CE
Cert No. 0062

KSA
ISO 9001
Cert No. QMS-0549

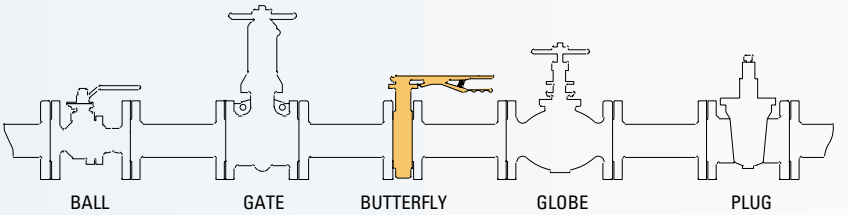
BUTTERFLY VALVES

Advantages of butterfly valve

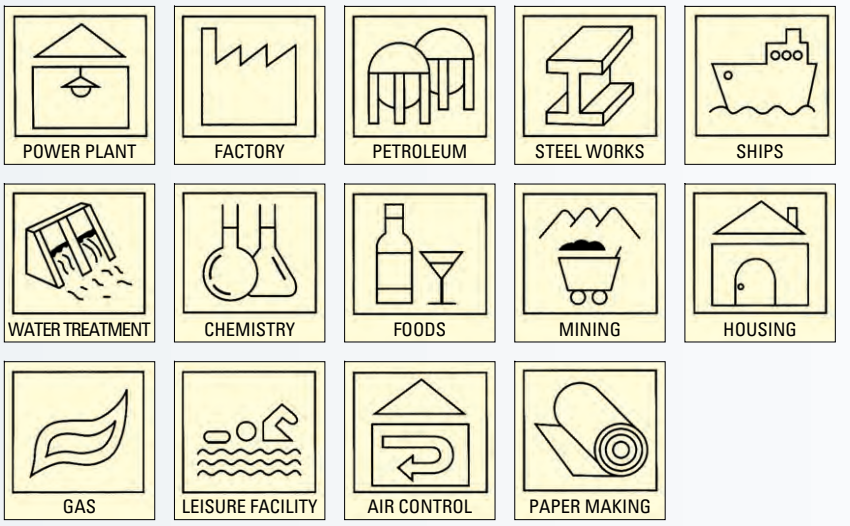
Butterfly valve is much smaller than other valve designs. The results are saving in materials, less weight, small space requirement, and easy installation and operation. The liner materials used in the construction of DK butterfly valve are either Elastomer or TEFLON®. Wafer construction provides maximum strength under conditions of pipeline strain. DK performs three basic functions of stopping flows, controlling flow and regulating flows and pressure with several advantage functions such as;

- Tight shut off
- Less fluid resistance achieved through smooth flow
- Low pressure drop
- On-off or throttling applications
- Suitable for automation with low operating torque and 90 degree operating angle
- Reduced weight and installation space
- No flange gasket
- Quick fitting and dismantling
- Easy replacement and renewable seat

Valve configurations scale drawing to actual size



Application



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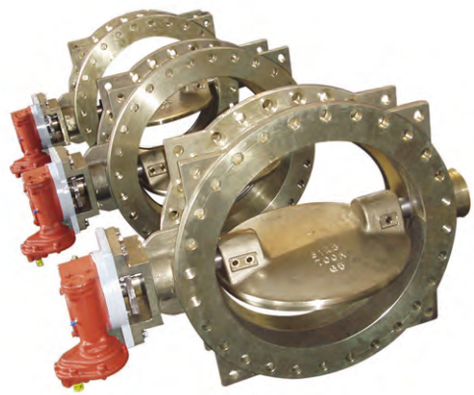
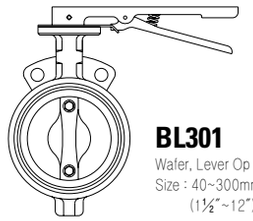
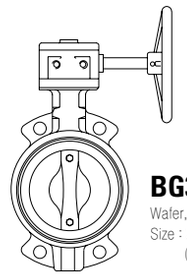
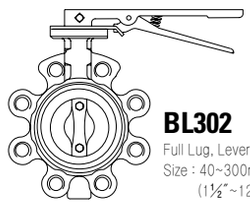




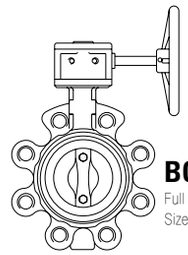
BL301
Wafer, Lever Op
Size : 40~300mm
(1½"~12")



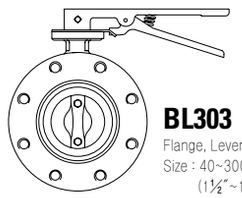
BG301
Wafer, Gear Op
Size : 200~1000mm
(8"~40")



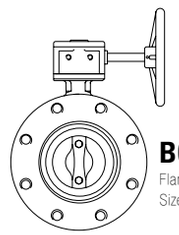
BL302
Full Lug, Lever Op
Size : 40~300mm
(1½"~12")



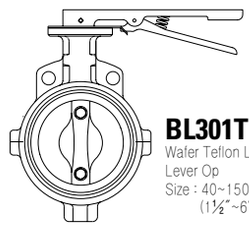
BG302
Full Lug, Gear Op
Size : 40~1000mm
(1½"~40")



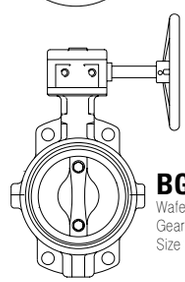
BL303
Flange, Lever Op
Size : 40~300mm
(1½"~12")



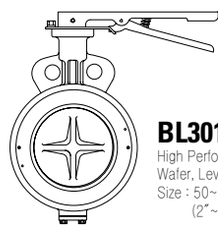
BG303
Flange, Gear Op
Size : 40~1000mm
(1½"~40")



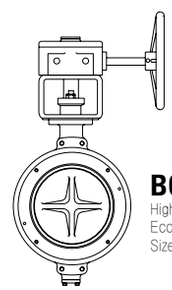
BL301T
Wafer Teflon Lined
Lever Op
Size : 40~150mm
(1½"~6")



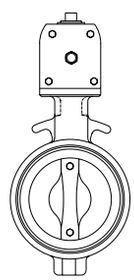
BG301T
Wafer Teflon Lined
Gear Op
Size : 200~800mm
(8"~32")



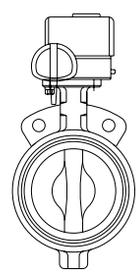
BL301E
High Performance
Wafer, Lever Op
Size : 50~150mm
(2"~6")



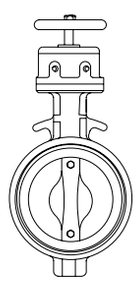
BG301E
High Performance
Eccentric, Gear Op
Size : 50~1000mm
(2"~40")



