



SamWoo Valve Product Guidebook



Main Product

- ▶ Concentric Type Butterfly Valve for General Purpose
- ▶ Double Eccentric High-performance Butterfly Valve
- ▶ Water work Butterfly Valve
- ▶ Triple Metal Seat Butterfly Valve
- ▶ Dual Plate Check Valve

Figure Number Abbreviations

A	B	C	D	E	F	G	H	I
Kind	Connection	Operation	Class	Material	Size			

AB - KIND

CL : Center Lined Butterfly Valve
 HP : High-Performance Butterfly Valve
 HT : High-Performance PTFE Seat Butterfly Valve
 HM : High-Performance Metal Seat Butterfly Valve
 HF : High-Performance Fire Safe Butterfly Valve
 TR : Triple Eccentric Metal Seat Butterfly Valve
 WW : Water Works Butterfly Valve
 DC : Duo-Check Valve
 VA : Various Valve

C - Connection

W : Wafer F : Flanged
 S : Semi-Lug B : Butt Welding
 L : Lug S : Socket Type

D - Operation

L : Lever
 G : Gear
 C : Chain Wheel
 E : Electric Motor
 P : Pneumatic
 F : Free Stem
 H : H.Y.D Actuator
 O : Other

E F - Class

J5 : JIS 5K A1 : ANSI 150LB
 J0 : JIS 10K A3 : ANSI 300LB
 J6 : JIS 16K A6 : ANSI 600LB
 J2 : JIS 20K A9 : ANSI 900LB
 D6 : PN6 TD : AWWA C207 Class D
 D0 : PN10 TE : AWWA C207 Class E
 D6 : PN16
 D2 : PN25

G - Trim

M : Metal F : Fire Safe
 T : Teflon R : Rubber

H I - Size

2" : 50A	22" : 550A	52" : 1300A
2.5" : 65A	24" : 600A	54" : 1350A
3" : 80A	26" : 650A	56" : 1400A
4" : 100A	28" : 700A	60" : 1500A
5" : 125A	30" : 750A	64" : 1600A
6" : 150A	32" : 800A	66" : 1650A
8" : 200A	34" : 850A	72" : 1800A
10" : 250A	36" : 900A	80" : 2000A
12" : 300A	38" : 950A	84" : 2100A
14" : 350A	40" : 1000A	96" : 2400A
16" : 400A	42" : 1050A	120" : 3000A
18" : 450A	44" : 1100A	140" : 3500A
20" : 500A	48" : 1200A	160" : 4000A



Greeting Message

The Samwoo Valve Co., Ltd.(SWV) was established in July 1997 in Korea as a manufacturer and a supplier specialized in valves.

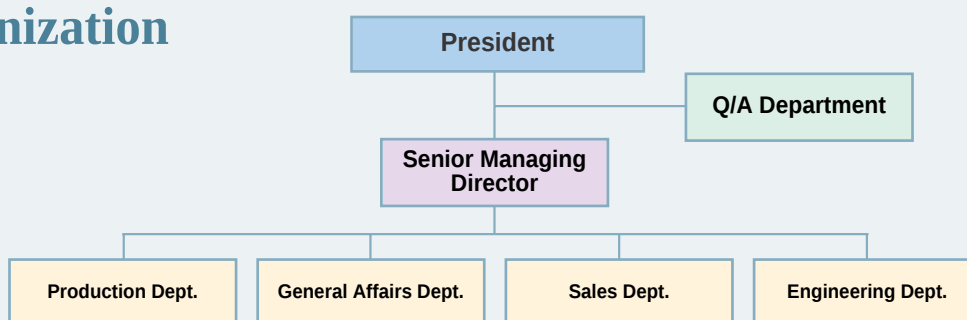
SWV has had major success with various construction projects and supply contracts and has become widely recognized for its expertise & service in providing a comprehensive range of products and services to satisfy Power plant, Cogeneration, Petro-Chemical, Refining, Marine, Steel and Gas plant, Dry powder, Air line, Sugar Industry, Food and beverage and etc.

We, SWV will provide products and services to meet our customer's requirements. We will commit our resources to comply with ISO 9001 & strive to continually improve our products, processes and Quality Managements System.

CEO President

LEE SANG IL

Organization



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SAMWOO VALVE PRODUCT LINE-UP

Best Technology!

With qualified engineer and advanced technology, We are realizing premier customer service.

SW-CL Series



▲ Concentric Wafer Lever Type
CLW-1S Series (Disc bolt type)



▲ Concentric Wafer Lever Type
CLW-2S Series (Double stem type)



▲ Concentric Wafer Gear Type
CLW- Series (Stainless steel)



▲ Concentric Wafer Lever Type
CTW Series (Full teflon seat type)



▲ Concentric Wafer Gear Type
CLW Series



▲ Concentric Lug Gear Type
CLL Series

SW-HP Series



▲ High-Performance Wafer gear Type
HRW-Rubber Seat Series MWH-Metal Seat Series
HTW-Teflon Seat Series FWH-Fire Safe Series



▲ High-Performance Lug gear Type
HRL-Rubber Seat Series MLH-Metal Seat Series
HTL-Teflon Seat Series FLH-Fire Safe Series



▲ High-Performance Flange gear Type
HRF-Rubber Seat Series MFH-Metal Seat Series
HTF-Teflon Seat Series FFH-Fire Safe Series

All kinds of butterfly valves conform to KS, JIS, ANSI, API, DIN, BS and ISO
Now we challenge the whole world market of butterfly valve



▲ Concentric Flange Gear Type
CLF- Series



▲ Concentric Wafer Type / CLWP- Series
(Pneumatic Operator type)



▲ Concentric Wafer Type / CLWM- Series
(Electric Motor Operator type)



▲ Concentric Lug Type / CLLM Series
(Electric Motor Operator type)



▲ Concentric Wafer Type / CLWGP Series
(Pneumatic with Declutch gear type)



▲ Concentric Wafer Type / CLWH Series
(Hydraulic Operator type)

SW-WW Series



▲ Waterwork Butterfly Valve
WWD Series

SW-DC Series



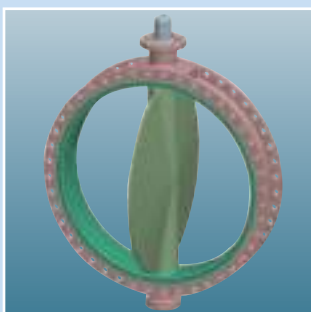
▲ Duo-Check Wafer Type
DCW Series



▲ Duo-Check Flange Type
DWF Series



Center Lined Butterfly Valve



100% Bi-directional tight shut off at full rated pressure.

Figure Number Abbreviation

- SW-CLW Center Lined Butterfly Valves - WAFER Type
- SW-CLS Center Lined Butterfly Valves - SEMI-LUG Type
- SW-CLL Center Lined Butterfly Valves - LUG Type
- SW-CLF Center Lined Butterfly Valves - FLANGE Type

Standard Compliance

SW Valve Center Lined Butterfly valves conform to ISO 5752, MSS SP67, JIS B 2032, JIS B 2064, API 609, BS5155, in general.

Production Range

- SIZE : DN 50 to DN 4000 (2 inch ~ 160 inch)
- Working Pressure : Up to 16bar
- Working Temperature : -20℃ ~ +160℃

Connection Flange

- ANSI B16.1 CL. 125LB & B16.5 CL. 150LB / MSS SP44 CL. 150LB /
- AS2129 Table D & E / BS4504 PN6, PN10 & PN16 /
- BS10 Table D & E / DIN2501 PN6, PN10 & PN16 /
- ISO 2531 PN6, PN10 & PN16 / KS/JIS 5K, 10K & 16K /
- SABS 1123 Table 1000/3 & Table 1600/3

Face to Face Dimensions

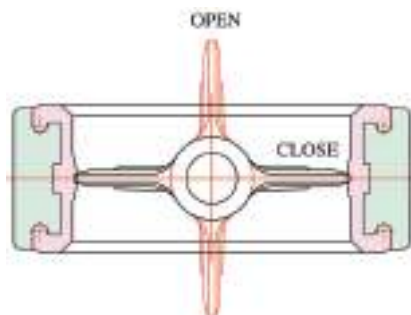
- Conform to BS5155, ISO 5752, MSS SP67, JIS B2032, and AP1609.

Application

- | | |
|------------------------------------|----------------------------|
| • Air conditioning | • Air line |
| • Water works | • Ballast and bilge system |
| • Chemical processing | • Power plants |
| • Desulination plants | • Desulphurisation plants |
| • Shipbuilding industry | • Drilling rigs |
| • Dry powder | • Food and beverage |
| • Gas plant | • Heating line |
| • Mining industry | • Paper industry |
| • Sand handling | • Sugar industry |
| • Thermo technical water treatment | |
| • Waste water | • Water and others |

Center Lined Butterfly Valve

Design Features



General Features

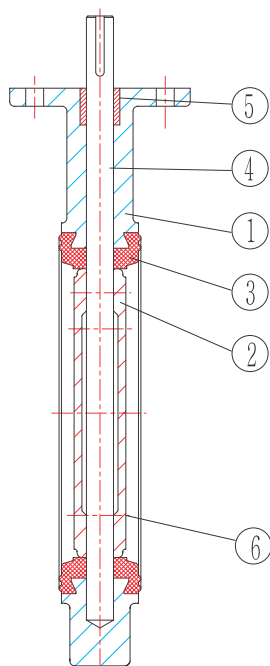
- 100% bi-directional tight shut off.
- Installation without restriction in direction of flow.
- Reduced weight and overall dimensions.
- Low pressure loss and reduced energy costs.
- High Kv/Cv values.
- Easy to clean and disinfect for portable water systems etc.
- Self cleaning (No residue will be trapped).
- Good resistance to corrosion.
- High reliability

No screw between disc and shaft

The disc and shaft connection features all of the benefits of a high strength 2 piece design with the disadvantage associated with designs using taper pins or disc screws which often fail through abrasion, corrosion or fatigue.

The disc edge is spherically machined and hand polished to produce a bubble-tight shut off minimum torque and longer seat life.

28" (DN700) & above size of disc & stem will connect by "taper pin"



No gasket required

O-rings or gaskets are not required when installation.

Low torque

SW Valve discs are spherical machined and polished. Every part of sealing surface is spherical.

These fit together with a smooth and low torque when close and open. The raised center seat has the cosine-curve structure.

Perfect Sealing

Seat and disc is sealed as flat surface matched both top and bottom shaft point.

This unique sealing gives perfect tight at low torque and smooth touch. And gasket with 3 molded O-rings gives self-adjusting and positive sealing in both directions.

Top Flange

Top Flange dimensions are in accordance with ISO5211 and it matches with any type of actuators.

Testing

SW Valve butterfly valves are confirmed to API 598 and BS5155. Body pressure test to be done 150% and shell to be 110% of maximum working pressure.

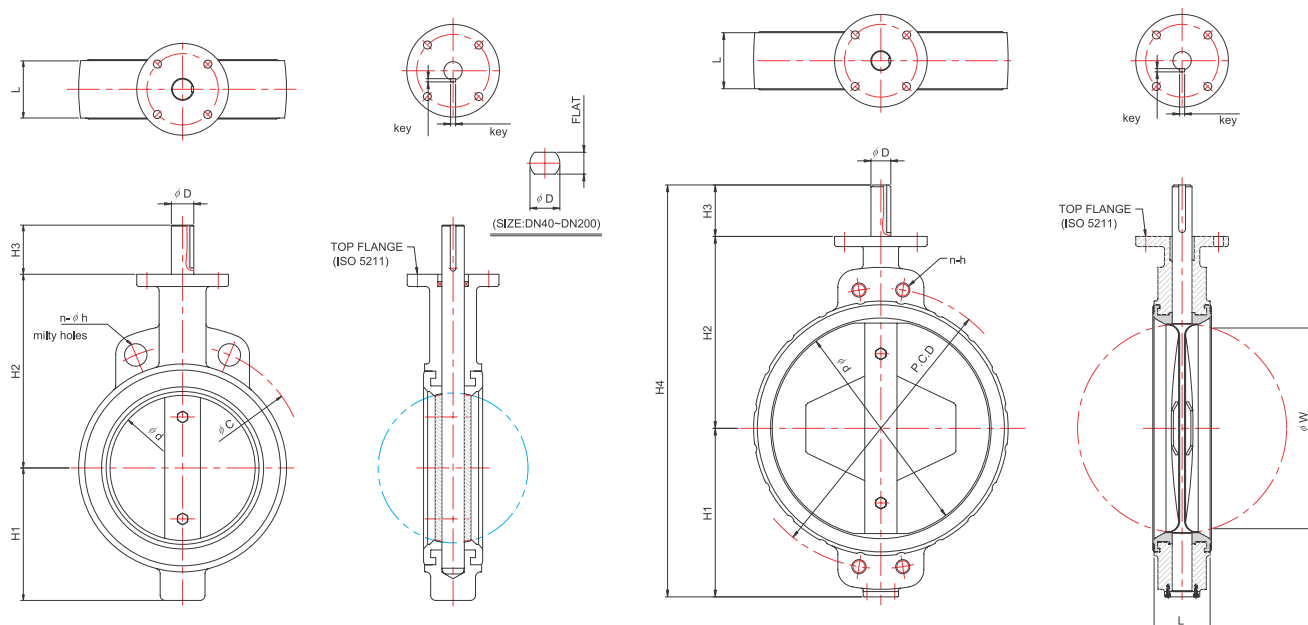
Operations

The following operation of the valves are possible, the choice is depending upon the valve location and the type of work and service for which the valve is used.

- Bare stem type valve only
- valve with 10 position lever operated
- valve with gear operated
- valve with electric actuator
- valve with pneumatic actuator
- valve with hydraulic actuator

P.NO.	PART NAME	MATERIAL
1	BODY	CAST IRON / DUCTILE IRON CARBON STEEL / SS304 / SS316 ALUMINUM / ALUMINUM BRONZE
2	DISC	DUCTILE IRON(+NICKEL PLATED) CARBON STEEL(+NICKEL PLATED) SS304 / SS316 / ALUMINUM BRONZE
3	SEAT	RUBBER (NBR / SILICON / EPDM / VITON / NEOPRENE)
4	STEM	STAINLESS STEEL (SS410 / SS304 / SS316 / SS630 / MONEL)
5	PACKING	NBR
6	DISC BOLT	STAINLESS STEEL

