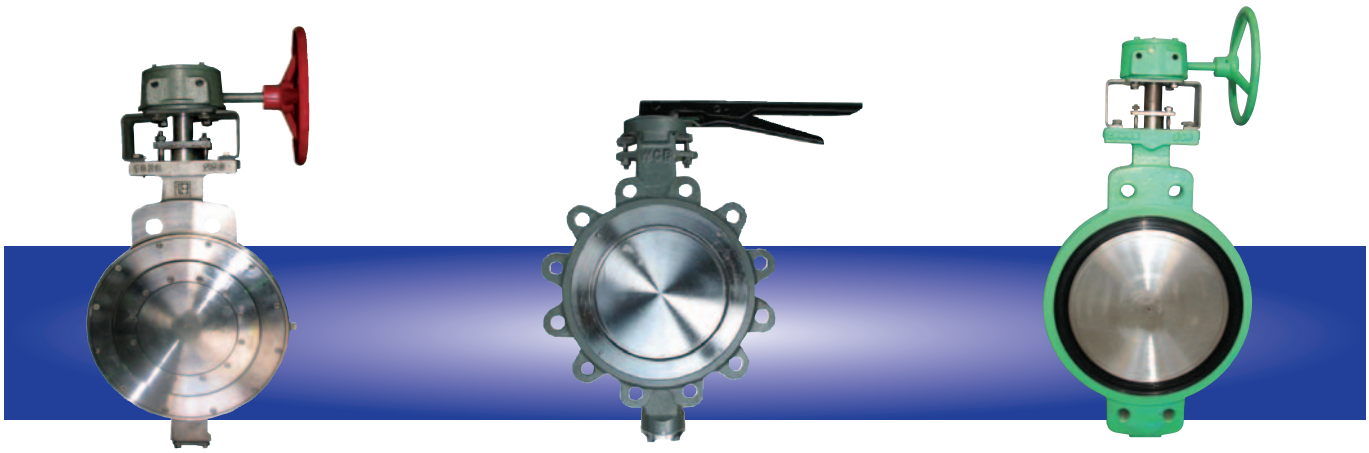
- Lug
- Pneumatic actuator
- PTFE seat



- High Clean Valve
- Flange
- Worm gear



- Wafer
- Electric actuator
- Metal seat



- Wafer
- Worm gear
- Metal seat

- Lug
- Lever handle
- PTFE seat

- Semi-Lug
- Worm gear
- Rubber seat

Concentric



- Wafer
- Worm gear
- Rubber seat

- Wafer
- Pneumatic actuator (Declutch type)
- Back up ring seat

- Wafer
- Lever handle
- Rubber seat

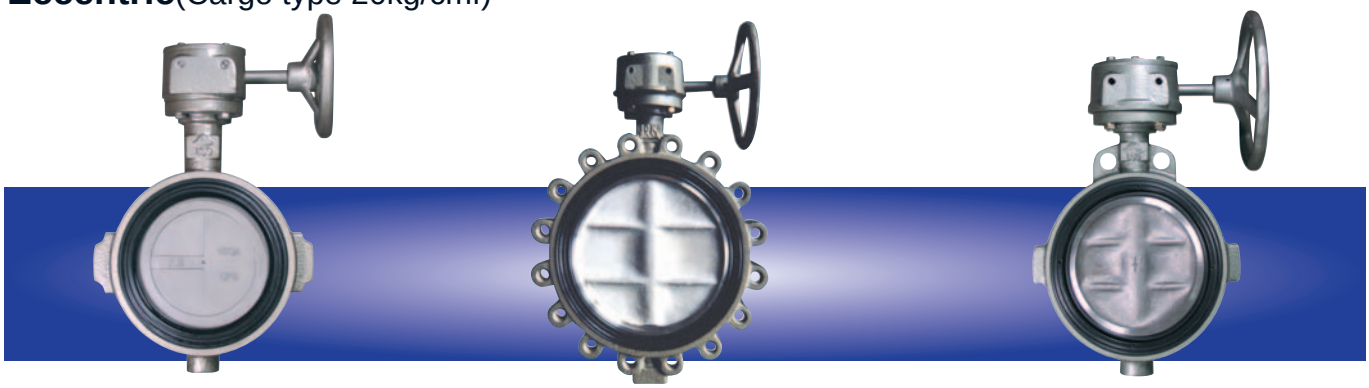


- Flange
- Worm gear
- Rubber Lined seat

- Wafer
- Lever handle
- PFA Lined seat

- Water works
- Flange
- Worm gear
- Rubber Lined seat

Eccentric(Cargo type 20kg/cmf)