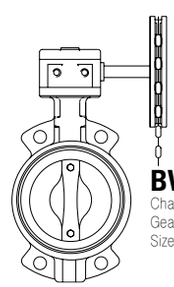
BE301
Wafer, Pneumatic Op
Size : 40~1000mm
(1½"~40")



BP301
Wafer, Electric Op
Size : 40~1000mm
(1½"~40")



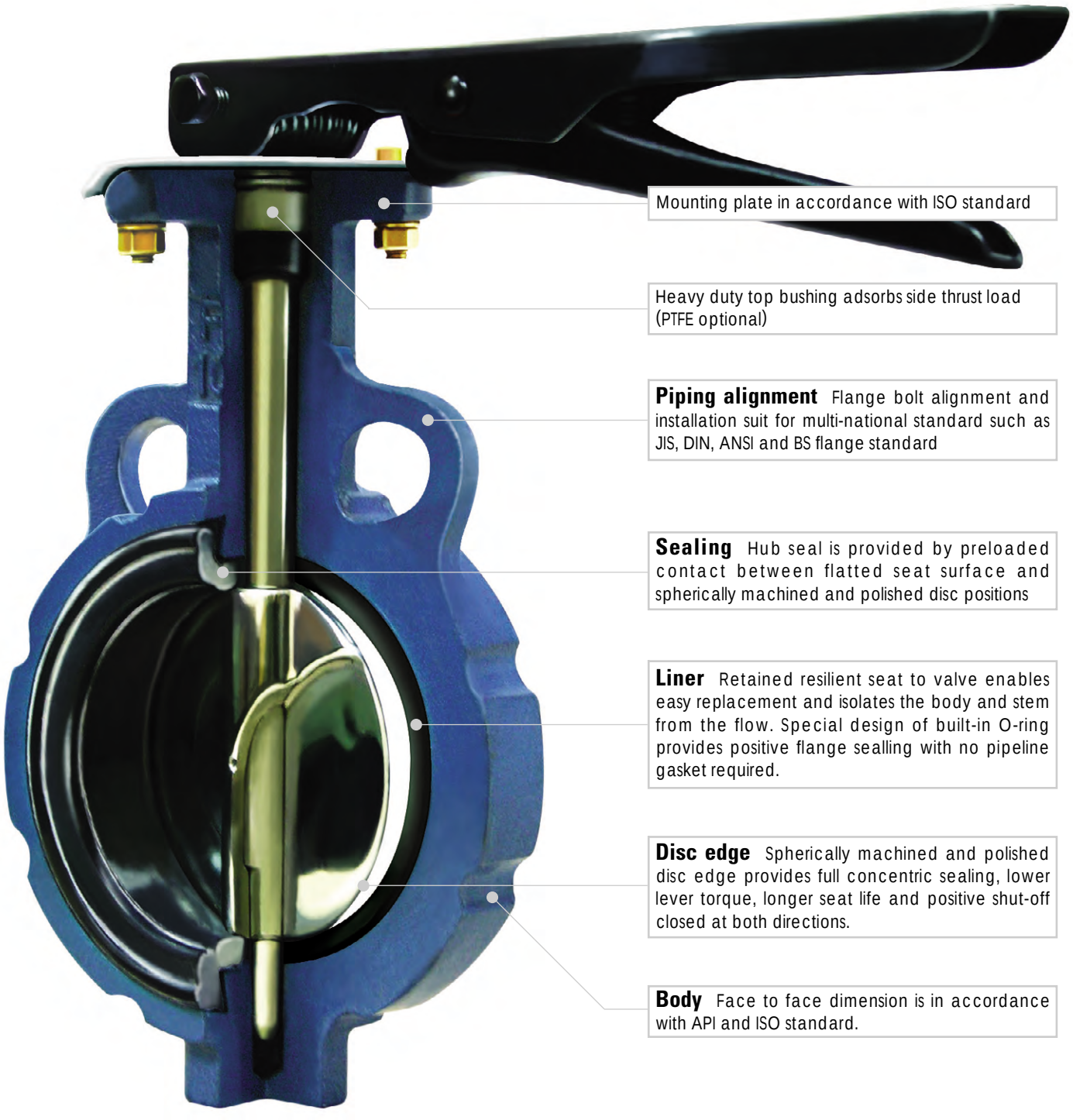
BC301
Wafer
Center wheel Op
Size : 40~300mm
(1½"~12")



BW301
Chain wheel Op
Gear Op
Size : 40~1000mm
(1½"~40")

Leak-tightness at Line stream, shaft passages and the atmosphere

A perfect zero leakage seal at bi-direction is obtained by the compression of the inner between the valve body and the edge of the disc. A perfect zero leakage seal is provided by means of flatted liner area around both up and down shaft passages and the spherically machined disc. Since the seat stem hole is smaller than the stem diameter, there is a compression fit forming a secondary seal. The seal insures that no fiuid will leak to atmosphere.



Mounting plate in accordance with ISO standard

Heavy duty top bushing adsorbs side thrust load (PTFE optional)

Piping alignment Flange bolt alignment and installation suit for multi-national standard such as JIS, DIN, ANSI and BS flange standard

Sealing Hub seal is provided by preloaded contact between flatted seat surface and spherically machined and polished disc positions

Liner Retained resilient seat to valve enables easy replacement and isolates the body and stem from the flow. Special design of built-in O-ring provides positive flange sealling with no pipeline gasket required.

Disc edge Spherically machined and polished disc edge provides full concentric sealing, lower lever torque, longer seat life and positive shut-off closed at both directions.

Body Face to face dimension is in accordance with API and ISO standard.