CLW Series Center Lined Butterfly Valve / Wafer Type Dimension



VALVE DIMENSIONS

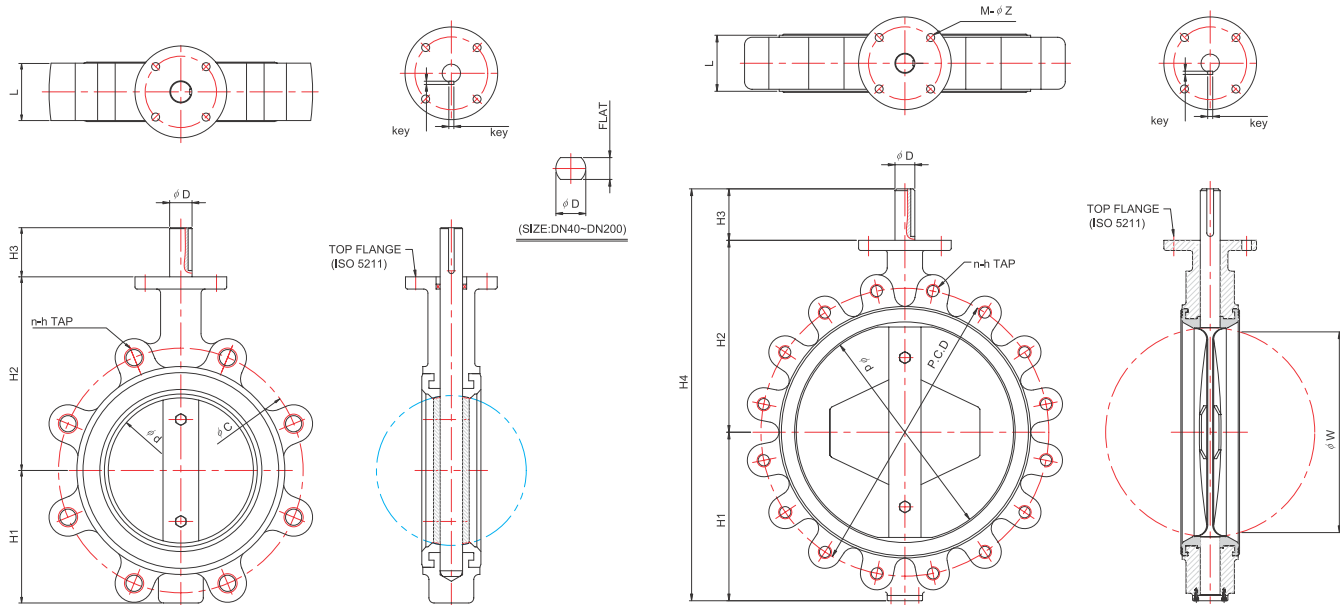
unit : mm

SIZE		ø d	L	H1	H2	H3	STEM		TOP FLANGE (ISO5211)	JIS 10K			ANSI 150LB			BS 4504 PN10			WEIGHT (APPROX) (kg)
inch	mm						D	key		ø C	n	h	ø C	n	h	ø C	n	h	
1.5"	40	40	40	54	120	33	14	FL'10	F 07	105	4	19	98.5	4	16	110	4	19	2.5
2"	50	52	43	68	130	33	14	FL'10	F 07	120	4	19	120.5	4	19	125	4	19	3.0
2.5"	65	64	46	77	138	33	14	FL'10	F 07	140	4	19	139.5	4	19	145	4	19	4.0
3"	80	76	46	84	157	33	16	FL'12	F 07	150	8	19	152.5	4	19	160	8	19	4.5
4"	100	101	52	105	170	33	16	FL'12	F 07	175	8	19	190.5	8	19	180	8	19	5.0
5"	125	126	56	120	186	33	19	FL'15	F 07	210	8	23	216.0	8	22	210	8	19	6.5
6"	150	149	56	135	200	33	19	FL'15	F 07	240	8	23	241.5	8	22	240	8	23	8.0
8"	200	196	60	183	237	33	22	FL'18	F 07	290	12	23	298.5	8	22	295	8	23	12.5
10"	250	244	68	223	286	50	22	8 X 7	F 10	355	12	25	362.0	12	25	350	12	23	19.5
12"	300	294	78	255	314	50	28	8 X 7	F 10	400	16	25	432.0	12	25	400	12	23	30.5
14"	350	333	78	280	340	50	28	8 X 7	F 10	445	16	25	476.0	12	29	460	16	23	55.0
16"	400	384	102	310	378	60	38	12 X 8	F14	510	16	27	539.5	16	29	515	16	28	70.0
18"	450	435	114	350	400	60	38	12 X 8	F14	565	20	27	578.0	16	32	565	20	28	95.0
20"	500	485	127	380	440	80	45	14 X 9	F 16	620	20	27	635.0	20	32	620	20	28	128.0
22"	550	534	142	396	485	80	55	14 X 9	F 16	680	20	M30	392.2	20	1 1/4	-	-	-	180.0
24"	600	573	154	448	510	80	55	14 X 9	F 16	730	24	M30	749.5	20	1 1/4	725	20	M27	222.0
26"	650	624	165	463	530	80	55	14 X 9	F 16	780	24	M30	806.5	24	1 1/4	-	-	-	265.0
28"	700	674	165	500	580	110	65	18X11	F16	840	24	M30	863.5	28	1 1/4	840	24	M27	295.0
30"	750	716	190	520	590	110	65	18X11	F 25	900	24	M30	914.5	28	1 1/4	-	-	-	350.0
32"	800	767	190	565	630	110	75	20X12	F 25	950	28	M30	978.0	28	1 1/2	950	24	M30	430.0
36"	900	860	203	670	700	150	90	22X14	F 25	1050	28	M30	1086.0	32	1 1/2	1050	28	M30	600.0
40"	1000	970	216	725	750	150	90	22X14	F 25	1160	28	M36	1200.0	36	1 1/2	1160	28	M33	720.0
44"	1100	1010	216	780	840	150	90	22X14	F 25	1270	28	M36	1314.5	40	1 1/2	-	-	-	805.0
48"	1200	1173	254	860	900	150	90	22X14	F 25	1380	32	M36	1422.4	44	1 1/2	1380	32	M36	860.0
52	1300	1272	280	920	970	180	120	32X18	F 30	-	-	-	1537	44	1 7/8	-	-	-	940.0
56	1400	1371	280	970	1010	180	120	32X18	F 30	-	-	-	-	-	-	1590	36	M39	1100.0
64	1600	1572	360	1120	1160	180	140	32X18	F 35	-	-	-	-	-	-	1820	40	M45	1450.0
72	1800	1740	360	1210	1270	200	170	40X22	F 40	-	-	-	2095.5	60	1 7/8	2020	44	M45	1850.0

Specification and design are subject to change without notice

CLL Series

Center Lined Butterfly Valve / Lug Type Dimension



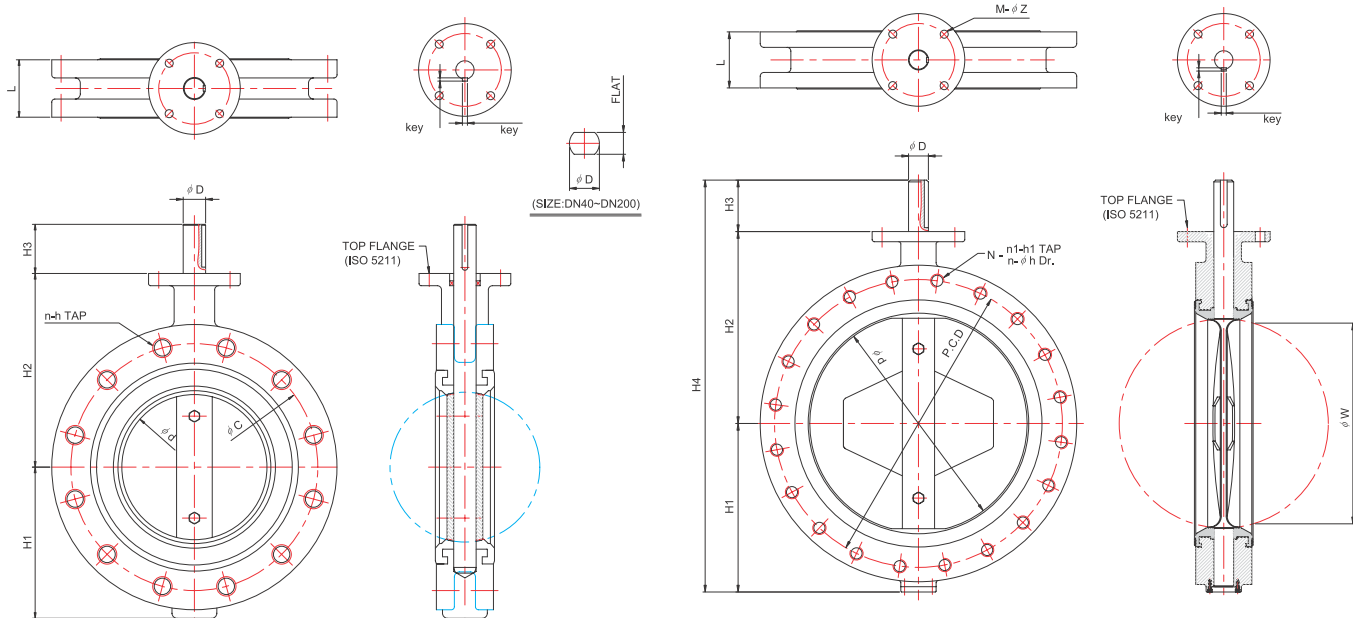
VALVE DIMENSIONS

unit : mm

SIZE		ø d	L	H1	H2	H3	STEM		TOP FLANGE (ISO5211)	JIS 10K			ANSI 150LB			BS 4504 PN10			WEIGHT (APPROX) (kg)
inch	mm						D	key		ø C	n	h	ø C	n	h	ø C	n	h	
1.5"	40	40	40	54	120	33	14	FL'10	F 07	105	4	M16	98.5	4	1 1/2	110	4	M16	3.0
2"	50	52	43	68	130	33	14	FL'10	F 07	120	4	M16	120.5	4	1 1/2	125	4	M16	3.5
2.5"	65	64	46	77	138	33	14	FL'10	F 07	140	4	M16	139.5	4	1 1/2	145	4	M16	4.7
3"	80	76	46	84	157	33	16	FL'12	F 07	150	8	M16	152.5	4	1 1/2	160	8	M16	5.5
4"	100	101	52	105	170	33	16	FL'12	F 07	175	8	M16	190.5	8	1 1/2	180	8	M16	7.5
5"	125	126	56	120	186	33	19	FL'15	F 07	210	8	M20	216.0	8	1 1/2	210	8	M16	9.5
6"	150	149	56	135	200	33	19	FL'15	F 07	240	8	M20	241.5	8	1 1/2	240	8	M20	12
8"	200	196	60	183	237	33	22	FL'18	F 07	290	12	M20	298.5	8	1 1/2	295	8	M20	16
10"	250	244	68	223	286	50	22	8 X 7	F 10	355	12	M22	362.0	12	1 1/2	350	12	M20	27
12"	300	294	78	255	314	50	28	8 X 7	F 10	400	16	M22	432.0	12	1 1/2	400	12	M20	44
14"	350	333	78	280	340	50	28	8 X 7	F 10	445	16	M22	476.0	12	1	460	16	M20	67
16"	400	384	102	310	378	60	38	12 X 8	F14	510	16	M24	539.5	16	1	515	16	M24	100
18"	450	435	114	350	400	60	38	12 X 8	F14	565	20	M24	578.0	16	1 1/8	565	20	M24	130
20"	500	485	127	380	440	80	45	14 X 9	F 16	620	20	M24	635.0	20	1 1/8	620	20	M24	162
22"	550	534	142	396	485	80	55	14 X 9	F 16	680	20	M30	392.2	20	1 1/4	-	-	-	185
24"	600	573	154	448	510	80	55	14 X 9	F 16	730	24	M30	749.5	20	1 1/4	725	20	M27	220
26"	650	624	165	463	530	80	55	14 X 9	F 16	780	24	M30	806.5	24	1 1/4	-	-	-	300
28"	700	674	165	500	580	110	65	18X11	F16	840	24	M30	863.5	28	1 1/4	840	24	M27	345
30"	750	716	190	520	590	110	65	18X11	F 25	900	24	M30	914.5	28	1 1/4	-	-	-	390
32"	800	767	190	565	630	110	75	20X12	F 25	950	28	M30	978.0	28	1 1/2	950	24	M30	480
36"	900	860	203	670	700	150	90	22X14	F 25	1050	28	M30	1086.0	32	1 1/2	1050	28	M30	630
40"	1000	970	216	725	750	150	90	22X14	F 25	1160	28	M36	1200.0	36	1 1/2	1160	28	M33	750
44"	1100	1010	216	780	840	150	90	22X14	F 25	1270	28	M36	1314.5	40	1 1/2	-	-	-	860
48"	1200	1173	254	860	900	150	90	22X14	F 25	1380	32	M36	1422.4	44	1 1/2	1380	32	M36	915
52	1300	1272	280	920	970	180	120	32X18	F 30	-	-	-	1537.0	44	1 7/8	-	-	-	1010
56	1400	1371	280	970	1010	180	120	32X18	F 30	-	-	-	-	-	-	1590	36	M39	1245
64	1600	1572	360	1120	1160	180	140	32X18	F 35	-	-	-	-	-	-	1820	40	M45	1550
72	1800	1740	360	1210	1270	200	170	40X22	F 40	-	-	-	2095.5	60	1 7/8	2020	44	M45	2100

Specification and design are subject to change without notice

CLF Series Center Lined Butterfly Valve / Flange Type Dimension



VALVE DIMENSIONS

unit : mm

SIZE		ø d	L	H1	H2	H3	STEM		TOP FLANGE (ISO5211)	JIS 10K			ANSI 150LB			BS 4504 PN10			WEIGHT (APPROX) (kg)
inch	mm						D	key		ø C	n	h	ø C	n	h	ø C	n	h	
1.5"	40	40	40	70	120	33	14	FL'10	F 07	105	4	M16	98.5	4	1/2	110	4	M16	4.0
2"	50	52	43	83	130	33	14	FL'10	F 07	120	4	M16	120.5	4	5/8	125	4	M16	5.5
2.5"	65	64	46	90	138	33	14	FL'10	F 07	140	4	M16	139.5	4	3/4	145	4	M16	8.0
3"	80	76	46	98	157	33	16	FL'12	F 07	150	8	M16	152.5	4	5/8	160	8	M16	10
4"	100	101	52	110	170	33	16	FL'12	F 10	175	8	M16	190.5	8	3/4	180	8	M16	13
5"	125	126	56	130	186	33	19	FL'15	F 10	210	8	M20	216.0	8	3/4	210	8	M16	16
6"	150	149	56	145	200	33	19	FL'15	F 10	240	8	M20	241.5	8	3/4	240	8	M20	18
8"	200	196	60	183	237	33	22	FL'18	F 10	290	12	M20	298.5	8	3/4	295	8	M20	31
10"	250	244	68	223	286	50	22	8 X 7	F 10	355	12	M22	362.0	12	7/8	350	12	M20	45
12"	300	294	78	255	314	50	28	8 X 7	F 10	400	16	M22	432.0	12	7/8	400	12	M20	58
14"	350	333	78	280	340	50	28	8 X 7	F 10	445	16	M22	476.0	12	1	460	16	M20	65
16"	400	384	102	310	378	60	38	12 X 8	F14	510	16	M24	539.5	16	1	515	16	M24	94
18"	450	435	114	350	400	60	38	12 X 8	F14	565	20	M24	578.0	16	1 1/8	565	20	M24	145
20"	500	485	127	380	440	80	45	14 X 9	F 16	620	20	M24	635.0	20	1 1/8	620	20	M24	160
22"	550	534	142	396	485	80	55	14 X 9	F 16	680	20	M30	392.2	20	1 1/4	-	-	-	185
24"	600	573	154	448	510	80	55	14 X 9	F 16	730	24	M30	749.5	20	1 1/4	725	20	M27	280
26"	650	624	165	463	530	80	55	14 X 9	F 16	780	24	M30	806.5	24	1 1/4	-	-	-	300
28"	700	674	165	500	580	110	65	18X11	F16	840	24	M30	863.5	28	1 1/4	840	24	M27	345
30"	750	716	190	520	590	110	65	18X11	F 25	900	24	M30	914.5	28	1 1/4	-	-	-	390
32"	800	767	190	565	630	110	75	20X12	F 25	950	28	M30	978.0	28	1 1/2	950	24	M30	480
36"	900	860	203	670	700	150	90	22X14	F 25	1050	28	M30	1086.0	32	1 1/2	1050	28	M30	630
40"	1000	970	216	725	750	150	90	22X14	F 25	1160	28	M36	1200.0	36	1 1/2	1160	28	M33	750
44"	1100	1010	216	780	840	150	90	22X14	F 25	1270	28	M36	1314.5	40	1 1/2	-	-	-	860
48"	1200	1173	254	860	900	150	90	22X14	F 25	1380	32	M36	1422.4	44	1 1/2	1380	32	M36	915
52	1300	1272	280	920	970	180	120	32X18	F 30	-	-	-	1537.0	44	1 7/8	-	-	-	1010
56	1400	1371	280	970	1010	180	120	32X18	F 30	-	-	-	-	-	-	1590	36	M39	1245
64	1600	1572	360	1120	1160	180	140	32X18	F 35	-	-	-	-	-	-	1820	40	M45	1550
72	1800	1740	360	1210	1270	200	170	40X22	F 40	-	-	-	2095.5	60	1 7/8	2020	44	M45	2100

Specification and design are subject to change without notice

Torques Required to Operate Center Lined Butterfly Valves

TORQUE TABLE

unit : kg.m/Nm/in-lb

Size		Working Pressure (bar)											
		3 bar			5 bar			10 bar			16 bar		
mm	inch	kg-m	Nm	in-lb	kg-m	Nm	in-lb	kg-m	Nm	in-lb	kg-m	Nm	in-lb
50A	2	1.2	11.7	104.0	1.5	14.7	130.1	1.8	17.6	156.1	2.3	22.5	199.5
65A	2 1/2	1.5	14.7	130.1	1.8	18.3	162.6	2.5	24.5	216.8	2.7	26.4	234.1
80A	3	2.5	24.5	216.8	3.1	30.6	271.0	3.0	29.4	260.2	3.5	34.3	303.5
100A	4	3.5	34.3	303.5	4.3	42.8	379.4	5.0	49.0	433.6	5.0	49.0	433.6
125A	5	5.0	49.0	433.6	6.2	61.2	542.1	6.5	63.7	563.7	8.0	78.4	693.9
150A	6	8.0	78.4	693.9	10.0	98.0	867.3	10.0	98.0	867.3	11.0	107.8	954.1
200A	8	14.0	137.2	1214.3	16.0	156.8	1387.8	18.0	176.4	1561.2	24.0	235.2	2081.7
250A	10	23.0	225.4	1994.9	22.0	215.6	1908.2	29.0	284.2	2515.3	36.0	352.8	3122.5
300A	12	31.0	303.8	2688.8	34.0	333.2	2949.0	53.0	519.4	4597.0	72.0	705.6	6245.0
350A	14	45.0	441.0	3903.1	50.0	490.0	4336.8	63.0	617.4	5464.4	115.0	1127.0	9974.8
400A	16	61.0	597.8	5290.9	70.0	686.0	6071.6	80.0	784.0	6938.9	144.0	1411.2	12490.1
450A	18	81.0	793.8	7025.7	92.0	901.6	7979.8	117.0	1146.6	10148.2	190.0	1862.0	16480.1
500A	20	106.0	1038.8	9194.1	120.0	1176.0	10408.4	150.0	1470.0	13010.6	220.0	2156.0	19082.2
550A	22	130.0	1274.0	11275.8	162.5	1592.5	14094.8	181.0	1773.8	15699.4	295.0	2891.0	25587.5
600A	24	221.0	2165.8	19168.9	240.0	2352.0	20816.9	260.0	2548.0	22551.7	355.0	3479.0	30791.7
650A	26	182.0	1783.6	15786.2	245.0	2401.0	21250.6	288.0	2822.4	24980.3	345.6	3386.8	29976.4
700A	28	215.0	2107.0	18648.5	315.0	3087.0	27322.2	355.0	3479.0	30791.7	426.0	4174.8	36950.1
750A	30	255.0	2499.0	22118.0	342.0	3351.6	29664.1	390.0	3822.0	33827.5	468.0	4586.4	40593.0
800A	32	290.0	2842.0	25153.8	405.0	3969.0	35128.6	460.0	4508.0	39899.1	552.0	5409.6	47879.0
850A	34	325.0	3185.0	28189.6	495.0	4851.0	42934.9	538.0	5272.4	46664.6	645.6	6326.8	55997.6
900A	36	405.0	3969.0	35128.6	578.0	5664.4	50134.1	660.0	6468.0	57246.6	792.0	7761.6	68695.9
1000A	40	565.0	5537.0	49006.6	880.0	8624.0	76328.8	1050.0	10290.0	91074.2	1260.0	12348.0	109289.0
1200A	48	968	9486	83961	1210	11858	104952	1760	17248	152657	2110	21658	191689
1350A	54	1135	11123	98446	1400	13720	121432	2024	19835	175556	2211	21667	191776
1800A	72	1970	19306	170872	2260	22148	196026	2780	27244	241129	3813	37367	330729
3000A	120	10500	102900	910742	12367	121196	1072680	20850	204330	1808473	28630	280574	2483290
4000A	160	39800	390040	3452146	41500	406700	3599600	48850	478730	4237119	67300	659540	5837423

■ The operating speed of the actuator must be considered in order to avoid water hammer when the valve is closed in junction with Liquid.

■ The factors affect the torque required to operate Butterfly valves.