- Wafer
- Worm gear
- Rubber seat(inner plate)

- Lug
- Worm gear
- Rubber seat(inner plate)

- Wafer
- Worm gear
- Rubber seat(inner plate)

Installation Procedures

1. Shipment & Storage

- The seat, disc, stem, and bushing of the butterfly valve should be coated with silicone lubricant in general.
- The disc should be positioned at 10° open.
- The faces of each valve should be covered with cardboard, plywood, plastic, etc. to prevent damage to the seat face, disc edge, or butterfly valve interior.
- Valves should be stored indoors with face protectors intact. Temperature should preferably be 4°C to 45°C
- When valves are stored for a long time, open and close the valves once every 3 months.

2. Installation considerations - Piping and Valve Orientation and Placement

- Piping and Flange Compatibilities - The butterfly valves have been designed to be suitable for all types of ANSI,JIS,BSI, DIN flanges, regardless of flat-faced, raised-face, slip-on, weld-neck, etc. (Type C stub- end flanges conform to no standard for the flange face and are not recommended for use with resilient-seated butterfly valves). These valves have been engineered so that the critical disc chord dimension at the full open position will clear the adjacent inside diameter of most types of piping, including Schedule 40, lined pipe, heavy wall, etc. If in question, one should compare the minimum pipe I.D. with the published disc cord dimension at full open.
- Valve Location and Orientation in Piping

・Valve Location - Butterfly valves should be installed if possible a minimum of 6 pipe diameters from other line elements, i.e. elbows, pumps, valves, etc. Of course, 6 pipe diameters is not always practical, but it is important to achieve as much distance as possible. Where the butterfly valve is connected to a check valve or pump, use an expansion joint between them to ensure the disc does not interfere with the adjacent equipment.