Specifications

Standard
According to ISO 5752 - BS 5155 - MSS SP 67 - API 609

Product range
40mm up to 1000mm(1½″~40″)

Pressure range
Designed for maximum working pressure of 16bar (240psi)

Flange connections
The shape of valve body has been so designed as to allow flange bolt alignment onto following standards. Wafer type valve has been successfully developed to fit multi functional application onto either connection standard in the same configuration, mainly

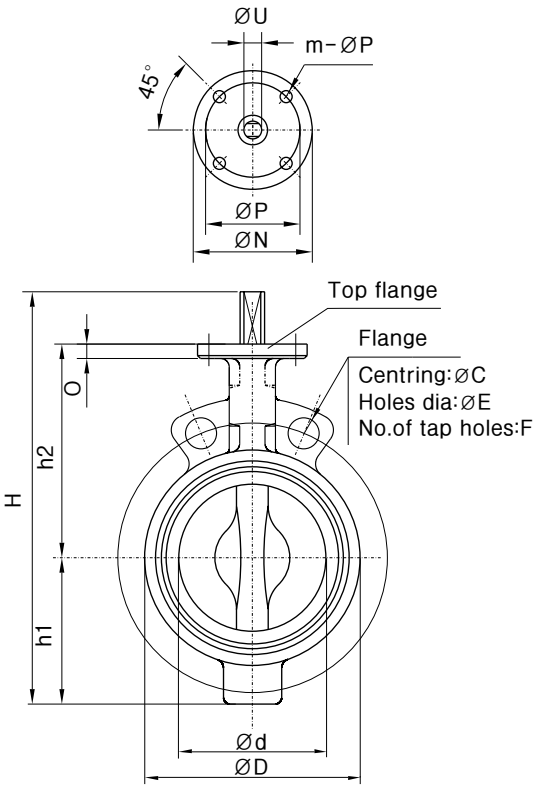
ISO PN 6, 10, 16, 20
ANSI B 16.1 CL.
BS 4504 PN6, PN10, PN16
AS 2109 Table D and E
MSS SP 44 CL. 150
ANSI B 16.5 CL. 150
BS 10 Table D and E
JIS B 2210 5K, 10K, 16K and 20K

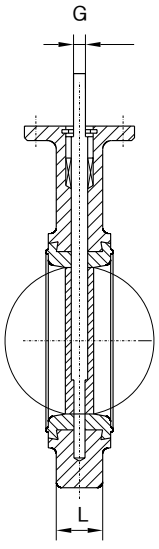
Operating
Hand lever with notch plate
Manual worm gear
With locking device
Electric/Pneumatic actuator
Hydraulic actuator
Chainwheel gear box

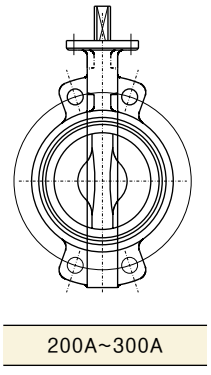
Testing
API598
MSS SP 61, ANSI B 16.104

Materials

Body	· Cast iron	ASTM A 126 Cl. B
	· Ductile iron	ASTM A 536 Gr 65-45-12
	· Carbon steel	ASTM A 216 WCB
	· Stainless steel	ASTM A 351 Gr CF8-CF8M
	· Bronze	ASTM B 62
Disc	· Ductile iron	ASTM A 536 Gr 65-45-12
	· Stainless steel	ASTM A 351 Gr CF8-CF8M
	· Aluminum bronze	ASTM B 148 Cl. C95500
	· Coated	EPDM, Viton, Buna-N, etc
Stem	· Stainless steel	ASTM A 276 304
	· Stainless steel	ASTM A 276 410
	· Stainless steel	ASTM A 276 316
	· Stainless steel	17-4PH ASTM A 564 TYPE 630
	· K-Monel	ASTM B 164
Seat	Elastomer	Working temperature
	· EPDM	0℃ ~ + 80℃
	· NBR	0℃ ~ + 70℃
	· Viton	−20℃ ~ +150℃
	· Silicon	−20℃ ~ +120℃
	· Neoprene	−10℃ ~ + 70℃
Packing	· EPDM	
	· NBR	
	· Viton	
Gland	· PP	





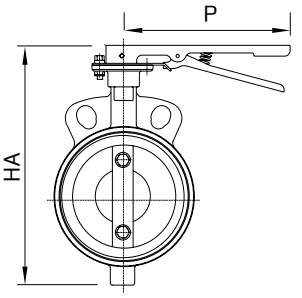


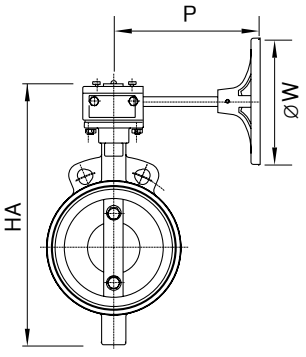
Valve dimensions

Unit(mm)

Size		ØD	Ød	L	H	h1	h2	Stem		Top flange to ISO 5211					O	WT (kg)
Inch	mm							ØU	G	Type	ØN	ØP	m	Øs		
1 ½″	40	86	40	41	205	58	124	10	8	F07	90	70	4	9	10	3.1
2″	50	105	52	43	227	66.5	130.5	14	10	F07	90	70	4	9	11	3.7
2½″	65	114	65	46	241	71	140	14	10	F07	90	70	4	9	11	4
3″	80	129	80	46	263	83	150	14	10	F07	90	70	4	9	11	4.4
4″	100	155	100	52	290	95	163	16	12	F07	90	70	4	9	11	5.9
5″	125	180	125	56	319	110	178	19	15	F07	90	70	4	9	12	8.9
6″	150	207	150	56	347	124	191	19	15	F07	90	70	4	9	12	9
8″	200	260	198	60	433	163	238	22	18	F07	90	70	4	9	13	11
10″	250	331	248	68	546	227	285	28	20	F10	125	102	4	12	15	20
12″	300	377	298	78	601	252	315	28	20	F10	125	102	4	12	15	31.5

refer to flange drilling on page 24

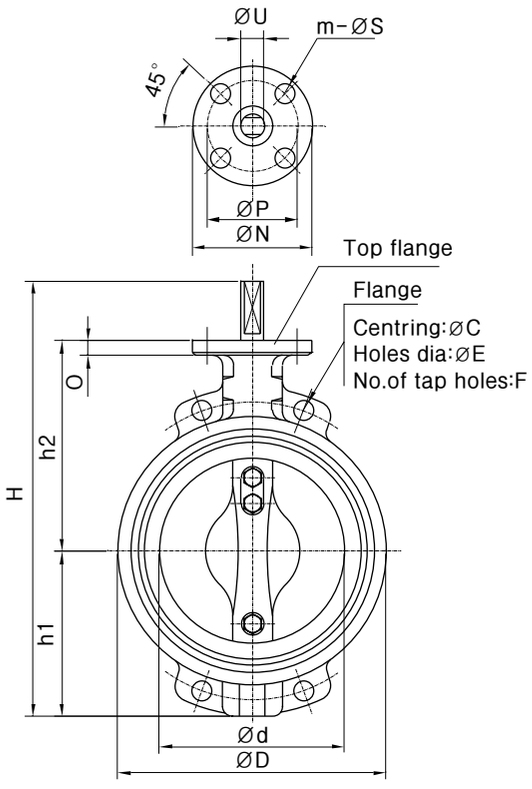


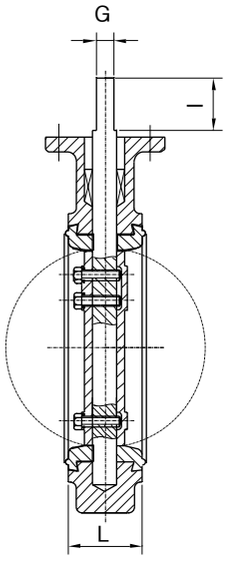


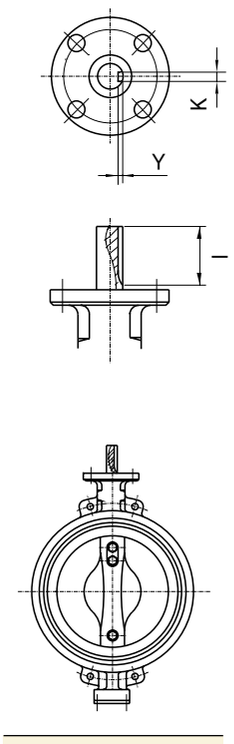
Dimensions

Unit(mm)