- Valve Diameter
- Shaft Diameter
- Bearing Friction Coefficient
- Type of Seat Material
- Shut off Pressure
- Velocity
- Shape of Disc
- System Head Characteristics
- Piping Arrangement

■ Actuator torques can be calculated using the following formulas.

$$T_a = T_b + T_s + T_h = 1.2T_b \pm T_d$$

$$T_s = C_s D^2$$

$$T_b = 4.17 D^2 d f P$$

$$T_d = C_t D^3 P$$

$$T_h = 3.06 D^4$$

$$V = C_f \sqrt{P} = \frac{Q}{0.785 D^2}$$

T_a : The required actuator torque(lb-ft)

T_s : Seating or unseating torque(lb-ft)

T_d : Dynamic torque(lb-ft)

T_h : Hydrostatic torque(lb-ft)

Q : Flow(cubic foot per second)

V : Velocity(feet per second)

D : Diameter of valve(feet)

d : Diameter of Shaft(inch)

P : Pressure drop across valve(psi)

C_s : Coefficient of Seating or unseating torque

C_t : Coefficient of dynamic torque

C_f : Coefficient of flow

f : Bearing friction coefficient

CL Series Basic Formulas for obtaining Cv-Value

Cv is in imperial units, the water flow in U.S. gallons per minute which passes through the valve giving a pressure drop of 1 PSI at a temperature of 68° F

In metric units the same coefficient is called Kv and correspond to the flow rate in m3/h passing through the valve giving a pressure drop of 1bar at a temperature of 20° C

The approximate corresponding formulas are :

$$Q = C_v \cdot \sqrt{\frac{\Delta P \cdot 62.4}{D}}$$

$$Q = C_v \cdot \sqrt{\frac{\Delta P \cdot 1000}{D}}$$

Where :

Q = valve flow rate in gpm (USGPM)

ΔP = pounds per square inch (psi)
pressure drop through the valve

62.4 = conversion factor for fluids
computed in relation to water

D = is pounds per cu.ft (pct) fluid density

Where :

Q = valve flow rate in m3/h

ΔP = pressure drop through the valve in bar

1000 = conversion factor for fluids
computed in relation to water

D = kg/m3 fluid density

The relation between Cv and Kv, expressed in the above mentioned unit of measure is as follows :

$C_v = 1.16 K_v$

Flow coefficient for Center Lined Butterfly Valves

VALVE SIZE		DISC OPENING															
		20°		30°		40°		50°		60°		70°		80°		90°	
inch	mm	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	100.0	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
26"	650	1691	1962	2552	2960	3978	4614	6491	7530	10476	12152	16964	19678	26058	30227	31193	36184
28"	700	1961	2275	2959	3432	4613	5351	7528	8733	12150	14094	19673	22821	30222	35057	36177	41965
30"	750	2252	2612	3397	3940	5295	6142	8642	10025	14002	16242	22584	26198	34693	40244	41530	48175
32"	800	2562	2972	3865	4483	6025	6989	9833	11406	15869	18408	25696	29807	39472	45788	47252	54812
34"	850	2892	3355	4363	5061	6802	7890	11100	12876	17915	20781	29009	33650	44561	51691	53343	61878
36"	900	3242	3761	4891	5674	7625	8845	9859	11436	20163	23389	32522	37725	49958	57951	59803	69371
38"	950	3613	4191	5450	6322	8496	9855	13866	16084	22378	25958	36235	42033	55663	64569	66632	77293
40"	1000	4003	4643	6039	7005	9414	10920	15364	17822	24796	28763	40150	46574	61676	71544	73831	85644
42"	1050	4413	5119	6658	7723	10497	12176	16939	19649	27337	31711	44266	51348	67997	78877	81398	94422
44"	1100	4843	5618	7307	8476	11391	13213	18591	21565	30003	34803	48582	56355	74628	86568	89335	103629
46"	1150	5294	6141	7986	9264	12449	14441	20319	23570	32792	38039	53098	61594	81566	94617	97641	113264
48"	1200	5761	6683	8696	10087	13556	15725	22124	25664	35706	41419	57816	67067	88814	103024	106316	123327
54"	1350	6006	6967	9061	10511	14126	16386	23055	26744	37208	43162	60250	69890	92552	107360	110792	128519
72"	1800	12540	14546	18918	21945	29491	34210	48133	55834	77682	90111	125786	145991	193224	214140	226106	262283
160"	4000	62770	72813	94695	109846	147620	171240	240929	279478	388834	451047	629617	730356	967177	1121926	1157784	1343030

Installation Instructions

Storage of Valves

Store the valve in dry, dark and cool conditions, preferably indoors with the actual valve temperature higher than the dew point. If outdoor storage is unavoidable, support the valves off the ground and protect the valves with a watertight cover. Do not remove the valve packaging or end port protection, until necessary for inspection or installation. Store the valve in the slightly open position to avoid deformation of the rubberlining.

Installation Instructions

General

Before shipment, the seat surface is lubricated with silicone grease. If it is considered not necessary for special usage, it can be removed with solvent. In case valves are for chlorine, oxygen hydrogen, valves should be cleaned and degreased perfectly. Valves can be installed in the pipeline in any position. Before installation of valves, the pipeline must be cleaned from dirt and welding residues. Otherwise seat may be damaged. Pipes must be free of tension. Wafer and lug type butterfly valves can be installed directly in between flanges without any gaskets.

Installation in line related to wafer butterfly valve (on the existing pipeline)

Verify the distance between two flanges to be equal to face to face valve dimension. In order to facilitate installation of the valve, allow a sufficient room with adequate tools in between two flanges. Insert the lower part of flanges at least two flange-bolts. Close valve disc partially so that disc edge is at least 10mm within the body. Insert valve in between two flanges. Valve will be held by the two flange-bolts previously fitted in the lower part of flanges. Insert the flange-bolts through centering lugs of valve. Insert the remaining flange-bolts aligning the valve with the flanges and tightening flange-bolts manually. Maintain the valve aligned, remove gradually flange spreaders and tighten bolts partially. Control open and close operation of valve to be easy and smooth. Open the valve completely and cross tighten the bolts to adequate torque.

Installation of lug type butterfly valves has the same procedure with wafer type except using cap screws instead of bolts and nuts.

Installation in line related to wafer butterfly valve (on the new pipeline)

Shut partially valve disc until disc profile is at least 10mm within the body. Align the two flanges with the valve body. Span the body with some flange-bolts and tighten the bolts partially. Finish tightening by uniform cross bolting. Use the flange-valve-flange unit for pipe centering. Tack-weld the flanges to the pipe. Remove the bolting and the valve from the flanges. Just perform tack-welding only when the valve is inserted, as high heat temperature can damage valve seat. Weld flanges to the pipe and wait until completely cooled down. Install the valve by applying the same instruction procedure as the installation instruction on the existing pipeline.



High-Performance Butterfly Valve



100% Bi-directional tight shut off at full rated pressure.

Figure Number Abbreviation

- SW-HRW High-performance Rubber seat Butterfly valves - WAFER type
- SW-HRL High-performance Rubber seat Butterfly valves - LUG type
- SW-HRF High-performance Rubber seat Butterfly valves - FLANGE type
- SW-HTW High-performance Teflon seat Butterfly valves - WAFER type
- SW-HTL High-performance Teflon seat Butterfly valves - LUG type
- SW-HTF High-performance Teflon seat Butterfly valves - FLANGE type
- SW-MWH High-performance Metal seat Butterfly valves - WAFER type
- SW-MLH High-performance Metal seat Butterfly valves - LUG type
- SW-MFH High-performance Metal seat Butterfly valves - FLANGE type
- SW-FWH High-performance Fire safe seat Butterfly valves - WAFER type
- SW-FLH High-performance Fire safe seat Butterfly valves - LUG type
- SW-FFH High-performance Fire safe seat Butterfly valves - FLANGE type

Standard Compliance

Conform to BS 5155, MSS SP 67 and API 609

Production Range

- SIZE : DN 50 to DN 2000 (2 inch ~ 80 inch)
- Working Pressure : upto 25 bar
- Working Temperature : -100°C ~ +450°C

Connection Flange

- BS4504 PN10, PN16, PN25 and PN40 / DIN2501 PN10, PN16, PN25 and PN40 /
- ANSI B16.5 CL. 150LB and 300LB / MSS SP44 CL. 150LB and 300LB /
- ISO 2531 PN10, PN16, PN25 and PN40 / KS/JIS 10K, 16K & 20K /

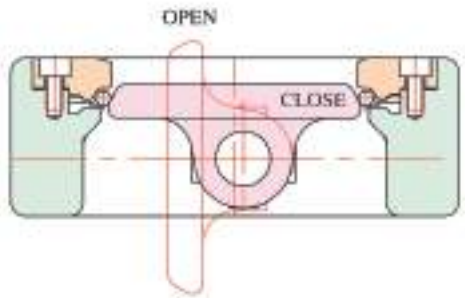
Face to Face Dimensions

- Conform to BS5155, ISO5752, MSS SP67 and API609

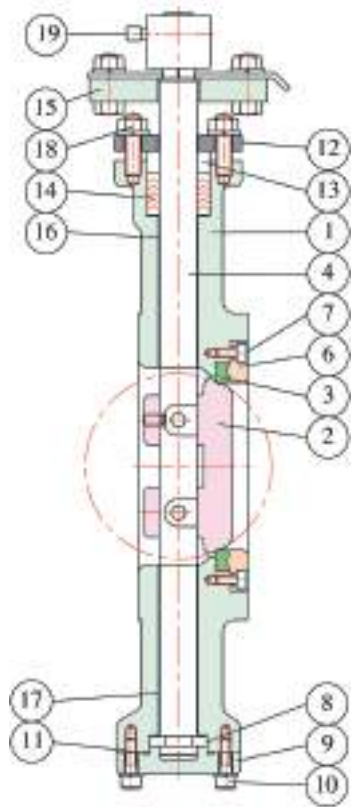
Application

- | | | |
|----------------------------|--------------------------------------|---------------------------------|
| • Crude Oil | • Chemical and Petro-Chemical Plants | |
| • Offshore Plant | • Ethylene | • LPG |
| • Petroleum Products | • Sea Water | • Steam |
| • Textile industry | • Water and Others | • Foundry |
| • Sugar refining | • Food Plants | • Marine tankers- Ship building |
| • Fire safer Piping system | | |

High-Performance Butterfly Valve

	Design Features
	• Bi-directional tight shut off. • Reduced weight and overall dimensions. • Low pressure loss and reduced energy costs. • High Kv / Cv values. • High reliability. • Easy to clean and disinfect for potable water systems etc. • Easy to handle, to install, and to dismantle. • Less space in storage and installation. • Insulation of noise and heat transfer.

P.NO.	PART NAME	MATERIAL
1	BODY	DUCTILE IRON, CAST STEEL, STAINLESS STEEL, AL-BRONZE, DUPLEX
2	DISC	CAST STEEL, STAINLESS STEEL, AL-BRONZE
3	SEAT	SS. STEEL, TEFLON, RUBBER
4	STEM	SS. STEEL (304, 316, 316L, 630, 17-4PH, Monel)
5	DISC PIN	STAINLESS STEEL
6	RETAINER	STAINLESS STEEL, DUCTILE IRON, MILD STEEL
7	RETAINER BOLT	STAINLESS STEEL
8	THRUST PLATE	BRONZE, STAINLESS STEEL
9	BOTTOM COVER	STAINLESS STEEL, AL-BRONZE
10	BOTTOM BOLT	STAINLESS STEEL
11	BOTTOM GASKET	TEFLON, GRAPHITE
12	PACKING GLAND	SS. STEEL
13	GLAND RING	BRASS, STAINLESS STEEL
14	PACKING	TEFLON, GRAPHITE, RUBBER
15	TOP FLANGE	SS. STEEL
16	STEM BEARING	METALOPLAST, STAINLESS STEEL
17	STEM BEARING	METALOPLAST, STAINLESS STEEL
18	BOLT & NUT	STAINLESS STEEL
19	LEVER	STEEL, DUCTILE IRON



The New Concert For Metal Seated Valve

- This product is of heavy load designed for high pressure flow application.
- Excellent durability of seats area and low operating torque by non-rubbing characteristic with triple offset construction.
- Achieved bi-directional zero leakage service by the action of resilient metal seal and torque seating.
- The seat rings both of body and disc are solid and real metal, can't be finished away as lamellar seat.

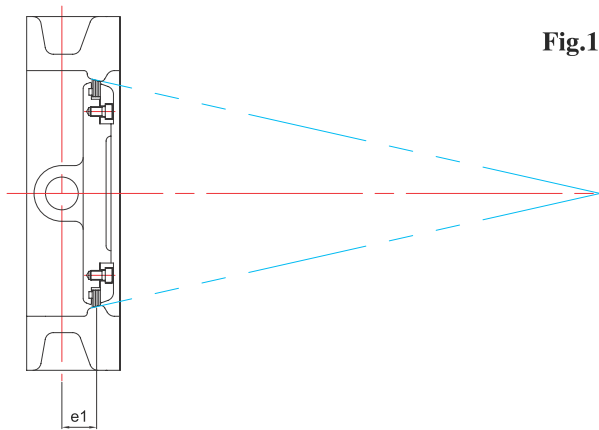


Fig.1

SINGLE OFFSET

The centre of rotation is moved back from the centreline of the valve disc. The seat and seal are designed conically and on centre. This design relies on a frictional, interference seal and so is applicable only to soft seated valves.

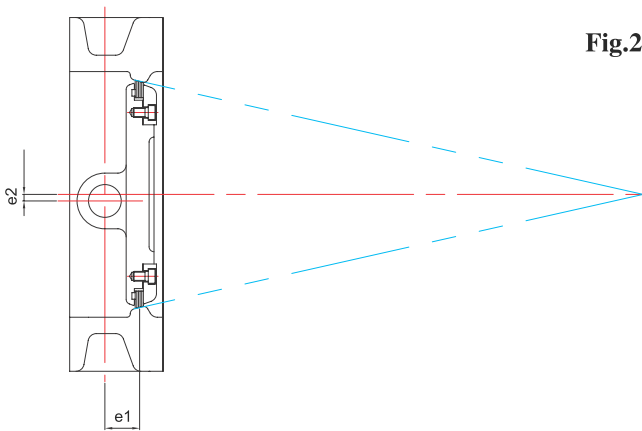


Fig.2

DOUBLE OFFSET

The centre of rotation is moved from the centerline of the valve body. The seat and seal design remains conical and on centre. This design again relies on a frictional, interference seal, but the length of rotation over which this friction occurs is reduced, allowing a larger range of process resistant seat materials to be used. However these materials must be relatively soft or highly elastic to prevent "jamming".

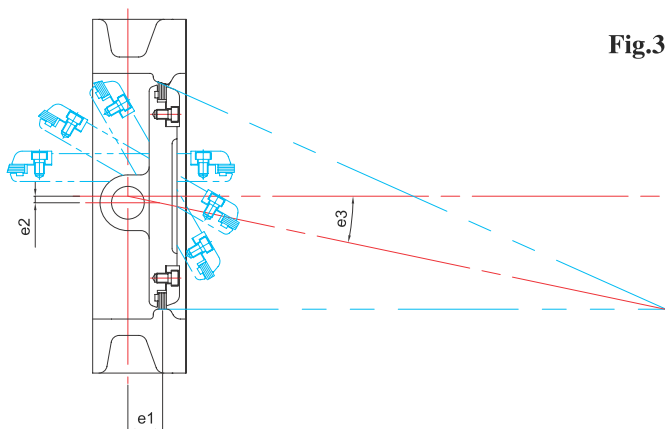


Fig.3

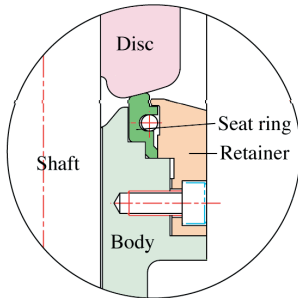
TRIPLE OFFSET

The centreline of the cone is rotated away from the valve centreline resulting in an ellipsoidal profile and providing the third offset. With this geometry, seat seal interference is completely eliminated ensuring long sealing life. The result is a torque seated, process pressure aided FRICTIONLESS seal. The geometry allows the body seat to be used as the closed limit stop, aiding operator adjustment. The Triple Offset design is ideally suited to metal seated valves providing bubble-tight performance on high temperature, high pressure and firesafe applications.

High-Performance Butterfly Valve

Design Features

Soft Seated (-45° C ~ +180° C)



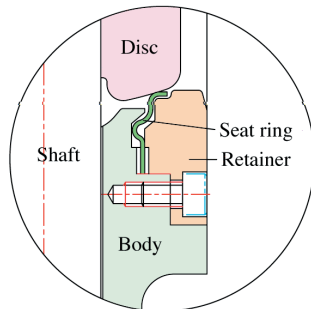
The RTFE seat ring is well-suited for extremely corrosive chemical solutions and high-temperature fluids of up to +210°C.

APPLICATIONS

Pharmaceuticals, water, jet fuel, Saturated steam, chlorine, ammonia, natural gas vacuum, oxygen, nitrogen, air-conditioning chilled, exhaust gas, town gas, hot water.

Abrasives, suspended solids, scaling mediums

Metal Seated (up to 450° C)

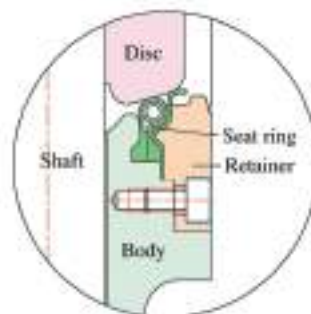


The metal seat ring allows control of extremely high-temperature fluids, thereby replacing conventional gate valves, and ball valves.

APPLICATIONS

High temperature, low temperature, abrasives, fly ash, slurries, steam, air, combustion gas, exhaust gas, nitrogen gas, sulfuric-acid gas.

Fire Seated (-45° C ~ +210° C)



PTFE-metal-seat system

- Bidirectional sealing and fire safe design.

Bidirectional

- The primary PTFE : seat ring will be replenished with a secondary metal back-up ring. This metal seat provides a mechanical load to energize the PTFE-seat. In combination with the line pressure a bidirectional sealing against the design pressure is obtained.

Fire safe design

- After a fire, when the PTFE-seat ring has burned away, the secondary metal seat gives bidirectional sealing. This sealing system meets the fire test requirement

APPLICATIONS

Fire-safe installations, abrasives, slurries, steam

Operations

The following operation of the valves are possible, the choice is depending upon the valve location and the type of work and service for which the valve is used.