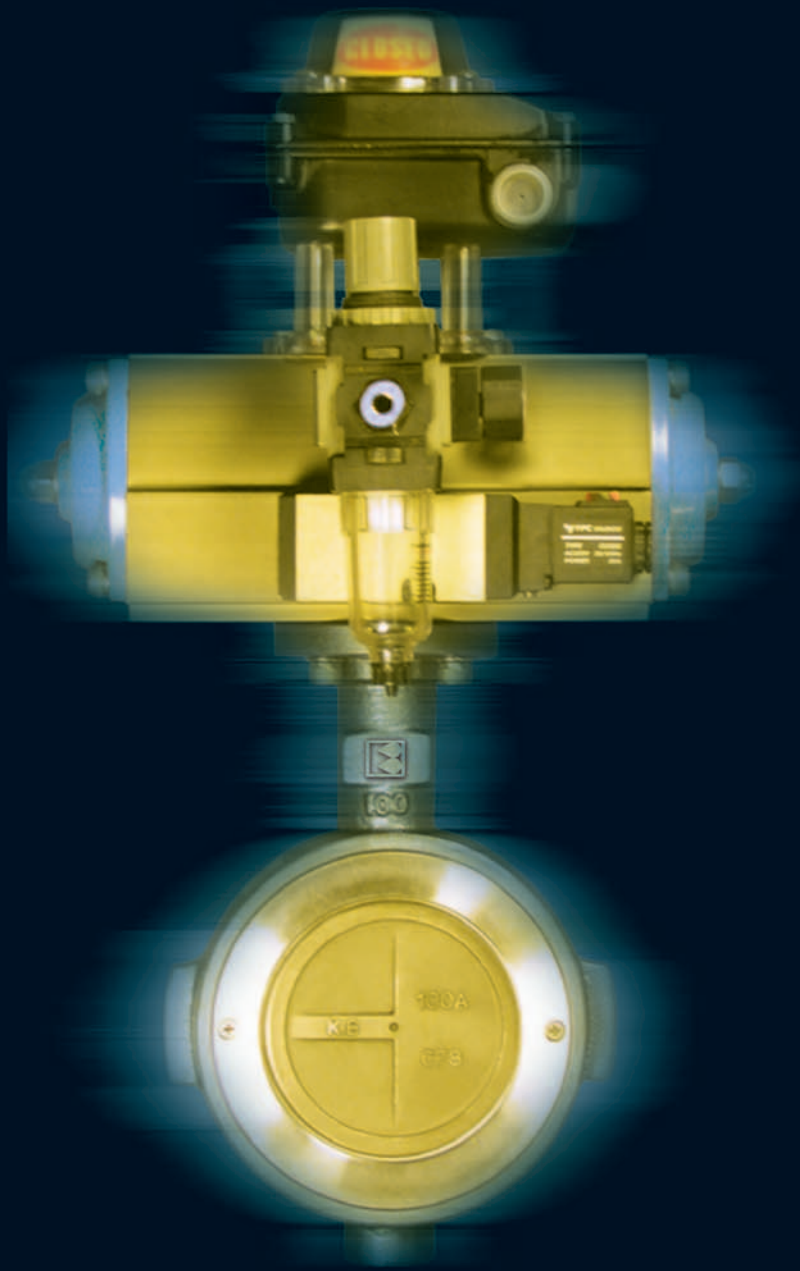
・Valve Orientation

・・In general. We recommend that the valve be installed with the stem in the vertical position and the actuator mounted vertically directly above the valve. However there are those applications as discussed below where the stem should be horizontal. The valve should not be installed upside down.

・・For slurries, sludge, mine tailings, pulp stock, dry cement, and any media with sediment or particles, recommends that the valve be installed with the stem in the horizontal position with the lower disc edge opening in the downstream direction.

・・For valve orientation located at downstream of pump, bend, etc; see the figures(A.B.C) for the installation orientation on the next page.

(The data citation)



3. Installation Procedure

• General Installation

· Make sure the pipeline and pipe flange faces are clean. Any foreign material such as pipe scale, metal chips, welding slag, welding rods, etc., can obstruct disc movement or damage the disc or seat.

· The elastomer seat had moulded o-rings on the face of the seat. As a result, no gaskets are required as these o-rings serve the function of a gasket.

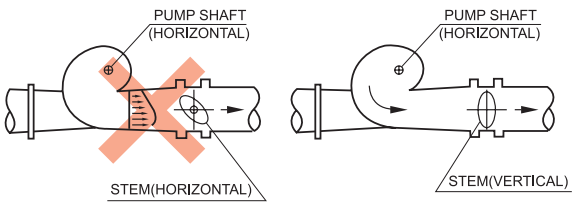
· Align the piping and then spread the pipe flanges a distance apart so as to permit the valve body to be easily dropped between the flanges without contacting the pipe flanges.

· Check to see that the valve disc had been positioned to a partially open position, with the disc edge about 10mm from the face of the seat (approximately 10° open).

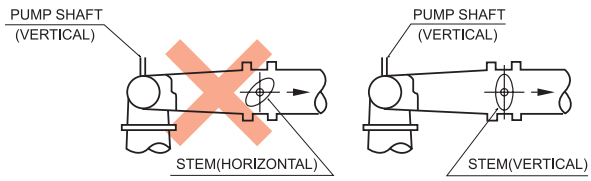
· Insert the valve between the flanges, taking care not to damage the seat faces. Always pick the valve up by the locating holes or by using a nylon sling on the neck of the body. Never pick up the valve by the actuator or operator mounted on top of the valve.

· Place the valve between the flanges, centre it, and then span the valve body with all flange bolts, but do not tighten the bolts. Carefully open the disc to the full open position, making sure the disc does not hit the adjacent pipe I.D. Now systematically remove jack bolts or other flange spreaders, and hand-tighten the flange bolts. Very slowly close the valve disc to ensure disc edge clearance from the adjacent pipe flange I.D. Now open the disc to full open and tighten all flange bolts per specification. Finally repeat a full close to full open rotation of the disc to ensure proper clearances.