Size	Inch	2″	2.5″	3″	4″	5″	6″	8″	10″	12″
	mm	50	65	80	100	125	150	200	250	300
LEVER	HA	228	246	268	292	327	358.5	445		
	P	210	210	210	262	262	262	297		
GEAR	HA	254	264	280	316	351	382.5	469	568	636
	P	150	150	150	150	150	150	225	270	270
	W	150	150	150	150	150	150	190	250	250







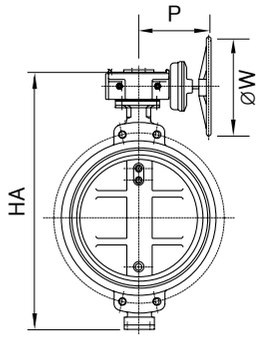
Size 16″~ 40″

Valve dimensions

Unit(mm)

Size		ØD	Ød	L	H	h1	h2	Stem					Top flange to ISO 5211					O	WT (kg)
Inch	mm							ØU	G	I	Y	K	Type	ØN	ØP	m	Øs		
14″	350	416	327	78	675	271	324	32	19.5	45	-	-	F10	125	102	4	12	20	43
16″	400	475	387	102	817	343	369	35	-	60	5	10	F14	175	140	4	18	23	63.5
18″	450	535	438	114	877	366	406	38	-	60	5	10	F14	175	140	4	18	23	99
20″	500	590	477	127	1008	421	485	45	-	60	5	10	F16	230	190	6	19	34	114.5
24″	600	695	560	154	1180	493	570	50	-	60	5	10	F16	230	190	6	19	34	214.5
28″	700	800	690	165	1355	580	574	70	-	120	5	10	F25	230	190	6	18.5	35	377
30″	750	857	729	180	1445	656	615	70	-	120	5	10	F25	300	250	6	22	35	460
32″	800	920	785	180	1495	630	669	80	-	140	5.5	14	F25	300	250	6	22	35	542
36″	900	1020	900	180	1625	690	671	80	-	140	5.5	14	F30	300	250	6	22	38	699
40″	1000	1125	990	200	1802	790	842	90	-	140	5.5	14	F30	300	250	6	22	40	977

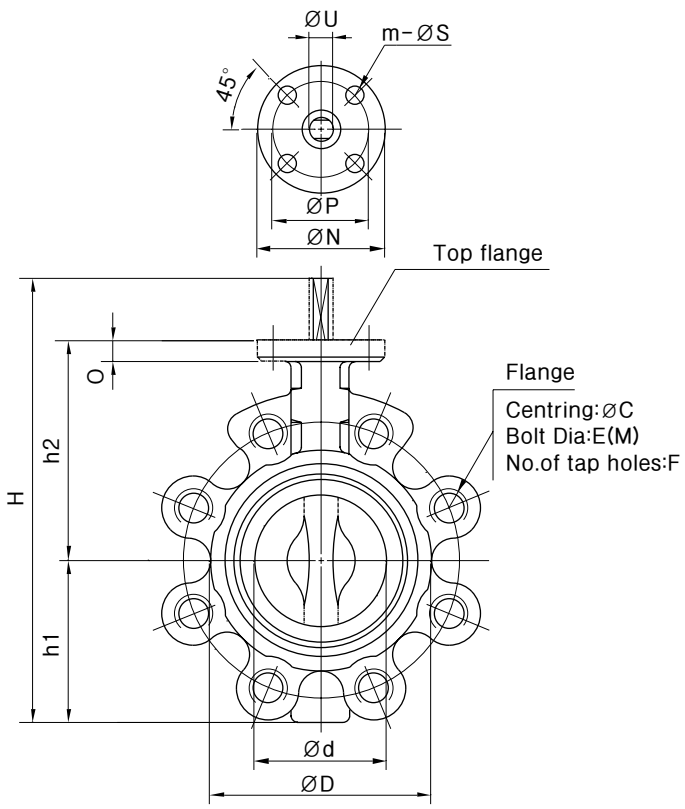
refer to flange drilling on page 24

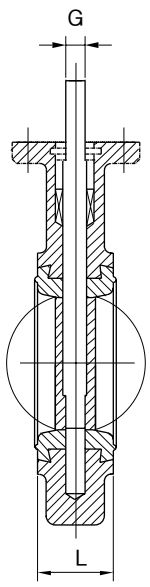


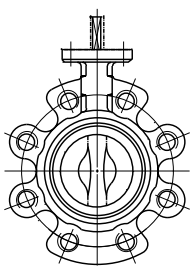
Dimensions

Unit(mm)

Size	Inch	14″	16″	18″	20″	22″	24″	28″	30″	32″	36″	40″
	mm	350	400	450	500	550	600	700	750	800	900	1000
GEAR	HA	657	807	867	1013	1059	1172	1310	1355	1455	1510	1775
	P	270	330	330	330	330	330	320	320	320	330	330
	W	300	400	400	400	400	400	700	700	700	800	800







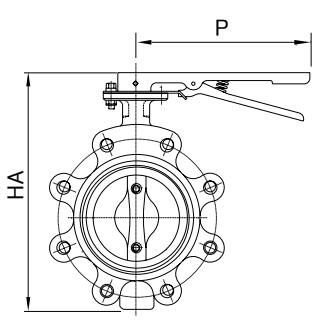
Size 10″~ 12″

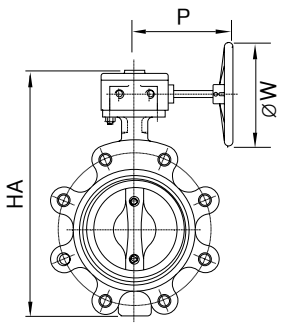
Valve dimensions

Unit(mm)