- Bare stem type valve only
- valve with gear operated
- valve with pneumatic actuator
- valve with 10 position lever operated
- valve with electric actuator
- valve with hydraulic actuator

Triple Offset Butterfly Valve Metal to Metal Seat

The laminated metal seal consisted of stainless steel with intermediate material of graphite or ceramic fiber layers is used widely. The laminated seal is secured to the disc with a bolt-on stainless steel clamp ring, and easily accessible for replacement. The graphite laminated seal rack is suitable for temperatures between -40℃ and 650℃ in general.

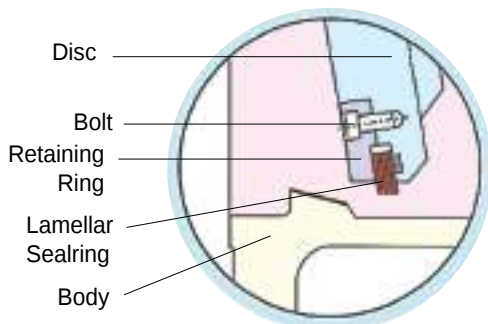
Features

- Zero leakage
- Metal Seated
- Bi-Directional
- Inherently Firesafe
- Low operating torques
- Torque sealed
- Continued sealing through thermal cycling
- Zero seat/seal friction
- Extended service life
- Excellent flow and throttling characteristics
- Excellent control of fugitive emissions
- Quarter turn operation

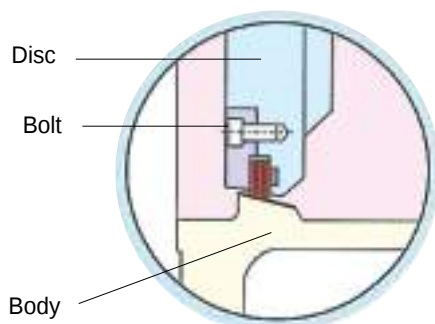
Design Standard Specifications

- Design : ASME / ANSI B16. 34, API 609, BS 5155, DIN 3840, JIS
- Fire safe : API 607, API 6FA, BS 6755
- Pressure Temperature ratings : ASME/ANSI B16.34
- Body & Seat Pressure Test : API Std. 598, API 6D, ISO 5208
- Seat leakage test : ANSI B16.104 class VI
- Flange drilling : ANSI B16.5, ANSI B16.47, MSS SP-44, DIN, JIS, BS
- Face to Face : ISO 5752, ANSI B16.10, API 609, BS 5155
- Marking : MSS SP-25

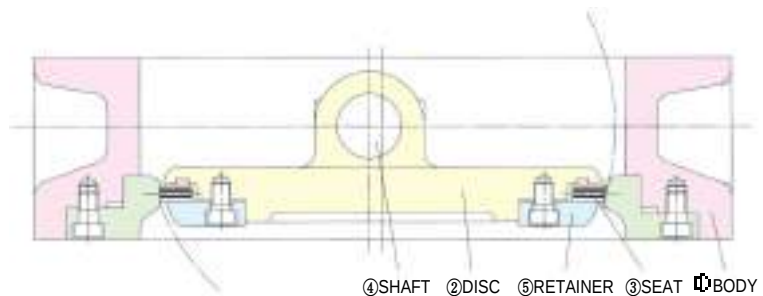
Design Features



OPEN



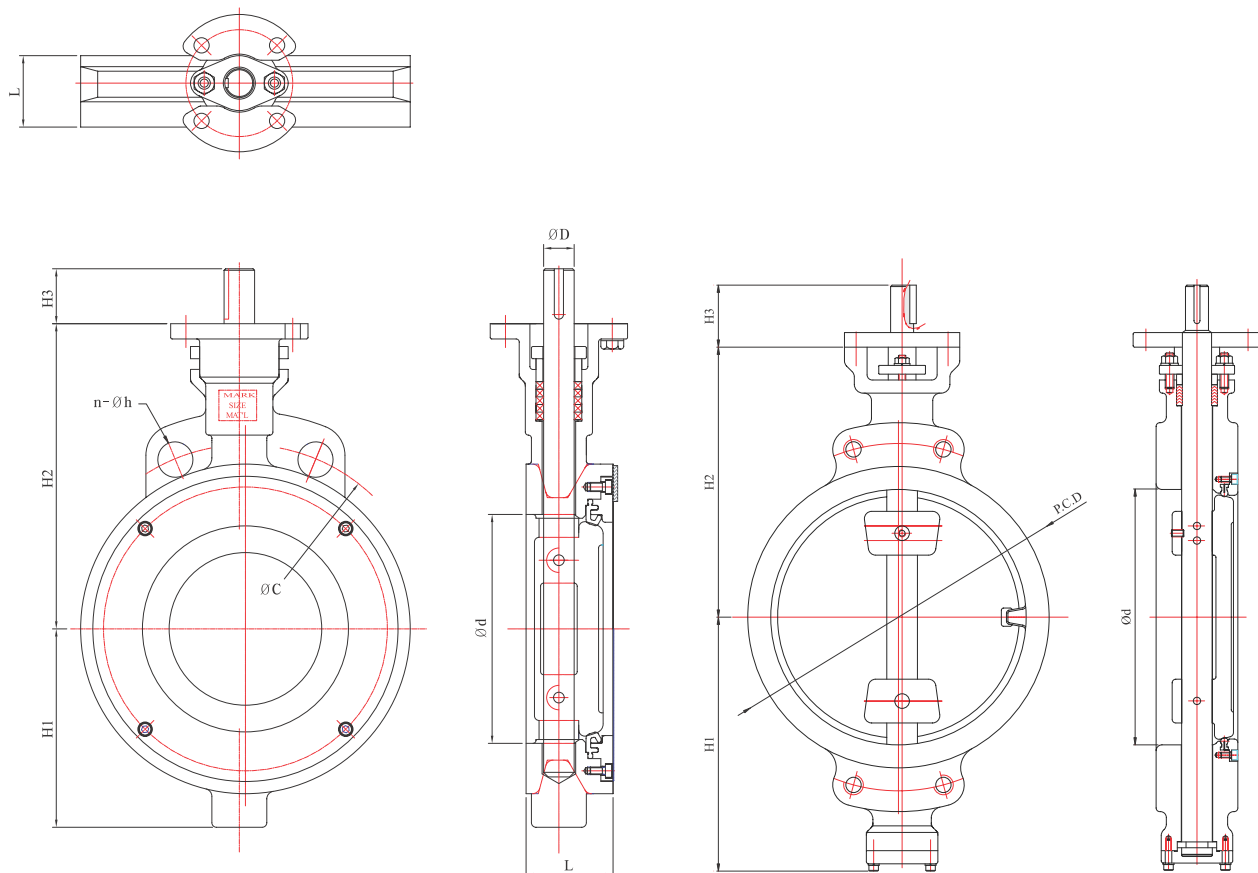
CLOSED



Construction and Material

P.NO.	PART NAME	MATERIAL
1	BODY	A216 WCB/A351 CF8M
2	DISC	A216 WCB/A351 CF8M
3	SEAT	LAMINATED STAINLESS STEEL+GRAPHITE
4	SHAFT	STAINLESS STEEL (316/630/420/410/ETC)
5	RETAINER	STAINLESS STEEL (304/316/316L)

HPW Series High-Performance Butterfly Valve / Wafer Type Dimension



VALVE DIMENSIONS

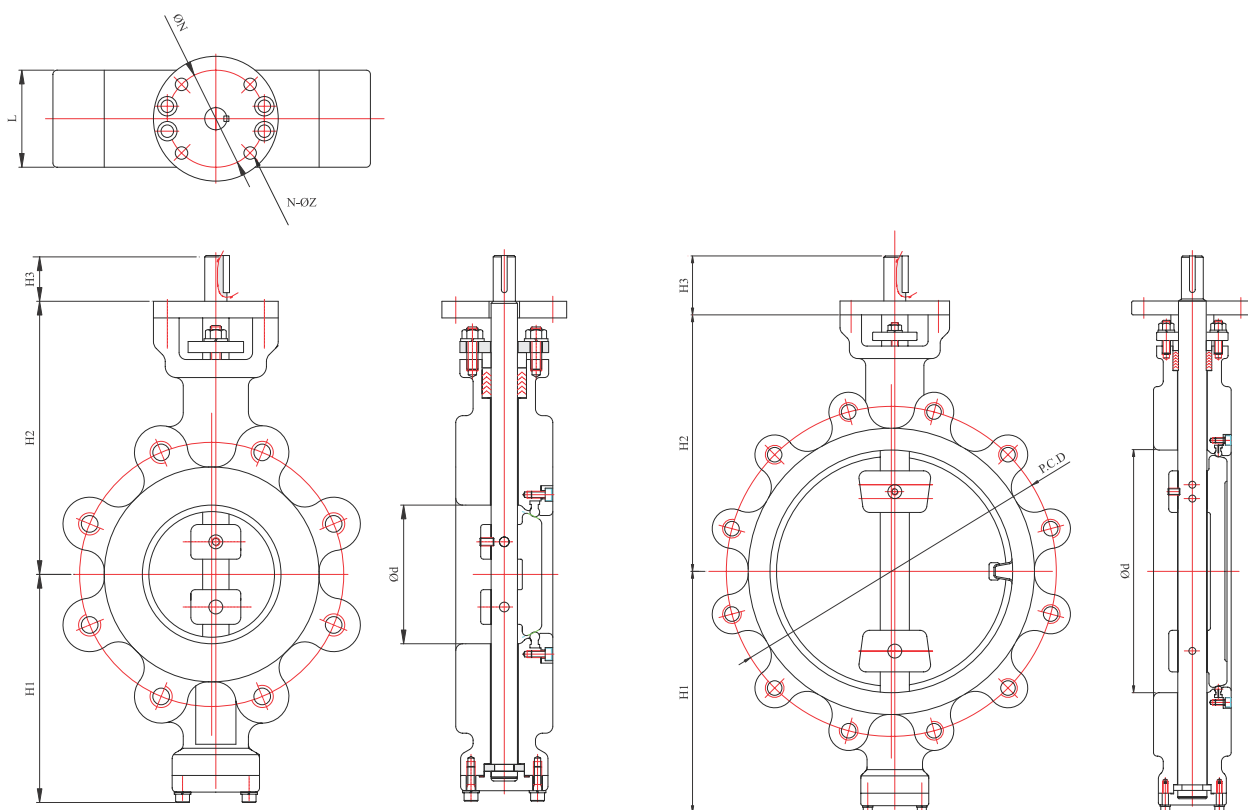
unit : mm

SIZE		Ø d	L	H1	H2	H3	Ø D	TOP FLANGE TYPE	JIS 10K			ANSI 150LB			BS 4504 PN 10			WEIGHT (APPROX.) (kg)
inch	mm								Ø C	n	h	Ø C	n	h	Ø C	n	h	
2"	50	50	43	60	180	35	16	F 07	120	4	19	120.5	4	19	125	4	19	4.5
2.5"	65	65	46	70	180	35	16	F 07	140	4	19	139.5	4	19	145	4	19	5.5
3"	80	80	48	75	185	35	19	F 07	150	8	19	152.5	4	19	160	8	19	9.0
4"	100	100	54	100	200	35	19	F 07	175	8	19	190.5	8	19	180	8	19	10.0
5"	125	125	57	110	215	35	20	F 07	210	8	23	216.0	8	22	210	8	19	13.0
6"	150	150	57	130	235	35	20	F 07	240	8	23	241.5	8	22	240	8	23	17.0
8"	200	200	64	150	255	50	25	F 10	290	12	23	298.5	8	22	295	8	23	26.0
10"	250	250	71	245	300	50	32	F 10	355	12	25	362.0	12	25	350	12	23	40.0
12"	300	300	81	285	320	50	32	F 10	400	16	M22	432.0	12	25	400	12	23	68.0
14"	350	350	92	342	440	80	42	F 14	445	16	M22	476.0	12	29	460	16	M20	93.0
16"	400	400	102	380	460	80	42	F 14	510	16	M24	539.5	16	1"	515	16	M24	121.0
18"	450	450	114	402	492	120	50	F 16	565	20	M24	578.0	16	1 1/8	565	20	M24	144.0
20"	500	500	127	432	552	120	50	F 16	620	20	M24	635.0	20	1 1/8	620	20	M24	160.0
22"	550	550	154	465	572	120	65	F 16	680	20	M30	392.2	20	1 1/4	-	-	-	228.0
24"	600	600	154	510	610	120	65	F 16	730	24	M30	749.5	20	1 1/4	725	20	M27	284.0
26"	650	650	165	540	630	120	65	F 16	780	24	M30	806.5	24	1 1/4	-	-	-	327.0
28"	700	700	165	570	665	120	65	F 25	840	24	M30	863.5	28	1 1/4	840	24	M27	388.0
30"	750	750	190	595	695	140	80	F 25	900	24	M30	914.5	28	1 1/4	-	-	-	462.0
32"	800	800	190	640	740	140	80	F 25	950	28	M30	978.0	28	1 1/2	950	24	M30	607.0
36"	900	900	203	705	800	140	90	F 25	1050	28	M30	1086.0	32	1 1/2	1050	28	M30	860.0
40"	1000	1000	216	675	865	140	90	F 25	1160	28	M36	1200.0	36	1 1/2	1160	28	M33	1180.0
44"	1100	1100	254	830	925	170	120	F 30	1270	28	M36	1314.5	40	1 1/2	-	-	-	1460.0
48"	1200	1200	254	890	990	170	120	F 30	1380	32	M36	1422.4	44	1 1/2	1380	32	M36	1800.0
56"	1400	1400	280	950	1160	180	140	F 30	-	-	-	1651	48	1 5/8	1590	36	M39	2045.0
64"	1600	1600	360	1100	1260	180	140	F 35	-	-	-	-	-	-	1820	40	M45	2570.0
72"	1800	1800	360	1200	1370	200	170	F 35	-	-	-	2095.5	60	1 5/8	2020	44	M45	2895.0
80"	2000	2000	400	1275	1450	220	170	F 40	-	-	-	2230	48	1 5/8	2230	48	M45	3120.0

Specification and design are subject to change without notice

HPL Series

High-Performance Butterfly Valve / Lug Type Dimension



VALVE DIMENSIONS

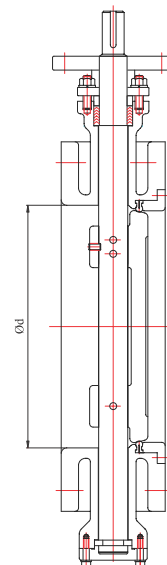
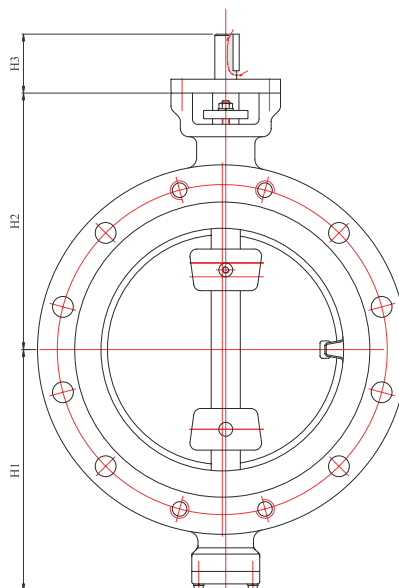
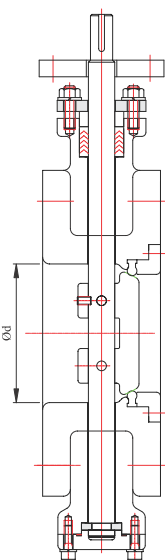
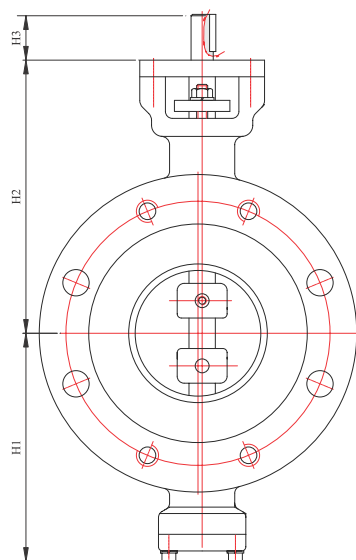
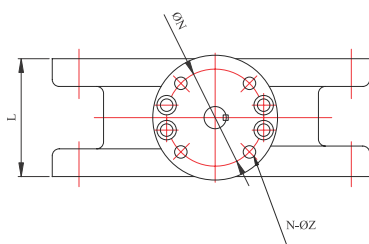
unit : mm