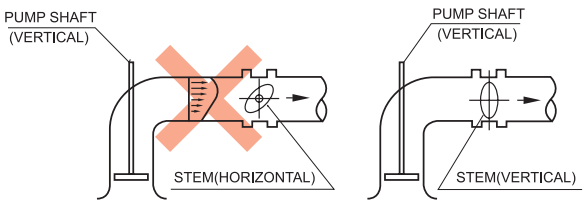
A. Butterfly valves located at the discharge of a pump should be orientated as follows:



i. For Centrifugal Pump-Pump shaft horizontal and stam vertical

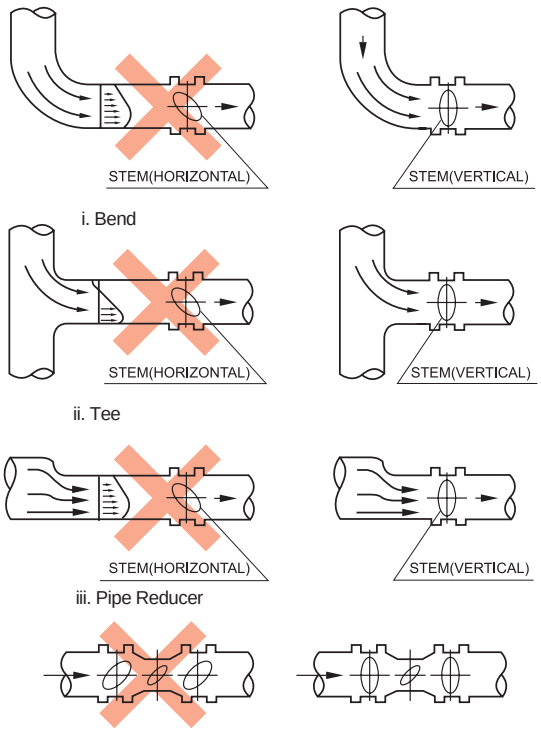


ii. Centifugal Pump-Pump shaft vertical & stem horizontal



iii. Axial Pump-Pump shaft vertical & stem

B. Butterfly valves located downstream of a bend or pipe reducer should be orientated as follows:



C. Butterfly valves in combination for control/isolation applications should be as up:

Installation with Flange Welding - When butterfly valves are to be installed between ANSI welding type flanges, care should be taken to abide by the following procedure to ensure no damage will occur to the seat:

- Place the valve between the flanges with the flange bores and valve body bore aligned properly. The disc should be in the 10" open position.
- Span the body with the bolts.
- Take this assembly of flange-body-flange and align it properly to the pipe.
- Take weld the flanges to the pipe.
- When tack welding is complete, remove the bolts and the valve from the pipe flanges and complete the welding of the flanges. Be sure to let the pipe and flanges cool before installing the valve. NOTE : Never complete the welding process (after tacking) with the valve between the pipe flanges. This causes severe seat damage due to heat transfer.

Figure 1-Insert Butterfly Valve Between Flanges

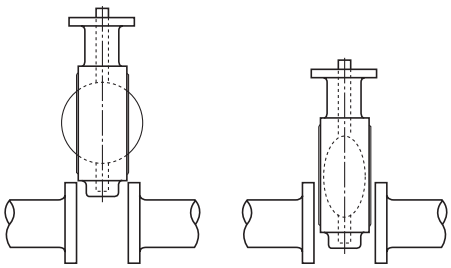


Figure 2-Recommended Bolt Tightening Sequence

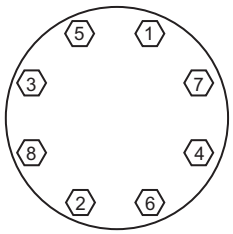
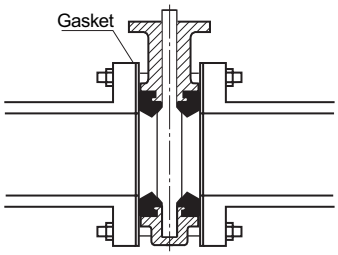
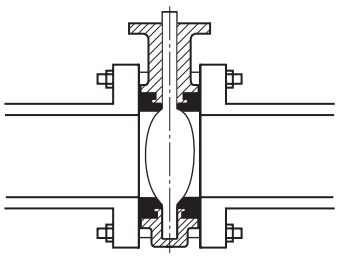