Size		ØD	Ød	L	H	h1	h2	Stem		Top flange to ISO 5211					O	WT
Inch	mm							ØU	G	Type	ØN	ØP	m	Øs		(kg)
1 ½″	40	86	40	41	205	58	124	10	8	F07	90	70	4	9	10	3.5
2″	50	100	52	43	235	72.5	130.5	14	10	F07	90	70	4	9	11	4.1
2 ½″	65	112	65	46	237	75.5	129.5	14	10	F07	90	70	4	9	11	5.5
3″	80	126	80	46	255	82	143	14	10	F07	90	70	4	9	11	6.8
4″	100	153	100	52	292	99.5	160.5	16	12	F07	90	70	4	9	11	8.6
5″	125	182	125	56	317	111	177	19	15	F07	90	70	4	9	12	10.5
6″	150	210	150	56	357	134	191	19	15	F07	90	70	4	9	12	12.5
8″	200	255	198	60	412	163	217	22	18	F07	90	70	4	9	13	21.4
10″	250	328	248	68	519	218	267	28	20	F10	125	102	4	12	15	29.3
12″	300	374	298	78	588	249	295	28	20	F10	125	102	4	12	15	44

refer to flange drilling on page 24

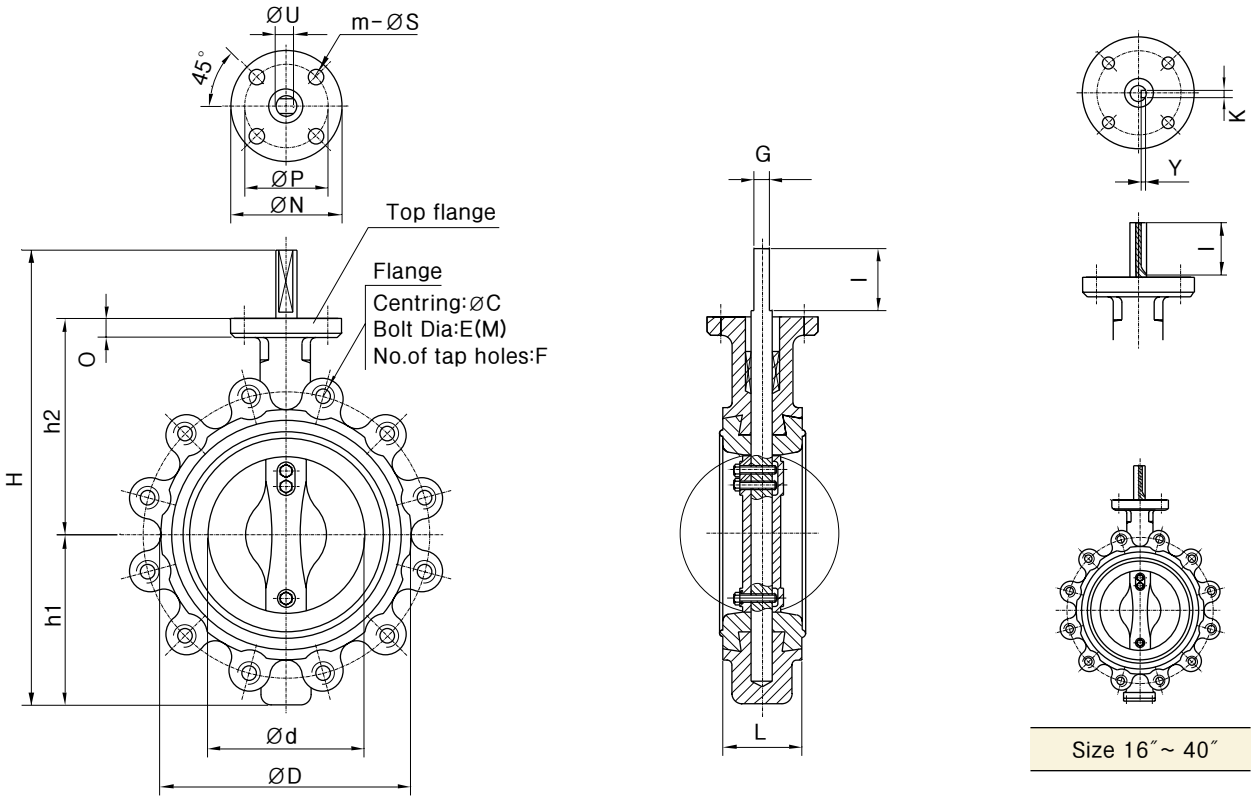




Dimensions

Unit(mm)

Size	Inch	2″	2.5″	3″	4″	5″	6″	8″	10″	12″
	mm	50	65	80	100	125	150	200	250	300
LEVER	HA	233	245	262	292	318	359	431		
	P	227	227	227	285	285	285	285		
GEAR	HA	257	265	280	314	359	397	452	553	614
	P	130	130	130	130	160	160	210	210	270
	W	150	150	150	150	190	190	250	250	300

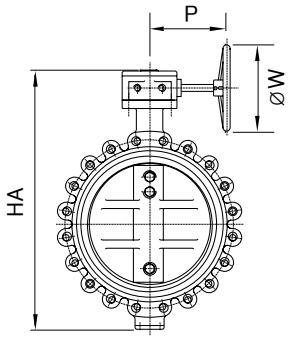


Valve dimensions

Unit(mm)

Size		ØD	Ød	L	H	h1	h2	Stem					Top flange to ISO 5211					O	WT
Inch	mm							ØU	G	I	Y	K	Type	ØN	ØP	m	Øs		(kg)
14″	350	416	327	78	675	271	324	32	19.5	45	-	-	F10	125	102	4	12	20	62.2
16″	400	475	387	102	817	343	369	35	-	60	5	10	F14	175	140	4	18	23	112
18″	450	535	438	114	877	366	406	38	-	60	5	10	F14	175	140	4	18	23	153
20″	500	586	477	127	1008	421	485	45	-	60	5	10	F16	230	190	6	19	34	199
24″	600	695	560	154	1180	493	570	50	-	60	5	10	F16	230	190	6	19	34	283
28″	700	800	690	165	1355	580	574	70	-	120	5	10	F25	230	190	6	18.5	35	490
30″	750	857	729	180	1445	656	615	70	-	120	5	10	F25	300	250	6	22	35	598
32″	800	920	785	180	1495	630	669	80	-	140	5.5	14	F25	300	250	6	22	35	677
36″	900	1020	900	180	1625	690	671	80	-	140	5.5	14	F30	300	250	6	22	38	874
40″	1000	1125	990	200	1802	790	842	90	-	140	5.5	14	F30	300	250	6	22	40	1221