SIZE		Ø d	L	H1	H2	H3	Ø D	TOP FLANGE TYPE	JIS 10K			ANSI 150LB			BS 4504 PN10			WEIGHT (APPROX.) (kg)
inch	mm								ØC	n	h	ØC	n	h	ØC	n	h	
2"	50	50	43	115	182	45	16	F 07	120	4	19	120.5	4	19	125	4	M16	4.5
2.5"	65	65	46	130	200	45	16	F 07	140	4	19	139.5	4	19	145	4	M16	5.5
3"	80	80	48	140	215	45	19	F 07	150	8	19	152.5	4	19	160	8	M16	9.0
4"	100	100	54	160	232	45	19	F 07	175	8	19	190.5	8	19	180	8	M16	10.0
5"	125	125	57	185	245	45	20	F 07	210	8	23	216.0	8	22	210	8	M16	13.0
6"	150	150	57	190	260	45	20	F 07	240	8	23	241.5	8	22	240	8	M20	17.0
8"	200	200	64	220	292	65	25	F 10	290	12	23	298.5	8	22	295	8	M20	26.0
10"	250	250	71	270	353	65	32	F 10	355	12	25	362.0	12	25	350	12	M20	40.0
12"	300	300	81	300	372	65	32	F 10	400	16	M22	432.0	12	25	400	12	M20	68.0
14"	350	350	92	342	440	80	42	F 14	445	16	M22	476.0	12	29	460	16	M20	93.0
16"	400	400	102	380	460	80	42	F 14	510	16	M24	539.5	16	1"	515	16	M24	121.0
18"	450	450	114	402	492	120	50	F 16	565	20	M24	578.0	16	1 1/8	565	20	M24	144.0
20"	500	500	127	432	552	120	50	F 16	620	20	M24	635.0	20	1 1/8	620	20	M24	160.0
22"	550	550	154	465	572	120	65	F 16	680	20	M30	392.2	20	1 1/4	-	-	-	228.0
24"	600	600	154	510	610	120	65	F 16	730	24	M30	749.5	20	1 1/4	725	20	M27	284.0
26"	650	650	165	540	630	120	65	F 16	780	24	M30	806.5	24	1 1/4	-	-	-	327.0
28"	700	700	165	570	665	120	65	F 25	840	24	M30	863.5	28	1 1/4	840	24	M27	388.0
30"	750	750	190	595	695	140	80	F 25	900	24	M30	914.5	28	1 1/4	-	-	-	462.0
32"	800	800	190	640	740	140	80	F 25	950	28	M30	978.0	28	1 1/2	950	24	M30	607.0
36"	900	900	203	705	800	140	90	F 25	1050	28	M30	1086.0	32	1 1/2	1050	28	M30	860.0
40"	1000	1000	216	675	865	140	90	F 25	1160	28	M36	1200.0	36	1 1/2	1160	28	M33	1180.0
44"	1100	1100	254	830	925	170	120	F 30	1270	28	M36	1314.5	40	1 1/2	-	-	-	1460.0
48"	1200	1200	254	890	990	170	120	F 30	1380	32	M36	1422.4	44	1 1/2	1380	32	M36	1800.0
56"	1400	1400	280	950	1160	180	140	F 30	-	-	-	1651	48	1 5/8	1590	36	M39	2045.0
64"	1600	1600	360	1100	1260	180	140	F 35	-	-	-	-	-	-	1820	40	M45	2570.0
72"	1800	1800	360	1200	1370	200	170	F 35	-	-	-	2095.5	60	1 7/8	2020	44	M45	2895.0
80"	2000	2000	400	1275	1450	220	170	F 40	-	-	-	2230	48	1 7/8	2230	48	M45	3120.0

Specification and design are subject to change without notice

HPF Series

High-Performance Butterfly Valve / Flanged Type Dimension



VALVE DIMENSIONS

unit : mm

SIZE		Ø d	L	H1	H2	H3	Ø D	TOP FLANGE TYPE	JIS 10K			ANSI 150LB			BS 4504 PN10			WEIGHT (APPROX.) (kg)
inch	mm								Ø C	n	h	Ø C	n	h	Ø C	n	h	
2"	50	50	43	115	182	45	16	F 07	120	4	19	120.5	4	19	125	4	19	4.5
2.5"	65	65	46	130	200	45	16	F 07	140	4	19	139.5	4	19	145	4	19	5.5
3"	80	80	48	140	215	45	19	F 07	150	8	19	152.5	4	19	160	8	19	9.0
4"	100	100	54	160	232	45	19	F 07	175	8	19	190.5	8	19	180	8	19	10.0
5"	125	125	57	185	245	45	20	F 07	210	8	23	216.0	8	22	210	8	19	13.0
6"	150	150	57	190	260	45	20	F 07	240	8	23	241.5	8	22	240	8	23	17.0
8"	200	200	64	220	292	65	25	F 10	290	12	23	298.5	8	22	295	8	23	26.0
10"	250	250	71	270	353	65	32	F 10	355	12	25	362.0	12	25	350	12	23	40.0
12"	300	300	81	300	372	65	32	F 10	400	16	M22	432.0	12	25	400	12	23	68.0
14"	350	350	92	342	440	80	42	F 14	445	16	M22	476.0	12	29	460	16	M20	93.0
16"	400	400	102	380	460	80	42	F 14	510	16	M24	539.5	16	1"	515	16	M24	121.0
18"	450	450	114	402	492	120	50	F 16	565	20	M24	578.0	16	1 1/8	565	20	M24	144.0
20"	500	500	127	432	552	120	50	F 16	620	20	M24	635.0	20	1 1/2	620	20	M24	160.0
22"	550	550	154	465	572	120	65	F 16	680	20	M30	392.2	20	1 1/2	-	-	-	228.0
24"	600	600	154	510	610	120	65	F 16	730	24	M30	749.5	20	1 1/2	725	20	M27	284.0
26"	650	650	165	540	630	120	65	F 16	780	24	M30	806.5	24	1 1/2	-	-	-	327.0
28"	700	700	165	570	665	120	65	F 25	840	24	M30	863.5	28	1 1/2	840	24	M27	388.0
30"	750	750	190	595	695	140	80	F 25	900	24	M30	914.5	28	1 1/2	-	-	-	462.0
32"	800	800	190	640	740	140	80	F 25	950	28	M30	978.0	28	1 1/2	950	24	M30	607.0
36"	900	900	203	705	800	140	90	F 25	1050	28	M30	1086.0	32	1 1/2	1050	28	M30	860.0
40"	1000	1000	216	675	865	140	90	F 25	1160	28	M36	1200.0	36	1 1/2	1160	28	M33	1180.0
44"	1100	1100	254	830	925	170	120	F 30	1270	28	M36	1314.45	40	1 1/2	-	-	-	1460.0
48"	1200	1200	254	890	990	170	120	F 30	1380	32	M36	1422.4	44	1 1/2	1380	32	M36	1800.0
56"	1400	1400	280	950	1160	180	140	F 30	-	-	-	1651	48	1 7/8	1590	36	M39	2045.0
64"	1600	1600	360	1100	1260	180	140	F 35	-	-	-	-	-	-	1820	40	M45	2570.0
72"	1800	1800	360	1200	1370	200	170	F 35	-	-	-	2095.5	60	1 7/8	2020	44	M45	2895.0
80"	2000	2000	400	1275	1450	220	170	F 40	-	-	-	2230	48	1 7/8	2230	48	M45	3120.0

Specification and design are subject to change without notice

Torques Required to Operate High-Performance Butterfly Valves

TORQUE TABLE

unit : kg-m/Nm/ft-lb

mm	inch	Working Pressure								
		5 bar			10 bar			16 bar		
		kg-m	Nm	ft-lb	kg-m	Nm	ft-lb	kg-m	Nm	ft-lb
50	2"	0.95	9.31	6.87	1.16	11.32	8.39	1.80	17.65	127.68
65	2.5"	1.40	13.72	10.13	1.89	18.52	13.67	2.31	22.65	163.85
80	3"	2.05	20.09	14.83	2.86	27.99	20.69	4.03	39.52	285.85
100	4"	3.70	36.26	26.76	4.87	47.75	35.22	6.38	62.57	452.54
125	5"	6.50	63.70	47.01	7.98	78.20	57.72	10.50	102.97	744.78
150	6"	11.00	107.80	79.56	15.54	152.29	112.40	21.00	205.94	1489.55
200	8"	24.50	240.10	177.21	28.56	279.89	206.57	35.28	345.98	2502.45
250	10"	32.00	313.60	231.46	44.52	436.30	322.01	54.60	535.44	3872.84
300	12"	43.50	426.30	314.63	60.48	592.70	437.45	91.56	897.89	6494.45
350	14"	62.00	607.60	448.45	86.52	847.90	625.80	128.52	1260.35	9116.07
400	16"	83.00	813.40	600.34	115.92	1136.06	838.45	173.04	1696.94	12273.92
450	18"	99.50	975.10	716.07	150.36	1473.53	1087.55	230.16	2257.09	16325.50
500	20"	129.00	1264.20	933.06	210.00	2058.00	1518.93	299.88	2940.81	21270.82
600	24"	223.00	2185.40	1612.96	328.44	3218.71	2375.60	496.44	4868.40	35213.04
700	28"	335.00	3283.00	2423.05	483.84	4741.63	3499.61	733.32	7191.39	52015.20
800	32"	480.80	4711.84	3477.62	677.04	6634.99	4897.02	1030.68	10107.48	73107.28

- The operating speed of the actuator must be considered in order to avoid water hammer when the valve is closed in junction with Liquid.

- The factors affect the torque required to operate Butterfly valves.

- Valve Diameter
- Shaft Diameter
- Bearing Friction Coefficient
- Type of Seat Material
- Shut off Pressure
- Velocity
- Shape of Disc
- System Head Characteristics
- Piping Arrangement

- Actuator torques can be calculated using the following formulas.

$$T_a = T_b + T_s + T_h = 1.2T_b \pm T_d$$

$$T_s = C_s D^2$$

$$T_b = 4.17 D^2 d f P$$

$$T_d = C_t D^3 P$$

$$T_h = 3.06 D^4$$

$$V = C_f \sqrt{p} = \frac{Q}{0.785 D^2}$$

T_a : The required actuator torque(lb-ft)

T_s : Seating or unseating torque(lb-ft)

T_d : Dynamic torque(lb-ft)

T_h : Hydrostatic 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)

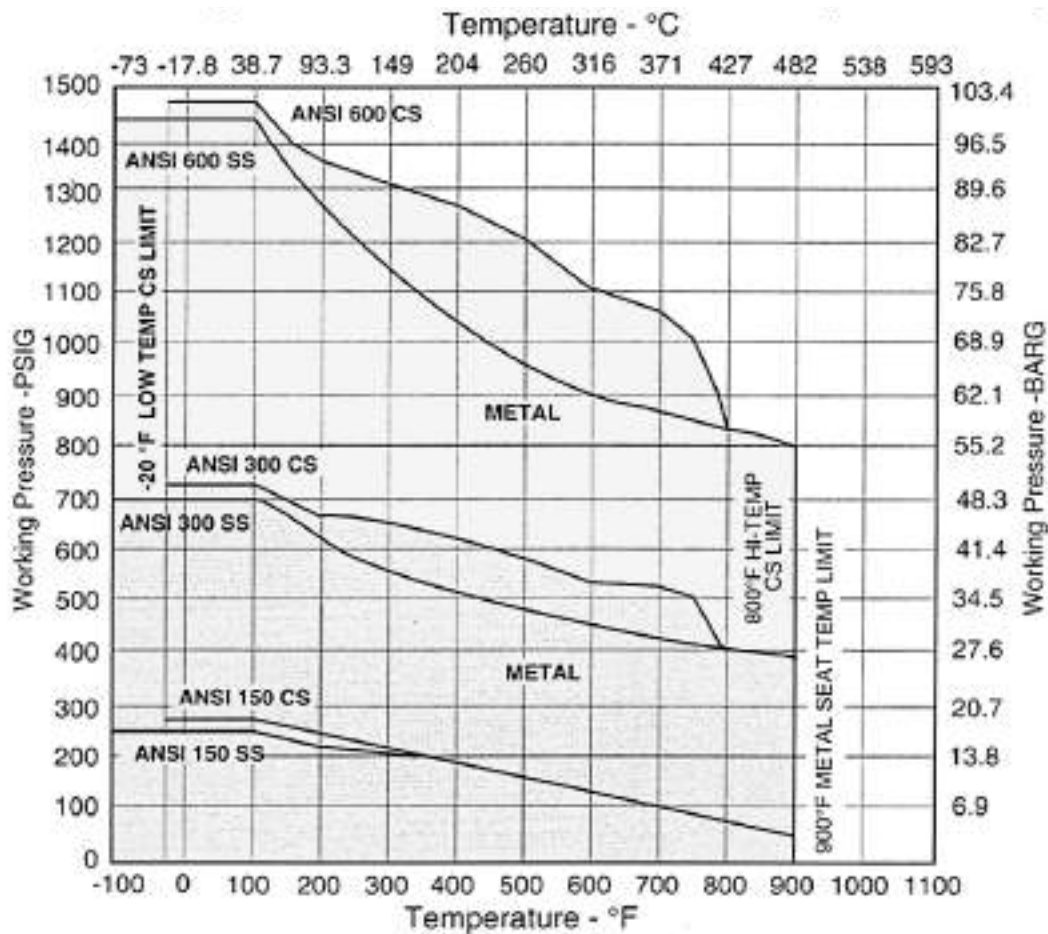
C_s : Coefficient of Seating or unseating torque

C_t : Coefficient of dynamic torque

C_f : Coefficient of flow

f : Bearing friction coefficient

ANSI B16.34 Body and Flowseal Metal Seat Pressure - Temperature Ratings



The heavy lines define the ratings of the carbon steel and stainless steel valve body(or"shell")in conformance to ANSI B16.34. The shaded areas define the rating of the metal seat. Seat rating are based on differential pressure with the disc in fully closed position.

TYPICAL METAL SEAT SPECIFICATION

1.0 Scope

This specification covers the design and testing of high pressure triple offset seat butterfly valves.

2.0 Applicable Standards

The following standards shall apply

- ISO 5752: Metal Valves for use in Flanged Pipe Systems- Face-to-Face and Centre-to-Face Dimensions
- ISO 5208: Testing of Valves
- ISO 5209: Marking of General Purpose Industrial Valves
- BS 4504: Circular Flanges for Pipes, Valves and Fittings
- API 598: Valve inspections and Testing
- API 607: Fire Test for Soft-Seated Quarter-turn Valves
- API 609: Butterfly Valve Wafer and Lug type

3.0 Design Requirement

- 3.1 Valves shall be High Performance Butterfly with triple offset seat and eccentric shaft. They shall be capable of Class IV sealing in either flow direction.
- 3.2 Valve seat shall be both self and pressure energized
- 3.3 Valve shall have retained top and bottom bearings.
- 3.4 Shaft design shall be single or dual piece
- 3.5 Retainer rings must be recessed in the body so that the line gasket prevents any potential external leakage

4.0 Inspection and Test

- 5.1 Valves shall be hydrostatically shell tested per ISO5208
- 5.2 Valves shall be seat tested per ANSI/FCI 70-2, class IV

Engineering Data

Recommended Standard and Specifications

Butterfly valve manufactured according to most severe quality control standards

ANSI	B16.5 B16.34	Steel pipeline flanges Steel valves
MSS	SP-6 SP-25 SP-44 SP-55 SP-61 SP-67narrow(C1-D1)	Standard finishes for pipe flanges Standard marking system for valves Steel pipeline flanges Quality standard for steel castings Pressure testing of steel valves Butterfly valves
API	598 609	Valve inspections and testing Butterfly valves Wafer and Lug type (face-to-face on valve)
ISO	7005 5208 5209 5211/1 5752 Tab.5(20series)	Metallic flanges Industrial valves - pressure testing of valves General purpose industrial valves - marking Part-turn valve actuator attachment -top flange dimensions Face-to-face and centre-to-face dimensions
DIN	3202-K1 50049-2.2 50049-3.1B	Face-to-face dimensions Certificates on material tests (standard) Certificates on material tests (on request)
BS	5155 short	Butterfly valves for general purposes
AWWA	C504	Rubber Seated Butterfly valves
JIS	B2002 B2003	Fac to face dimensions Valve Test

Inspection and testing in according to ISO5205, MSS SP61, AWWA C504, JIS B2003, API 598, and BS5155.

The body test is performed at 1.5 times the nominal pressure while the Seat Test at 1.1 times the nominal pressure, using for both emulsified water at room temperature. While testing, no leakage shall be noticed from the stems, as for the Body Test, not from upstream to downstream, as for the Seat Test. For the Pneumatic Test with disc closed the butterfly is covered with water and soap on that side where the visual control if the seal is performed, in order to show up a possible leak. Our valves are tested 100% before being delivered.

Pressure / Temperature Ratings

Temperature		Class 150				Class 300				Class 600				Class 900			
Temp °F	Temp °C	Carbon steel		Stainless Steel		Carbon steel		Stainless Steel		Carbon steel		Stainless Steel		Carbon steel		Stainless Steel	
		barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig	barg	psig
-200-100	-29-38	19.6	285	18.9	275	51	740	49.6	720	102	1480	99.3	1440	153.1	2220	148.9	2160
200	93	17.9	260	16.5	240	46.5	675	42.7	620	93.1	1350	85.5	1240	139.6	2025	128.2	1860
300	149	15.8	230	14.8	215	45.1	655	38.6	560	90.6	1315	77.2	1120	135.8	1970	115.8	1680
400	204	13.7	200	13.4	195	43.7	635	35.5	515	87.5	1270	71	1030	131	1900	106.2	1540
500	260	11.7	170	11.7	170	41.3	600	33.1	480	82.7	1200	65.8	955	123.7	1795	98.9	1435
600	316	9.6	140	9.6	140	37.9	550	31	450	75.5	1095	62.4	905	113.1	1640	93.4	1355
650	343	8.6	125	8.6	125	36.8	535	30.6	445	74.1	1075	61.3	890	111	1610	91.7	1330
700	371	7.5	110	7.5	110	36.8	535	29.6	430	73.3	1065	59.6	865	110.3	1600	89.3	1295
750	399	6.5	95	6.5	95	34.8	505	29.3	425	69.6	1010	58.2	845	104.1	1510	87.5	1270
800	427	5.5	80	5.5	80	28.2	410	28.6	415	56.8	825	57.2	830	85.1	1235	85.8	1245
850	454	4.4	65	4.4	65	18.6	270	27.9	405	36.8	535	55.8	810	55.5	805	83.7	1215
900	482	3.4	50	3.4	50	11.7	170	27.2	395	23.7	345	54.4	790	35.5	515	81.3	1180
950	510	2.4	35	2.4	35	7.2	105	26.5	385	14.1	205	53.4	775	21.3	310	80	1160
1000	538	1.3	20	1.3	20	3.4	50	25.1	365	7.2	105	50	725	10.6	155	75.1	1090
1050	566	-	-	1.3(1)	20(1)	-	-	24.8	360	-	-	49.6	720	-	-	74.4	1080
1100	593	-	-	1.3(1)	20(1)	-	-	22.4	325	-	-	44.4	645	-	-	66.5	965
1150	621	-	-	1.3(1)	20(1)	-	-	18.9	275	-	-	37.9	550	-	-	56.8	825
1200	649	-	-	1.3(1)	20(1)	-	-	14.1	205	-	-	28.2	410	-	-	42.7	620

Note

*WCB permissible but not recommended for prolonged use above 426°C (800° F)

*for welding end valves only, flanged end ratings terminates at 538°C (1000° F)

Installation Instructions

General

- Valve can be installed in the pipeline in any position.
- Before installing valves, the pipeline must be cleaned from dirt and welding residues. Otherwise seat may be damaged.
- The pipeline must be free from tension and electric current.
- When handling valves, be careful to avoid contact with or impact by other equipment, vault walls or trench walls.
- Check carefully to see if valve seat/disc surface, as well as mating face, is all clean.
- Tighten again, if any, all bolts loosened during transport and/or handling.
- Open and close valves to check for proper operation.
- If possible, install valves in the direction of arrow mark on it for easier access and maintenance.
- Do not use valve as a substitute for jack when putting pipes in alignment.
- The span of pipeline having connection between valve and pipe should be free from such excessive loading as may cause serious bending.