Figure 3-Initial centering & Flanging of Valve



WRONG

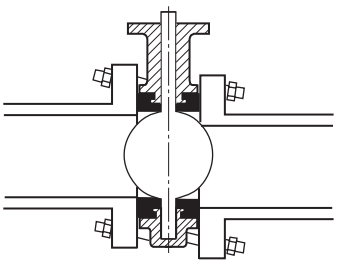
Disc in closed position: gaskets used: Results-Seat distorted and over-compressed causing high initial unseating torque problems



RIGHT

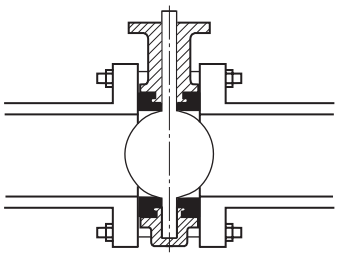
Bolts spanned, disc edge within body face-to-face. No disc edge damage, proper sealing allowed

Figure 4-Final Aligning of Flange bolts



WRONG

Piping misaligned Results-Disc O.D. strikes pipe I.D. causing disc edge damage. increased torque & leakage. Seat face o-ring seal improperly w/out engagement



RIGHT

Piping aligned properly when bolts tightened, disc in full open position; Results-disc clears adjacent pipe I.D., seat face seals properly, no excessive initial torque.

KB Product Code

Item	Size	Type		Class	Operator		body	disc	seat	shaft
1	2	2	3	- 4	4	5	- 6	7	8	9
H	0	2	F	- 1	5	G	- G	C	C	B

ex) High Clean Valve, A351 CF8M/A351 CF 8M/PTFE/A276 316, Flanged, Class 150, Size 2" Gear

1	Item		
	P - High Performance		
	C - Concentric	**W** - Water works	
	E - Eccentric	**R** - Rubber Lined	
	H - High Clean		

2	Size		
	15 - 1.5"	**08** - 8"	**22** - 22"
	02 - 2"	**10** - 10"	**24** - 24"
	25 - 2.5"	**12** - 12"	**26** - 26"
	03 - 3"	**14** - 14"	**28** - 28"
	04 - 4"	**16** - 16"	**30** - 30"
	05 - 5"	**18** - 18"	**32** - 32"
	06 - 6"	**20** - 20"	**34** - 34"

3	Type	
	W - wafer	**F** - flange
	L - lug	**S** - semi lug

4	Class
	15 - 150lb
	30 - 300lb
	60 - 600lb

5	Operator	
	L - lever	**S** - single air actuating
	G - gear	**D** - double air actuating
	C - chain	**E** - electric actuating
	B - Bare	**X** - others

6	Body Material		
	A - B148 C954	**D** - A351 CF3M	**G** - A216 WCB
	B - A351 CF8	**E** - B584 C336	**H** - A536 Gr65-45-12
	C - A351 CF8M	**F** - A126 CL.B	**X** - others

7	Disc Material
	A - B148 C954
	B - A351 CF8
	C - A351 CF8M
	D - A351 CF3M
	X - others

8	Seat Material		
	A - NBR	**D** - R-PTFE	**G** - VITON
	B - EPDM	**E** - 304SS	**H** - Stellite 6
	C - PTFE	**F** - 316SS	**I** - Inconel
	X - others		

9	Shaft Material	
	A - A276 304	**F** - A564 630
	B - A276 316	**G** - A276 410
	C - Inconel 625	**X** - others
	D - Monel K500	
	E - A276 316L	

KB Valve
HIGH TECHNOLOGY

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