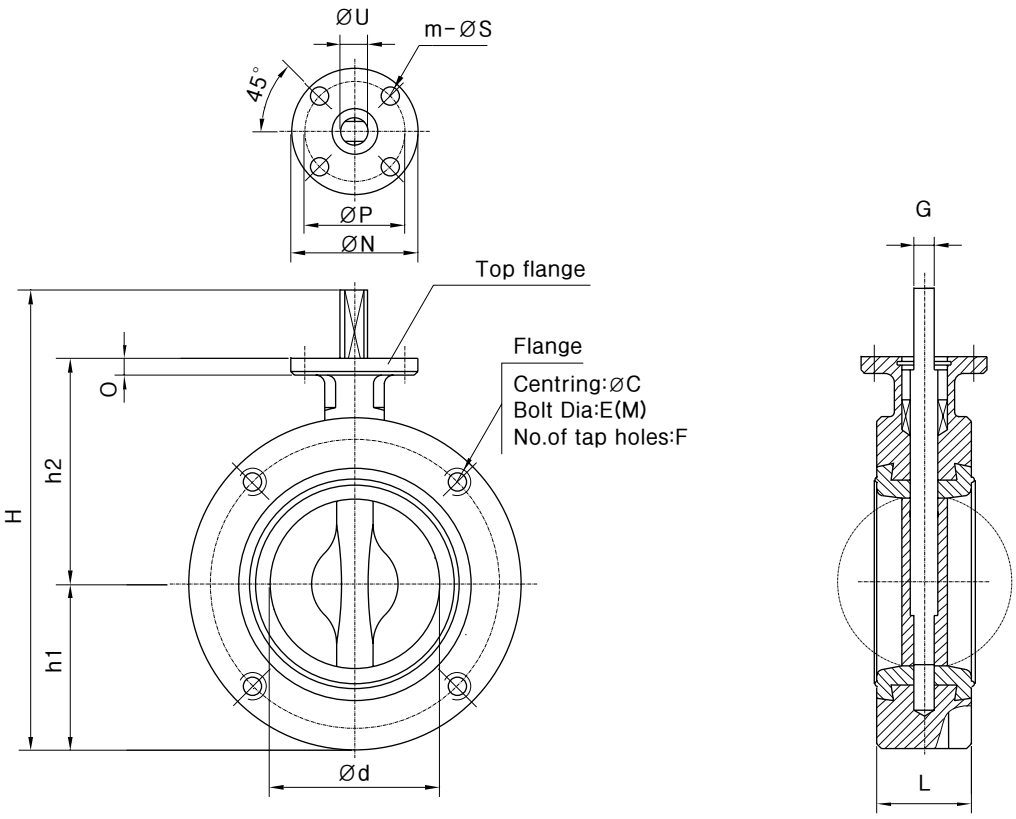
refer to flange drilling on page 24



Dimensions

Unit(mm)

Size	Inch	14″	16″	18″	20″	22″	24″	28″	30″	32″	36″	40″
	mm	350	400	450	500	550	600	700	750	800	900	1000
GEAR	HA	657	807	867	1013	1059	1172	1310	1355	1455	1510	1775
	P	270	330	330	330	330	330	320	320	320	330	330
	W	300	400	400	400	400	400	700	700	700	800	800

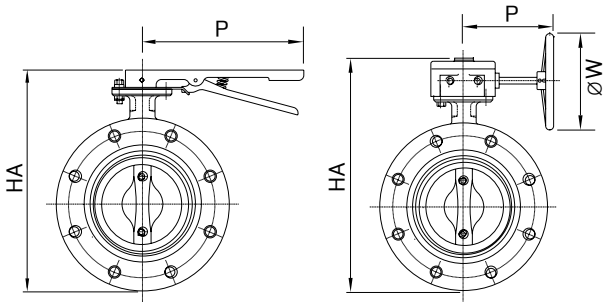


Valve dimensions

Unit(mm)

Size		Ød	L	H	h1	h2	Stem		Top flange to ISO 5211					O	WT
Inch	mm						ØU	G	Type	ØN	ØP	m	Øs		(kg)
1 ½″	40	40	41	205	58	124	10	8	F07	90	70	4	9	10	6.2
2″	50	52	43	240	77.5	130.5	14	10	F07	90	70	4	9	11	6.8
2 ½″	65	65	46	247	87.5	129.5	14	10	F07	90	70	4	9	11	8.9
3″	80	80	46	266	92.5	143	14	10	F07	90	70	4	9	11	10.2
4″	100	100	52	298	105	160.5	16	12	F07	90	70	4	9	11	14.5
5″	125	125	56	331	125	177	19	15	F07	90	70	4	9	12	16.8
6″	150	150	56	363	140	191	19	15	F07	90	70	4	9	12	19.8
8″	200	198	60	412	163	217	22	18	F07	90	70	4	9	13	31.2
10″	250	248	68	506	205	267	28	20	F10	125	102	4	12	15	46.2
12″	300	298	78	538	248.5	295	28	20	F10	125	102	4	12	15	58.8