Installation on the existing pipeline.

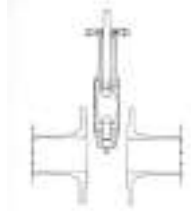
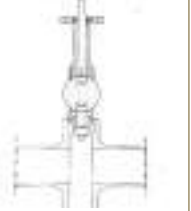
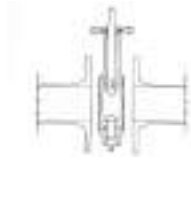
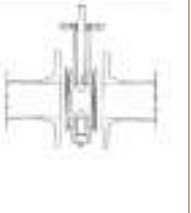
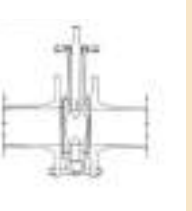
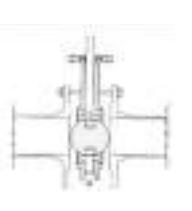
- Verify the distance between two flanges to be equal to face to face valve dimension.
- In order to facilitate installation of the valve, allow a sufficient room with adequate tools in between two flanges.
- Insert at least two flange-bolts through the two bottom pipe flange holes to rest valves on during installation.
- Close valve disc partially so that disc edge is at least 10 mm within the body.
- Insert valve in between two flanges. Flange gaskets should be positioned, aligned with valve bore.
- Valve will be held by the two flange-bolts previously fitted in the lower part of flanges.
- Insert the remaining flange-bolts aligning the valve with the flanges and tightening flange-bolts manually.
- Maintain the valve aligned, remove gradually flange spreaders and tighten bolts partially.
- Control open and close operation of valve to be easy and smooth.
- Open the valve completely and cross tighten the bolts to adequate torque.

Installation of lug type butterfly valves has the same procedure with wafer type except using cap screws instead of bolts and nuts.

Installation of the new pipeline

- Shut partially valve disc until disc profile is at least 10 mm within the body.
- Align the two flanges with the valve body. • Flange gaskets should be positioned, aligned with valve bore.
- Span the body with some flange-bolts and tighten the bolts partially.
- Finish tightening by uniform cross bolting. • Use the flange-valve-flange unit for pipe centering.
- Tack-weld the flanges to the pipe.
- Remove the bolts and the valve from the flanges. Just perform tack-welding only when the valve is inserted, high heat temperature can damage valve seat.
- Weld flanges to the pipe and wait until completely cooled down.
- Install the valve by applying the same instruction procedure as the installation instruction on the existing pipeline.

Maintenance Instructions

Correct Installation		Incorrect Installation	
	Spread flanges enough to allow the valve with disc in semi-closed position. It prevents the damage of disc and seat during installation		
	Flange gaskets should be positioned aligned with valve bore. Pipe misalignment will cause interference between disc edge and flange face, creating leakage and excessive torque to open valve.		
	Insert bolts through the two bottom pipe flange holes to rest valves on during installation. Disc should be in full open position after flange alignment and before evenly tightening flange bolts.		
	Disc in fully closed position causes seat distortion and excessive torque in initial operation. Tighten the flange bolts evenly to prevent the leakage between flange and valve.		



Water Works Butterfly Valve



100% Bi-directional tight shut off at full rated pressure.

Figure Number Abbreviation

- SW-WWW Eccentric Butterfly valves - WAFER type
- SW-WWF Eccentric Butterfly valve - FLANGE type

Standard Compliance

- The face to face dimension shall be in accordance with BS5155, AWWA, C504 or other STANDARDS are available upon request.
- Valve body & disc lined by rubber are available to manufacture according to customer's request.

Production Range

- SIZE : DN 50 to DN 4000 (4 inch ~ 160 inch)
- Working Pressure : upto 25 bar for DN 80 ~ DN 600
(Standard) upto 16 bar for DN 650 ~ DN 1000
 upto 10 bar for DN 1200 ~ DN 4000
- Working Temperature : -20°C ~ +160°C

Connection Flange

- BS4504 PN10, PN16 / DIN2501 PN10, PN16 / ANSI B 16.1 CL. 125LB & B16.5 CL. 150LB
- MSS SP44 CL. 150LB
- AWWA C207 Class D & E
- ISO 2531 PN10 PN16 / KS/JIS 10K, 16K and 20K

Face to Face Dimensions

- Conform to BS5155, ISO 5752, AWWA C504

Application

- | | |
|----------------------|---------------------------|
| • Water works | • Power Plant |
| • Sewage plant | • Heating and Ventilation |
| • Desulination plant | • Chemical Industry etc. |
| • Air conditioning | • Shipbuilding Industry |
| • Irrugation | • Gas Plant |

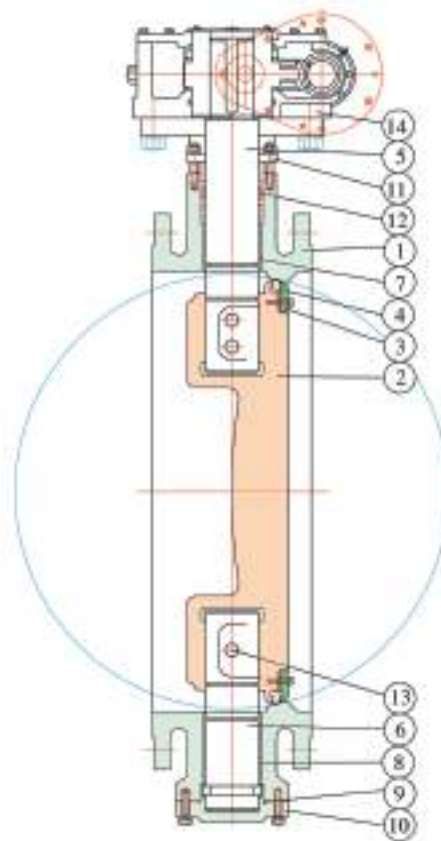
Water Works Butterfly Valve



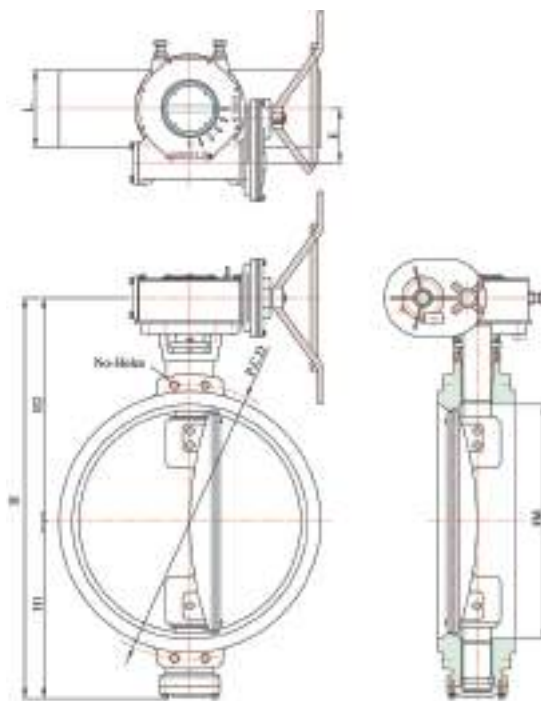
Schema of Eccentric type

- Basic Design : AWWA C-504 or BS 5155
- Employs an advanced lining procedure, this valves be designed and manufactured in accordance with AWWA C-504 or BS 5155 for use in corrosive service, that is, circulating water service, condenser partititon and condenser isolation for the Electric Utilities, Seawater Applications, Desalination plants, Chemical Processes, and so on. Operation is easy and suited for heavy duty services.
- The valve shall be capable of bi-directional sealing
- Valves are constructed with rugged shaft and bearing with self lubrication, and operate with low torque.
- Wide variety of body materials available.

No	PART NAME	METERIAL
1	BODY	Ductile iron / Cast steel Stainless steel / Ni-AL Bronze
2	DISC	Stainless steel / Ductile iron Ni-AL Bronze
3	RETAINER	Cast steel Stainless steel / Ni-AL Bronze
4	SEAT	NBR. EPDM. VITON
5	UPPER-STEM	Stainless steel (304, 316, 316L, 630(17-4PH), Super duplex, monel)
6	LOWER-STEM	Stainless steel (304, 316, 316L, 630(17-4PH), Super duplex, monel)
7	BEARING	Oilless Bearing
8	BEARING	Oilless Bearing
9	GASKET	Non ASBESTOS / O-RING
10	BOTTOM COVER	Ductile iron / Cast steel Stainless steel / Ni-AL Bronze
11	PACKING GLAND	Ductile iron / Cast steel Stainless steel / Ni-AL Bronze
12	PACKING	PTFE, GRAPHITE, Rubber
13	DISC PIN	Stainless steel
14	GEAR BOX	ASS'Y



WWW Series Water Works Butterfly valve / Wafer Type Dimension

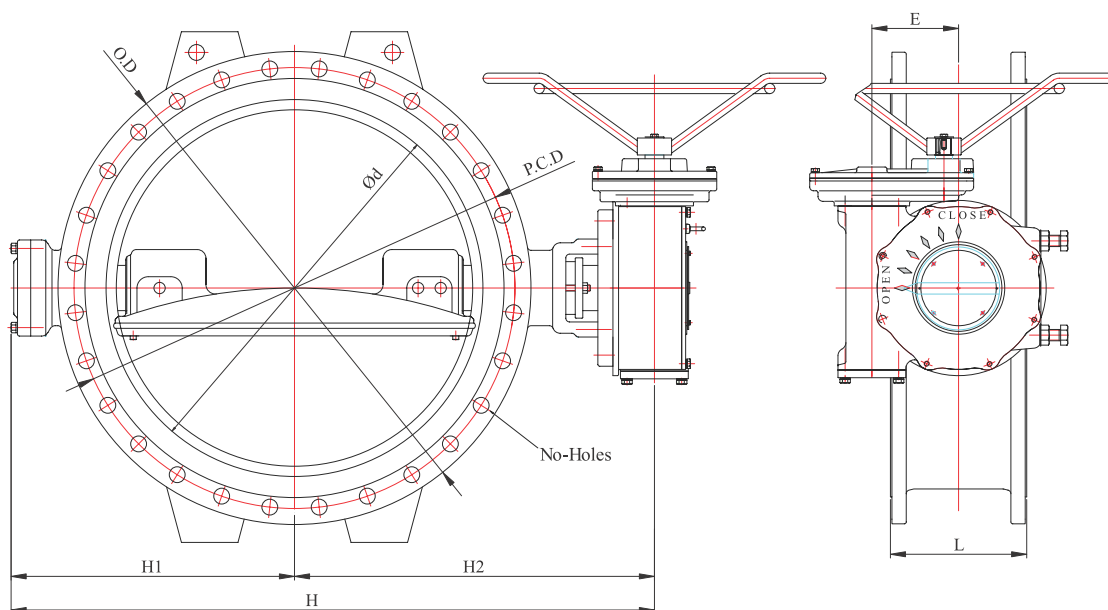


VALVE DIMENSIONS

unit : mm

SIZE		ø d	L	FLANGE (150LB)			H	H1	H2	E	WEIGHT (APPROX) (kg)
inch	mm			OD	PCD	No-Hole					
2"	50	50	43	152	120.5	4-19	325	115	210	66	7.2
3"	80	80	64	190	152.5	4-19	395	145	250	66	10
4"	100	100	64	229	190.5	8-19	427	162	265	66	39
6"	150	150	76	279	241.5	8-22	492	192	300	66	46
8"	200	200	89	343	298.5	8-22	526	209	317	80	50
10"	250	250	114	406	362	12-25	619	254	365	80	72
12"	300	300	114	483	432	12-25	692	278	414	120	81
14"	350	350	127	533	476	12-29	789	324	465	120	102
16"	400	400	140	597	539.5	16-29	844	349	495	120	128
18"	450	450	152	635	578	16-32	942	402	540	120	170
20"	500	500	152	698	635	20-32	1035	427	608	120	198
22"	550	550	170	749	692.2	20-35	1090	470	620	120	222
24"	600	600	178	813	749.5	20-35	1165	502	663	203	308
28"	700	700	229	927	863.5	28-35	1240	537	703	203	380
30"	750	750	230	984.5	914.5	28-35	1325	575	750	203	570
32"	800	800	241	1060.5	978	28-41	1370	605	765	203	730
36"	900	900	300	1168	1086	32-41	1512	682	830	203	880
40"	1000	1000	300	1289	1200	36-41	1710	752	958	203	1040
44"	1100	1100	350	1403	1314	40-41	1800	800	1000	203	1195
48"	1200	1200	350	1511	1422	44-41	1945	865	1080	203	1410
52"	1300	1300	350	1625	1537	44-47	2060	920	1140	270	1780
54"	1350	1350	350	1683	1594	44-48	2140	940	1200	270	2100
56"	1400	1400	390	1746	1651	48-48	2217	956	1261	270	2400
60"	1500	1500	390	1854	1759	52-48	2360	1050	1310	270	2800
64"	1600	1600	440	-	-	-	2500	1120	1380	270	3500
66"	1650	1650	440	2032	1930.4	52-48	2630	1180	1450	270	3900
72"	1800	1800	490	2197	2095.5	60-48	2740	1230	1510	550	4450
80"	2000	2000	540	2325	2230	48-48	2890	1290	1600	550	5830
84"	2100	2100	540	2534	2425.7	64-57	2950	1330	1620	550	6560
96"	2400	2400	650	2876.5	2756	68-70	4155	1980	2175	550	10600
112"	2800	2800	650	NOTE For 2800A and large It is available upon request			4650	2145	2495	700	18500
120"	3000	3000	800				5600	2695	2985	700	23800
140"	3500	3500	850				6600	3145	3440	700	28800
160"	4000	4000	900				7450	3590	3800	700	34900

Specification and design are subject to change without notice



VALVE DIMENSIONS

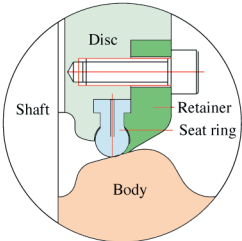
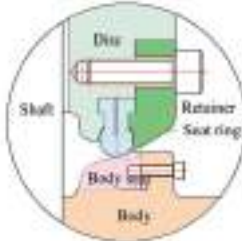
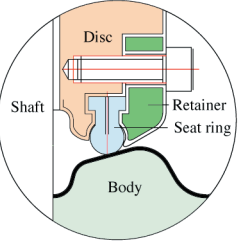
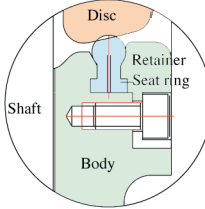
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44"	1100	1100	305	1403	1314	40-41	1800	800	1000	203	1588
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52"	1300	1300	381	1625	1537	44-47	2060	920	1140	270	2385
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64"	1600	1600	457	-	-	-	2500	1120	1380	270	4675
66"	1650	1650	457	2032	1930.4	52-48	2630	1180	1450	270	5200
72"	1800	1800	457	2197	2095.5	60-48	2740	1230	1510	550	5960
80"	2000	2000	457	2325	2230	48-48	2890	1290	1600	550	7780
84"	2100	2100	457	2534	2425.7	64-57	2950	1330	1620	550	8750
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120"	3000	3000	800				5600	2695	2985	700	32000
140"	3500	3500	850				6600	3145	3440	700	39800
160"	4000	4000	900				7450	3590	3800	700	47680

Specification and design are subject to change without notice

Water Works Butterfly Valve

Design Features

Disc Seat Design	Disc Seat Body Seat Design
 - It is designed rubber seat to be inserted in the disc. - More suitable rubber seat can be adopted in accordance with characteristics of fluids. - Rubber seat can be exchanged without dismantling of pipeline	 - It is designed rubber seat to be inserted in the disc. - More suitable rubber seat can be adopted in accordance with characteristics of fluids. - Rubber seat can be exchanged without dismantling of pipeline - An additional ring is inserted in the body to replace seat ring on the contacting area between body seat and disc seat. - The respective maintenance work is possible for seat and disc seat.
Rubber Lined Design	Body Seat Design
 - It is designed rubber seat to be inserted in the disc. - More suitable rubber seat can be adopted in accordance with characteristics of fluids. - Rubber seat can be exchanged without dismantling of pipeline - No corrosion prevention is available with special coating on the body and disc.	 - It is designed rubber seat to be inserted in the body - It is more effective design for the disc material of stainless steel. - More suitable rubber seat can be adopted in accordance with characteristics of fluids. - No sealing provision is required on the disc.

Operations

The following operation of the valves are possible, the choice is depending upon the valve location and the type of work and service for which the valve is used.