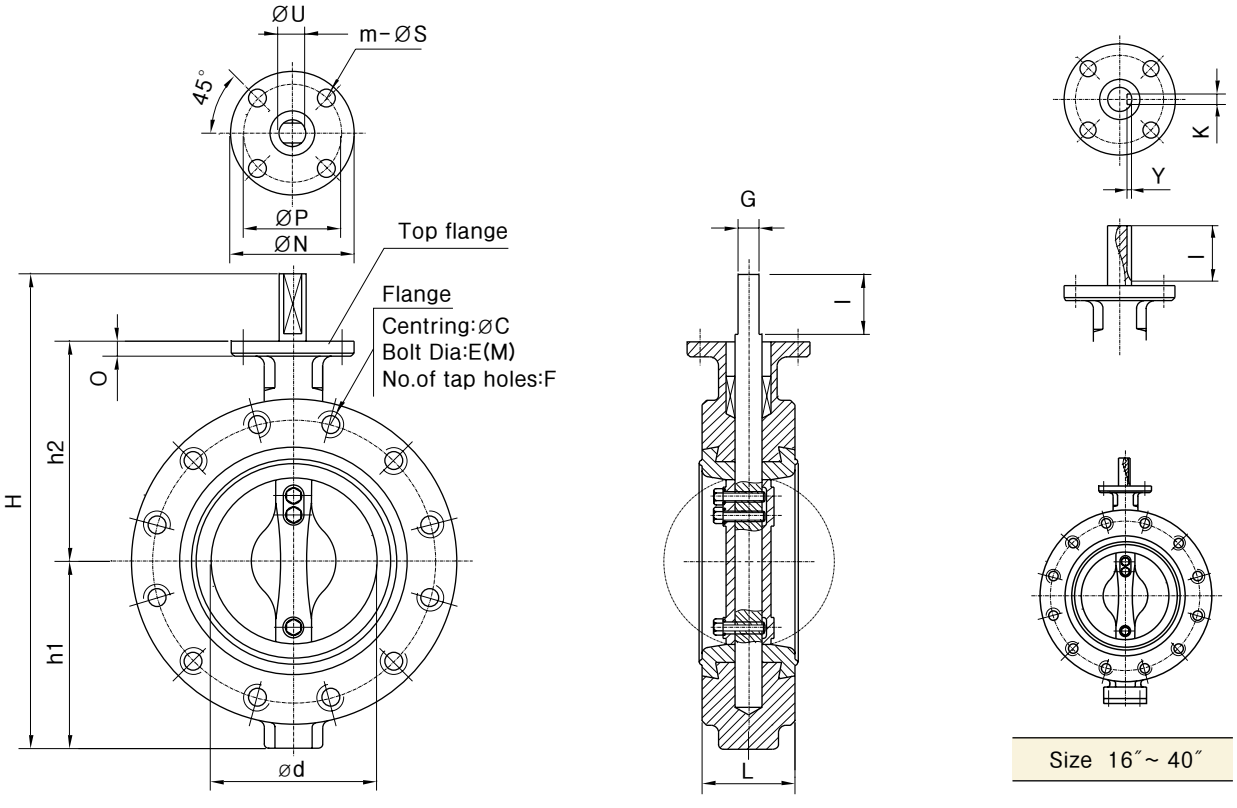
refer to flange drilling on page 24



Dimensions

Unit(mm)

Size	Inch	2″	2.5″	3″	4″	5″	6″	8″	10″	12″
	mm	50	65	80	100	125	150	200	250	300
LEVER	HA	238.5	257.5	272.5	298	333	365	433		
	P	227	227	227	285	285	285	285		
GEAR	HA	262.5	277.5	290.5	320	374	403	454	558	602.5
	P	130	130	130	130	160	160	210	220	270
	W	150	150	150	150	190	190	250	250	300

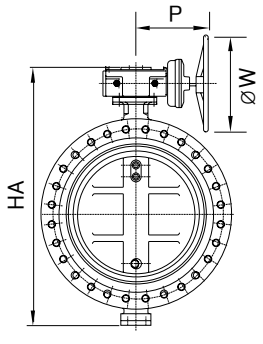


Valve dimensions

Unit(mm)

Size		Ød	L	H	h1	h2	Stem					Top flange to ISO 5211					O	WT
Inch	mm						ØU	G	I	Y	K	Type	ØN	ØP	m	Øs		(kg)
14″	350	327	78	675	271	324	32	19.5	45	-	-	F10	125	102	4	12	20	66.6
16″	400	387	102	817	343	369	35	-	60	5	10	F14	175	140	4	18	23	96
18″	450	438	114	877	366	406	38	-	60	5	10	F14	175	140	4	18	23	147
20″	500	477	127	1008	421	485	45	-	60	5	10	F16	230	190	6	19	34	161
24″	600	560	154	1180	493	570	50	-	60	5	10	F16	230	190	6	19	34	292
28″	700	690	165	1355	580	574	70	-	120	5	10	F25	230	190	6	18.5	35	539
30″	750	729	180	1445	656	615	70	-	120	5	10	F25	300	250	6	22	35	658
32″	800	785	180	1495	630	669	80	-	140	5.5	14	F25	300	250	6	22	35	745
36″	900	900	180	1625	690	671	80	-	140	5.5	14	F30	300	250	6	22	38	944
40″	1000	990	200	1802	790	842	90	-	140	5.5	14	F30	300	250	6	22	40	1307

refer to flange drilling on page 24



Dimensions

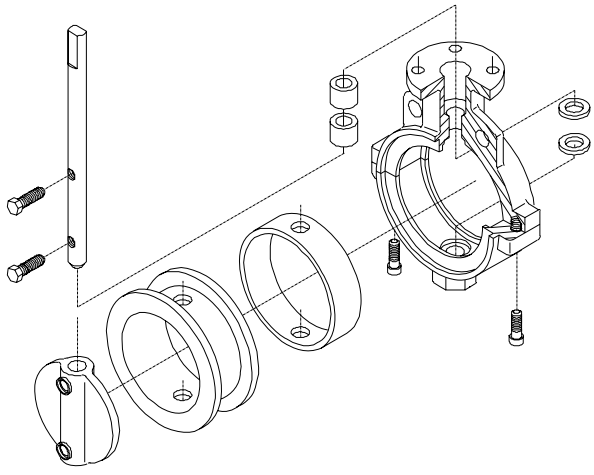
Unit(mm)

Size	Inch	14″	16″	18″	20″	22″	24″	28″	30″	32″	36″	40″
	mm	350	400	450	500	550	600	700	750	800	900	1000
GEAR	HA	657	807	867	1013	1059	1172	1310	1355	1455	1510	1775
	P	270	330	330	330	330	330	320	320	320	330	330
	W	300	400	400	400	400	400	400	400	400	800	800

Teflon® covered one-piece stainless steel disc and shaft

The seat configuration of the resiliency of elastomer back-up ring and the chemical resistance of a Teflon® makes valve with more suitable for application such as toxic and corrosive media where elastomers are unsuitable.

One-piece disc/shaft provide the minimum obstruction to fluid flow since shaft-attachment obstruction is eliminated. This results in excellent flow characteristics and makes a valve suited for the processing industries because fluid contact is limited to the seat and disc only



Application
Chemicals, acids, corrosive products

General Characteristics
Two piece-body
Bi-directional
Centred butterfly
1 piece stem and burrerfly

Construction
Body cast steel / stainless steel
Stainless steel butterfly PTFF lined
PTFF sleeve with rubber backup pad

Coating
Painting: oven backed epoxy powder coating, 150μ

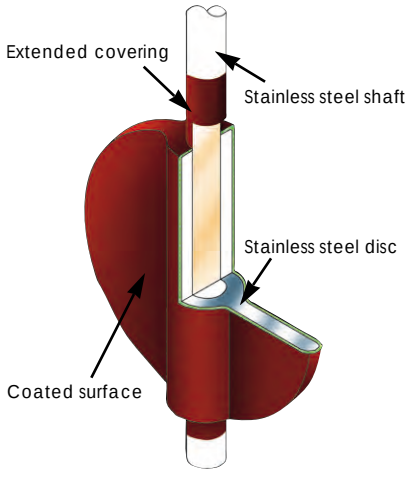
Working Conditions
5.5 Bar pressure

Hydraulic Tests
1.1 times the maximum working pressure

Connection
Between flanges ISO PN 10/16, ANSI B 16.5.150

Handling Possibilities
Lever
Gear box with opening indicator
Single or double effect pneumatic actuator
Electric motors 220/380 V mono/tri