- Bare stem type valve only
- valve with 10position lever operated
- valve with gear operated
- valve with electric actuator
- valve with pneumatic actuator
- valve with hydraulic actuator

Torques Required to Operate Water Works Butterfly Valve

TORQUE TABLE

unit : kg.m/Nm/in-lb

Size		Working Pressure (bar)											
		3 bar			5 bar			10 bar			20 bar		
mm	inch	kg-m	Nm	in-lb	kg-m	Nm	in-lb	kg-m	Nm	in-lb	kg-m	Nm	in-lb
100A	4	1.00	9.80	86.74	1.50	14.70	130.11	3.50	34.30	303.58	5.20	50.96	451.03
125A	5	2.20	21.56	190.82	3.00	29.40	260.21	7.00	68.60	607.16	8.40	82.32	728.59
150A	6	3.00	29.40	260.21	4.00	39.20	346.95	10.50	102.90	910.74	14.00	137.20	1214.32
200A	8	5.50	53.90	477.06	9.00	88.20	780.64	20.00	196.00	1734.75	28.00	274.40	2428.65
250A	10	13.00	127.40	1127.59	18.00	176.40	1561.27	48.00	470.40	4163.39	65.00	637.00	5637.93
300A	12	18.50	181.30	1604.64	32.00	313.60	2775.60	65.00	637.00	5637.93	88.00	862.40	7632.89
350A	14	27.50	269.50	2385.28	45.00	441.00	3903.18	88.00	862.40	7632.89	135.00	1323.00	11709.54
400A	16	44.00	431.20	3816.44	80.00	784.00	6938.99	115.00	1127.00	9974.80	182.00	1783.60	15786.20
450A	18	62.00	607.60	5377.72	100.00	980.00	8673.74	165.00	1617.00	14311.66	232.00	2273.60	20123.07
500A	20	75.00	735.00	6505.30	132.00	1293.60	11449.33	202.00	1979.60	17520.94	305.00	2989.00	26454.89
550A	22	130.00	1274.00	11275.86	182.00	1783.60	15786.20	240.00	2352.00	20816.96	408.00	3998.40	35388.84
600A	24	142.00	1391.60	12316.70	220.00	2156.00	19082.22	305.00	2989.00	26454.89	495.00	4851.00	42934.99
650A	26	160.00	1568.00	13877.98	285.00	2793.00	24720.14	408.00	3998.40	35388.84	602.00	5899.60	52215.88
700A	28	225.00	2205.00	19515.90	340.00	3332.00	29490.70	515.00	5047.00	44669.74	805.00	7889.00	69823.57
750A	30	260.00	2548.00	22551.71	415.00	4067.00	35996.00	601.00	5889.80	52129.15	910.00	8918.00	78930.99
800A	32	305.00	2989.00	26454.89	470.00	4606.00	40766.55	695.00	6811.00	60282.46	1005.00	9849.00	87171.04
850A	34	348.00	3410.40	30184.60	530.00	5194.00	45970.80	875.00	8575.00	75895.18	1310.00	12838.00	113625.93
900A	36	388.00	3802.40	33654.09	635.00	6223.00	55078.22	980.00	9604.00	85002.60	1450.00	14210.00	125769.16
1000A	40	420.00	4116.00	36429.69	690.00	6762.00	59848.77	1195.00	11711.00	103651.13	1625.00	15925.00	140948.19
1200A	48	1113.20	10909.36	96556.02	1391.50	13636.70	120695.02	2112.00	20697.60	183189.28	2917.20	28588.56	253030.20
1350A	54	1305.25	12791.45	113213.93	1652.00	16189.60	143290.10	2428.80	23802.24	210667.68	2918.52	28601.50	253144.69
1800A	72	2265.50	22201.90	196503.47	2666.80	26134.64	231311.16	3336.00	32692.80	289355.80	5033.16	49324.97	436562.96
3000A	120	12075.00	118335.00	1047353.50	14593.06	143011.99	1265763.35	25020.00	245196.00	2170168.50	37791.60	370357.68	3277943.24
4000A	160	45770.00	448546.00	3969968.51	48970.00	479906.00	4247528.03	58620.00	574476.00	5084543.46	88836.00	870592.80	7705399.22

- The operating speed of the actuator must be considered in order to avoid water hammer when the valve is closed in junction with Liquid.

- The factors affect the torque required to operate Butterfly valves.

- Valve Diameter
- Shaft Diameter
- Bearing Friction Coefficient
- Type of Seat Material
- Shut off Pressure
- Velocity
- Shape of Disc
- System Head Characteristics
- Piping Arrangement

- Actuator torques can be calculated using the following formulas.

$$T_a = T_b + T_s + T_h = 1.2T_b \pm T_d$$

$$T_s = C_s D^2$$

$$T_b = 4.17 D^2 d f P$$

$$T_d = C_t D^3 P$$

$$T_h = 3.06 D^4$$

$$V = C_f \sqrt{P} = \frac{Q}{0.785 D^2}$$

Ta : The required actuator torque(lb-ft)

Ts : Seating or unseating torque(lb-ft)

Td : Dynamic torque(lb-ft)

Th : Hydrostatic 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

Hydro Test Specifications

Series	ISO Series	AWWA Series
"Hydrostatic Shell test"	1.5 x maximum service pressure	2.0 x maximum service pressure
"Hydrostatic Seat test"	1.1 x working service pressure	working service pressure

WW Series Basic Formulas for obtaining Cv-Value

Cv is in imperial units, the water flow in U.S. gallons per minute which passes through the valve giving a pressure drop of 1 PSI at a temperature of 68° F

In metric units the same coefficient is called Kv and correspond to the flow rate in m3/h passing through the valve giving a pressure drop of 1bar at a temperature of 20° C

The approximate corresponding formulas are :

$$Q = C_v \cdot \sqrt{\frac{\Delta P \cdot 62.4}{D}}$$

Where :

Q = valve flow rate in gpm (USGPM)

ΔP = pounds per square inch (psi)
pressure drop through the valve

62.4 = conversion factor for fluids
computed in relation to water

D = is pounds per cu.ft (pct) fluid density

$$Q = C_v \cdot \sqrt{\frac{\Delta P \cdot 1000}{D}}$$

Where :

Q = valve flow rate in m3/h

ΔP = pressure drop through the valve in bar

1000 = conversion factor for fluids
computed in relation to water

D = kg/m3 fluid density

The relation between Cv and Kv, expressed in the above mentioned unit of measure is as follows :

$C_v = 1.16 k_v$

Flow coefficient for Water Works Butterfly Valves

VALVE SIZE		DISC OPENING																	
		10°		20°		30°		40°		50°		60°		70°		80°		90°	
mm	inch	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	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
28	700	672	780	1853	2150	3362	3900	5440	6310	8608	9985	12069	14000	17250	20010	22586	26200	25862	30000
30	750	724	840	1931	2240	3897	4520	5862	6800	9401	10905	14526	16850	18996	22035	25147	29170	29741	34500
32	800	905	1050	2759	3200	4888	5670	7707	8940	11940	13850	17707	20540	24224	28100	29483	34200	34483	40000
36	900	1103	1280	2948	3420	5905	6850	9914	11500	15500	18000	21552	25000	31034	36000	38578	44750	46720	54195
40	1000	1629	1890	3879	4500	8319	9650	13750	15950	22900	27931	32400	39698	46050	50690	58800	59526	69050	

Water Works Valve Installation Procedures

- 1) Install the valve at the designed Place, position and method.
- 2) Prepare sufficient room for valve operation after checking working condition and any obstacles in work place.
- 3) Check if the flow indicating arrow(→) of valve body is conforming to the pipe required direction and check the valve according to the pipe installation specification.
- 4) Deattach the protection cover of the valve flange and remove any foreign particles.
- 5) Clearing any dust and deposited outside debris of connection parts of the pipe.
- 6) Prepare more sufficient room when use the new pipeline.
- 7) Don't disassemble any parts of the valve like actuator or gear box. If the disassemble work of the valve parts is needed, please contact with our technical department.
- 8) - Preparing enough room for installation,
 - Leave a space between pipe flange,
 - Attaching the flange gasket,
 - Lifting the valve by the center of the valve,
 - Keeping the valve vertical,
 - Tightening the flange bolt as vertical and horizontal to flange.
- 9) Tightening the flange bolt regarding the below.
Tightening the bolt with adequate torque to prevent leakage.
- 10) After installation, check the leakage in the connection parts of flange and packing seal at the full open position and then check the same parts at the full close position.
- 11) If there is any leakage at the connection parts, please tighten the flange bolt with adequate torque. If there is leakage in the packing seal, tighten the gland bolt.
- 12) Should you have any kind of further questions, please kindly contact with our company





Dual Plate Check Valve



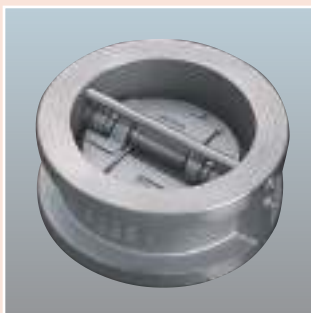
100% Bi-directional tight shut off at full rated pressure.

Figure Number Abbreviation

- SW-DCW Dual Plate Check - WAFER Type
- SW-DCL Dual Plate Check - LUG Type
- SW-DCF Dual Plate Check - FLANGE Type

Standard Compliance

- The face to face dimension shall be in accordance with API594, or other STANDARDS are available upon request.

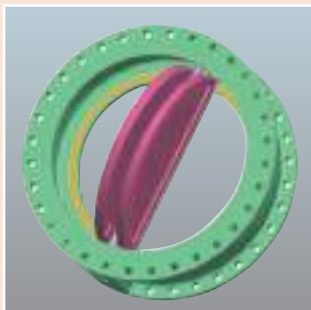


Production Range

- SIZE : DN 50 to DN 1800 (2 inch ~ 72 inch)
- Working Pressure : up to 25 bar
- Working Temperature : -20°C ~ +160°C

Connection Flange

- ANSI B16.1 CL. 125LB & B16.5 CL. 150LB / MSS SP44 CL. 150LB /
- AS2129 Table D & E / BS4504 PN6, PN10 & PN16 /
- BS10 Table D & E / DIN2501 PN6, PN10 & PN16 /
- ISO 2531 PN6, PN10 & PN16 / KS/JIS 5K, 10K, 16K & 20K



Face to Face Dimensions

- Conform to API 594

Application

- Chemical, petrochemical
- Mechanical engineering
- Textile industry
- Heating, air-conditioning, pipelines
- Wood-working, pulp and paper industry
- Iron and steel industry, mining industry
- Foodstuff and allied industries
- Public utilities, municipal undertakings
- Power generaiton
- Mineral-oil industry
- Shipbuilding

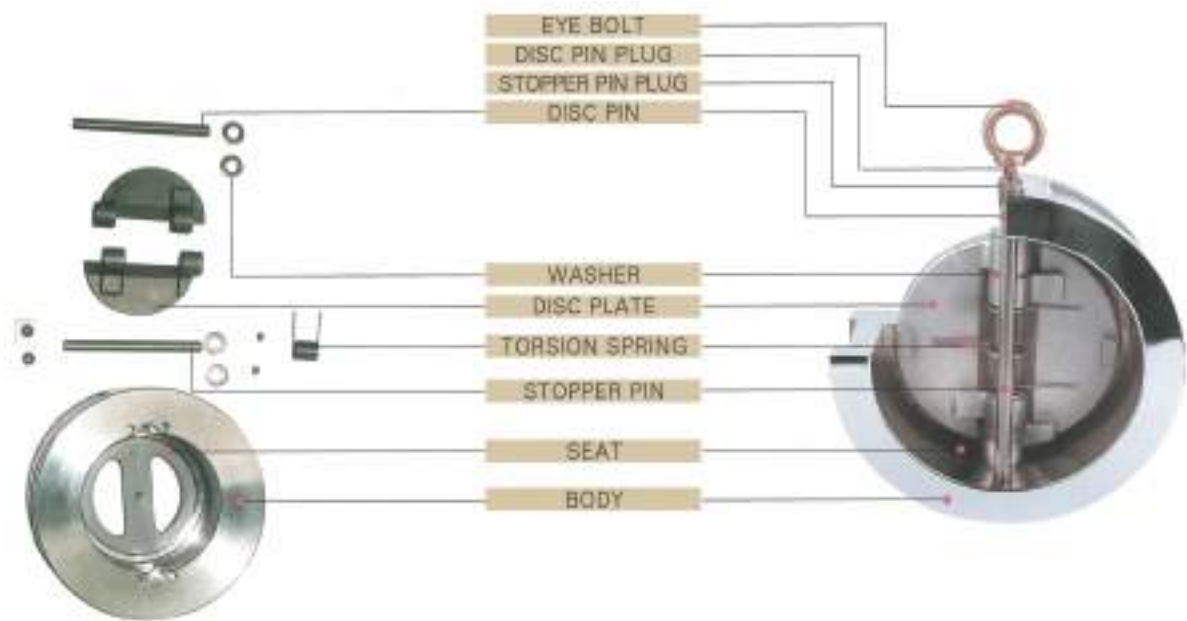
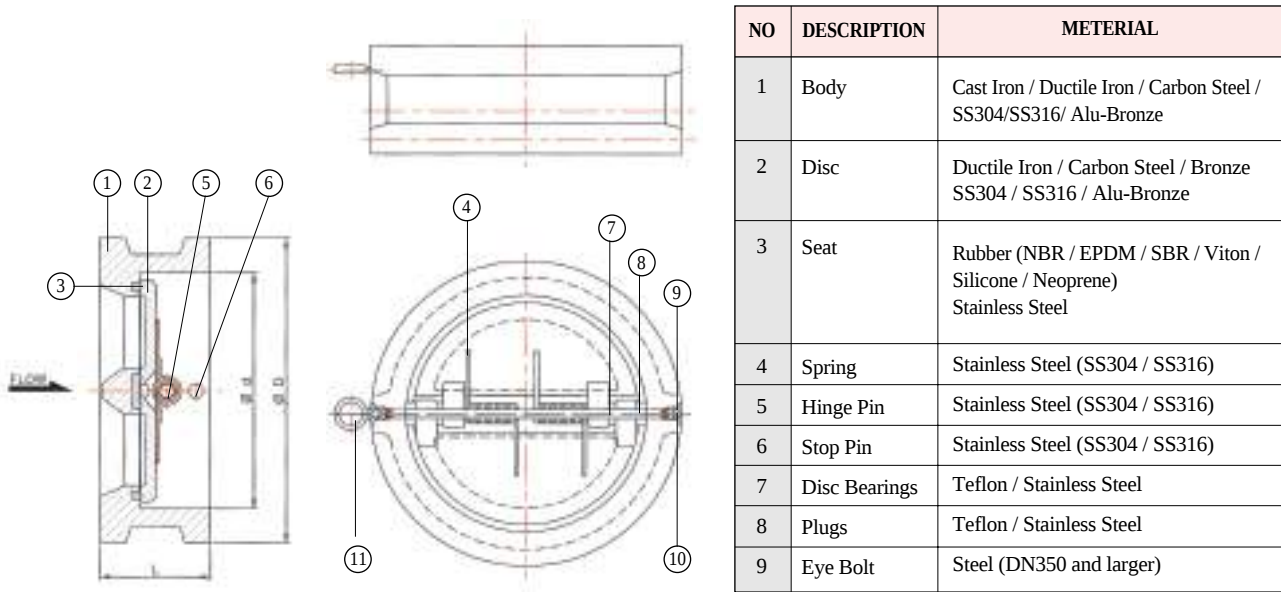
Dual Plate Wafer Check Valve

The short face-to-face design makes dual plate check valves more compact and lighter, providing easy installation and less expensive costs than conventional swing check valves.

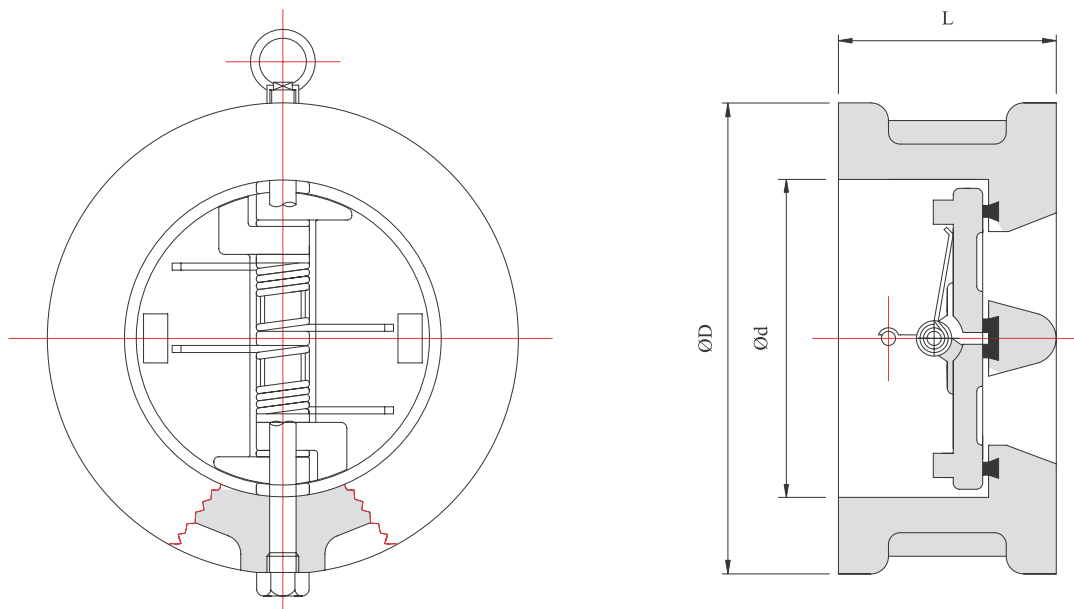
This design is standard on all ANSI series 125lb through 2500lb valves.

316ss Springs and INCONEL X-750 springs are mostly used with other materials available to meet all service conditions.

The torsion spring is designed to maximise reliability and minimise pressure loss and quickly colse the check valve at zero flow to prevent slamming and water hammer commonly associated with many types of other check valves.



DCW Series Wafer Type Valves



VALVE DIMENSIONS

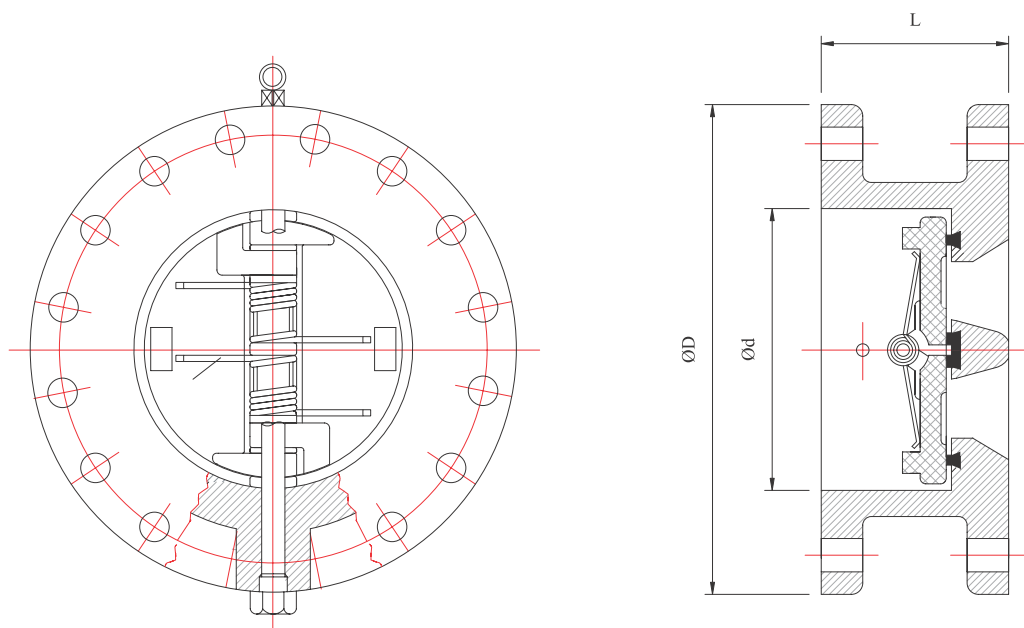
unit : mm

SIZE		ø d		L						ø D						Weight (kg) 150LB
inch	mm			150LB		300LB		600LB		150LB		300LB		600LB		
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	
2"	50	60	2.4	60	2.4	60	2.4	60	2.4	105	4.1	111	4.4	111	4.4	2.4
2 1/2"	65	73	2.9	67	2.6	67	2.6	67	2.6	124	4.9	130	5.1	130	5.1	4.3
3"	80	89	3.5	73	2.9	73	2.9	73	2.9	137	5.4	149	5.9	149	5.9	5.7
4"	100	114	4.5	73	2.9	73	2.9	79	3.1	175	6.9	181	7.1	194	7.6	7.5
5"	125	141	5.6	86	3.4	86	3.4	105	4.1	197	7.8	216	8.5	241	9.5	12
6"	150	168	6.6	98	3.9	98	3.9	136	5.4	222	8.7	251	9.9	267	10.5	16
8"	200	219	8.6	127	5.0	127	5.0	165	6.5	279	11.0	308	12.1	321	12.6	33
10"	250	273	10.7	146	5.7	146	5.7	213	8.4	340	13.4	362	14.3	400	15.7	50
12"	300	324	12.8	181	7.1	181	7.1	229	9.0	410	16.1	422	16.6	457	18.0	79
14"	350	356	14.0	184	7.2	222	8.7	273	10.7	451	17.8	486	19.1	492	19.4	93
16"	400	406	16.0	191	7.5	232	9.1	305	12.0	514	20.2	540	21.3	565	22.2	159
18"	450	457	18.0	203	8.0	264	10.4	362	14.3	549	21.6	597	23.5	613	24.1	178
20"	500	508	20.0	219	8.6	292	11.5	368	14.5	606	23.9	654	25.7	683	26.9	234
24"	600	610	24.0	222	8.7	318	12.5	438	17.2	718	28.3	775	30.5	791	31.1	348
26"	650	660	26.0	222	8.7	318	12.5	438	17.2	773	30.4	835	32.9	867	34.1	740
28"	700	711	28.0	305	12.0	318	12.5	438	17.2	832	32.8	903	35.6	915	36.0	692
30"	750	762	30.0	305	12.0	368	14.5	505	19.9	883	34.8	953	37.5	968	38.1	835
32"	800	813	32.0	356	14.0	368	14.5	505	19.9	940	37.0	1006	39.6	1024	40.3	665
36"	900	914	36.0	368	14.5	483	19.0	635	25.0	1048	41.3	1118	44.0	1130	44.5	1197
40"	1000	1016	40.0	419	16.5	483	19.0	635	25.0	1162	45.7	1115	43.9	1155	45.5	1247
42"	1050	1067	42.0	432	17.0	568	22.4	701	27.6	1219	48.0	1166	45.9	1220	48.0	1405
48"	1200	1219	48.0	524	20.3	629	24.8	701	27.6	1384	54.5	1274	50.2	1392	54.8	1307
54"	1350	1372	54.0	540	21.3	629	24.8	701	27.6	1549	61.0	1493	58.8	1556	61.3	2895
60"	1500	1524	60.0	660	26.0	650	25.6	750	29.5	1715	67.5	1645	64.8	1735	68.3	3645
72"	1800	1829	72.0	914	36.0	650	25.6	750	29.5	2051	80.7	-	-	-	-	6375

Specification and design are subject to change without notice

DCF Series

Flange Type Valves



VALVE DIMENSIONS

unit : mm

SIZE		ø d		L						ø D						Weight (kg) 150LB
inch	mm			150LB		300LB		600LB		150LB		300LB		600LB		
		mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	
2"	50	60	2.4	60	2.4	60	2.4	60	2.4	165	6.5	165	6.5	165	6.5	7.4
2 1/2"	65	73	2.9	67	2.6	67	2.6	67	2.6	191	7.5	191	7.5	191	7.5	7.4
3"	80	89	3.5	73	2.9	73	2.9	73	2.9	210	8.3	210	8.3	210	8.3	8.4
4"	100	114	4.5	73	2.9	73	2.9	79	3.1	229	9.0	254	10.0	273	10.7	13.5
5"	125	141	5.6	86	3.4	86	3.4	105	4.1	254	10.0	279	11.0	330	13.0	16
6"	150	168	6.6	98	3.9	98	3.9	136	5.4	279	11.0	318	12.5	356	14.0	22
8"	200	219	8.6	127	5.0	127	5.0	165	6.5	343	13.5	381	15.0	419	16.5	44
10"	250	273	10.7	146	5.7	146	5.7	213	8.4	406	16.0	445	17.5	508	20.0	86
12"	300	324	12.8	181	7.1	181	7.1	229	9.0	483	19.0	521	20.5	559	22.0	100
14"	350	356	14.0	184	7.2	222	8.7	273	10.7	533	21.0	584	23.0	603	23.7	127
16"	400	406	16.0	191	7.5	232	9.1	305	12.0	597	23.5	648	25.5	686	27.0	162
18"	450	457	18.0	203	8.0	264	10.4	362	14.3	635	25.0	711	28.0	743	29.3	190
20"	500	508	20.0	219	8.6	292	11.5	368	14.5	699	27.5	775	30.5	813	32.0	254
24"	600	610	24.0	222	8.7	318	12.5	438	17.2	813	32.0	914	36.0	940	37.0	403
26"	650	660	26.0	222	8.7	318	12.5	438	17.2	870	34.3	972	38.3	1016	40.0	482
28"	700	711	28.0	305	12.0	318	12.5	438	17.2	927	36.5	1035	40.7	1073	42.2	543
30"	750	762	30.0	305	12.0	368	14.5	505	19.9	984	38.7	1092	43.0	1130	44.5	696
32"	800	813	32.0	356	14.0	368	14.5	505	19.9	1060	41.7	1149	45.2	1194	47.0	855
36"	900	914	36.0	368	14.5	483	19.0	635	25.0	1168	46.0	1270	50.0	1314	51.7	1220
40'	1000	1016	40.0	419	16.5	483	19.0	635	25.0	1289	50.7	1238	48.7	1320	52.0	1410
42"	1050	1067	42.0	432	17.0	568	22.4	701	27.6	1346	53.0	1289	50.7	1403	55.2	1560
48"	1200	1219	48.0	524	20.6	629	24.8	701	27.6	1511	59.5	1416	55.7	1500	59.5	1770
54"	1350	1372	54.0	540	21.3	629	24.8	701	27.6	1683	66.3	1657	65.2	1778	70.0	1865
60"	1500	1524	60.0	660	26.0	650	25.6	750	29.5	1854	73.0	1810	71.3	1994	78.5	2110
72"	1800	1829	72.0	914	36.0	650	25.6	750	29.5	2197	86.5	-	-	-	-	2435

Specification and design are subject to change without notice

Engineerring Data

Cv-valve Capacity, ANSI 150#/300#			Min. Flow Velocity & Pressure Drops @ V(min)	
Valve Size		Cv	Min. Flow Velocity V(min), M/sec	Max. Pressure Drops at V(min), bar
2"	DN50	48	1.2	0.28
2.5"	DN65	86	1.2	0.28
3"	DN80	128	1.2	0.25
4"	DN100	278	1.2	0.20
5"	DN120	430	0.9	0.20
6"	DN150	680	0.9	0.18
8"	DN200	1370	0.9	0.12
10"	DN250	2360	0.8	0.10
12"	DN300	3760	0.8	0.10
14"	DN350	5080	0.8	0.10
16"	DN400	7430	0.8	0.08
18"	DN450	10100	0.6	0.08
20"	DN500	12900	0.6	0.08
24"	DN600	24100	0.6	0.08

The Minimum Flow Velocity, V(min) to be opened in full flow conditon(when the discs are to be stable position) is calculated as following equation.

$$V(\min) = 60 \sqrt{\frac{8(KT + Wd)}{\pi LD^2 \times 10^{-6}}} \text{ m/sec}$$

Where,

KT = Applicable Spring Torsional Coefficiency, Kgf/mm,

Wd = Disc Weight, kgf

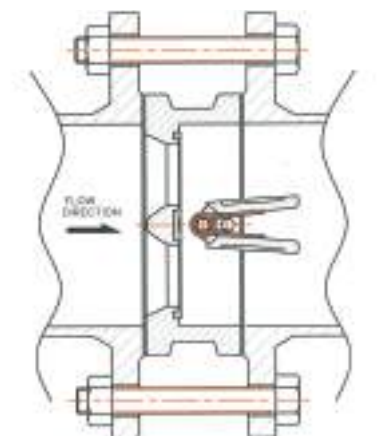
L = Spring Arm Rest total length, mm

D = Nominal Valve Size, DN(mm)

Installation

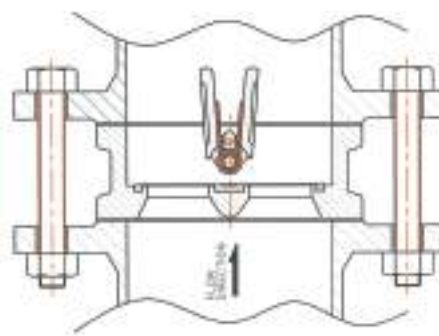
The Check valve is designed for steady flow condition and can be installed in horizontal and vertical pipelined but the instructions shown must be adhered to.

Installation in a horizontal pipeline



The disc shall must be in the vertical position.
PLAN VIEW
PREFERRED INSTALLATION

Installation in a vetical pipeline

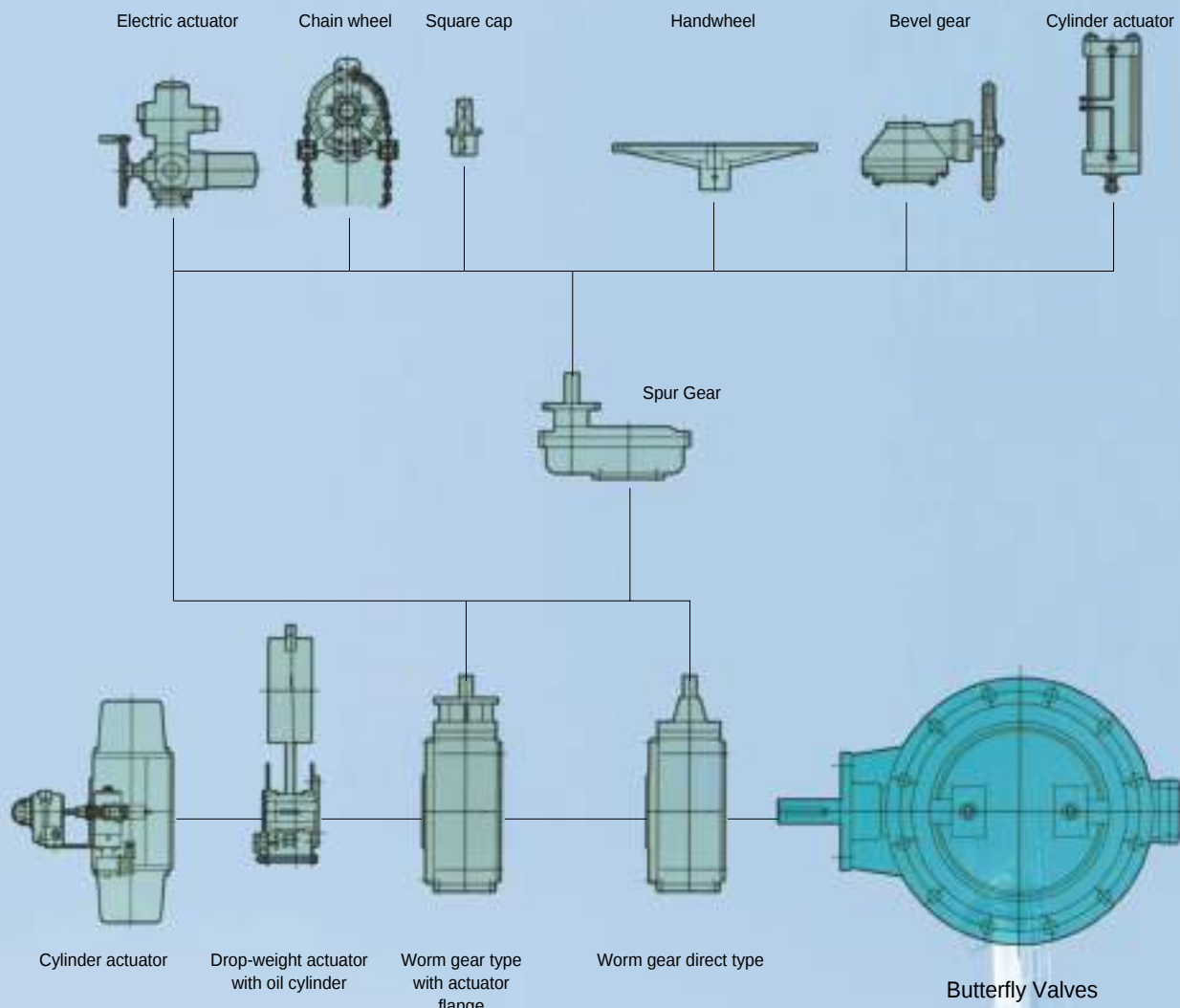


As standard the valve must be installed with flow up.

Note. The valve must not be installed in pipelines with pulsating flow or near to reciprocating pumps.

Additional pressure drop can be expected due to the weight of the discs

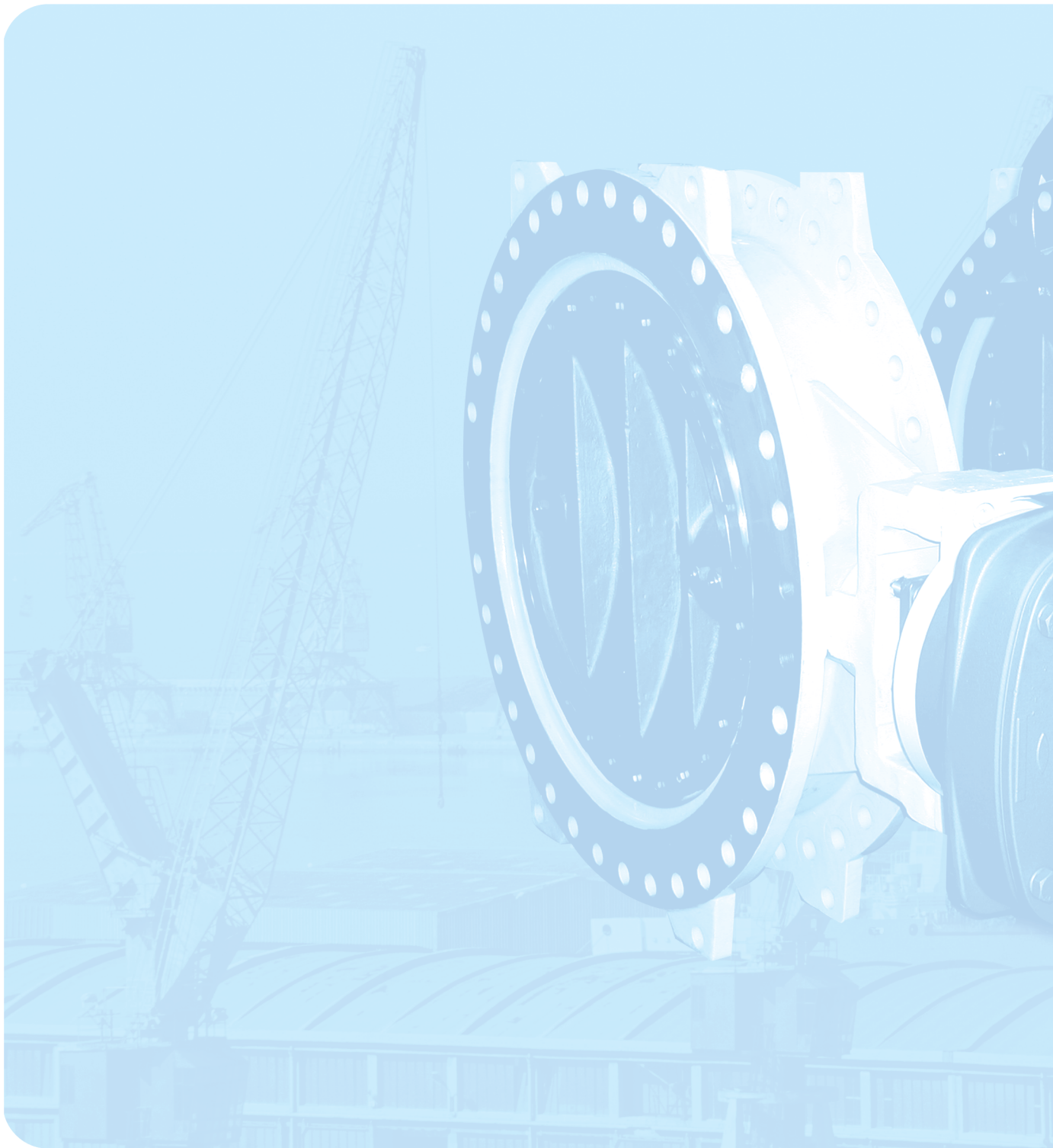
Specification Of Actuators



Our company endeavor ceaselessly to develop new products and for quality improvement.

CERTIFICATE





Specification and design are subject to change without notice



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