One-piece Stainless steel disc/shaft



Cut away PFA coated Disc-Stem
Stainless steel with finish allows proper secondary seal and bearing conditions at seat hole

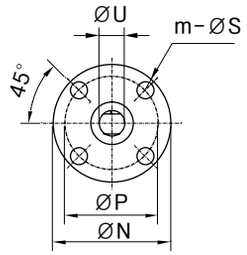
Extended covering from primary seal through secondary seal into seat hole area assures stem isolation

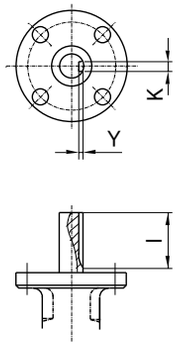
Complete encapsulation affords complete isolation of steel disc

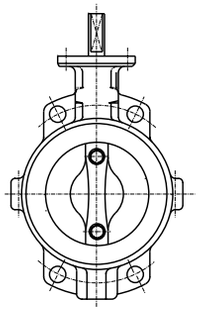
PFA-covered disc suitable not only for chemically resistant but for handling abrasives in the processing industries

Material standard

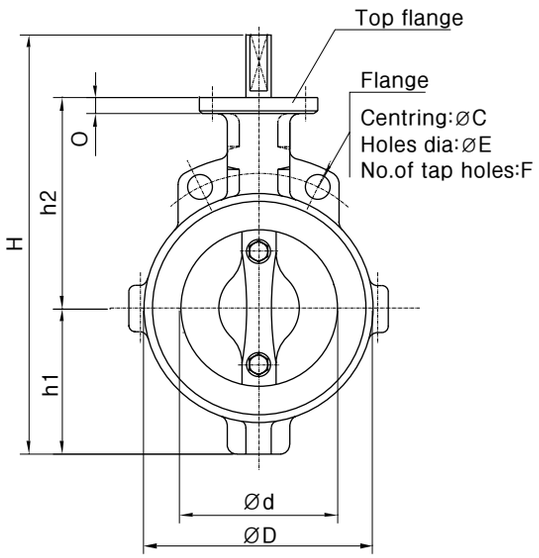
Body	Cast iron - Aluminium - Ductile iron
Disc	Hard rubber lined steel - SS 304-316
Seat	All kinds of rubber

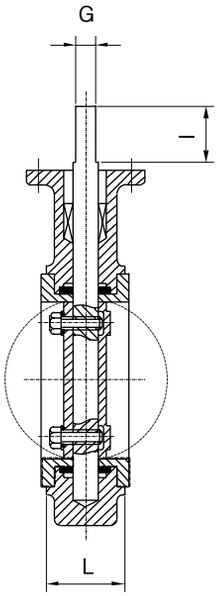


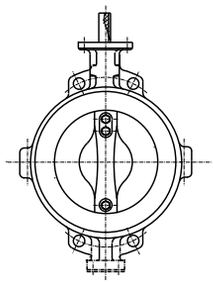




Size 8″







Size 16″~ 24″

Valve dimensions

Unit(mm)

Size		ØD	Ød	L	H	h1	h2	Stem					Top flange to ISO 5211					O	WT (kg)
Inch	mm							ØU	G	I	Y	K	Type	ØN	ØP	m	Øs		
2″	50	102	52	43	227	66.5	130.5	14	10	38	-	-	F07	90	70	4	9	11	4.3
2½″	65	115	65	46	241	71	140	14	10	38	-	-	F07	90	70	4	9	11	4.5
3″	80	128	80	46	263	83	150	14	10	38	-	-	F07	90	70	4	9	11	4.9
4″	100	153	100	52	290	95	163	16	12	38	-	-	F07	90	70	4	9	11	6.3
5″	125	183	125	56	319	110	178	19	15	38	-	-	F07	90	70	4	9	12	8.9
6″	150	210	150	56	347	124	191	19	15	38	-	-	F07	90	70	4	9	12	9.4
8″	200	259	198	60	433	163	238	22	18	38	-	-	F07	90	70	4	9	13	11.5
10″	250	328	248	68	546	227	285	28	20	45	-	-	F10	125	102	4	12	15	21
12″	300	374	298	78	601	252	315	28	20	45	-	-	F10	125	102	4	12	15	32
14″	350	416	327	78	675	271	324	32	19.5	45	-	-	F10	125	102	4	12	20	43.6
16″	400	475	387	102	817	343	369	35	-	60	5	10	F14	175	140	4	18	23	64
18″	450	535	438	114	877	366	406	38	-	60	5	10	F14	175	140	4	18	23	99.7
20″	500	586	477	127	1008	421	485	45	-	60	5	10	F16	230	190	6	19	34	115

Specifications

Product range

40mm up to 1000mm(1½″~40″)

Pressure Temperature range

Metal seat type WMP 4.90Mpa (50kgf/㎠) WMT 450 deg. Cels.
Teflon seat type WMP 1.96Mpa (20kgf/㎠) WMT 230 deg. Cels.

Flange connections

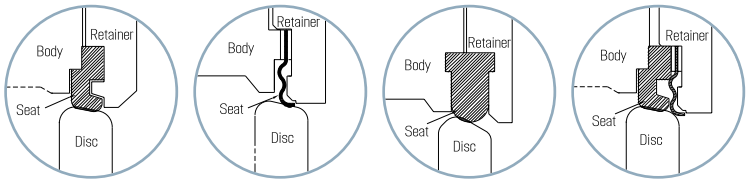
ISO PN 10, 16, 20 and 25	MSS SP 44 CL. 150, 300
ANSI B 16.1 CL.	ANSI B 16.5 CL. 150, 300
BS 4504, PN 10, PN 16	BS 10 Table D and E
AS2129 Table D and E	JIS B 2210 10K, 16K and 20K

Test and Inspection Conforms to API 598

Body test 1.5 times the maximum working pressure with water. The test is performed on the assembled valve with the disc in half open position

Seat and shaft seal test 1.1 times the maximum working pressure. The shaft seal test and inspection is conducted simultaneously with seat test

Seat Construction



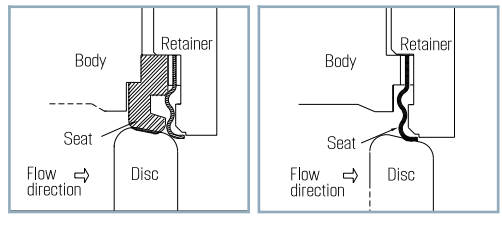
RTFE Seat | Flat Metal Seat | Rubber Seat | Fire Safe PTFE with Metal

Materials

Body	Ductile iron	ASTM A 536 Gr 65-45-12
	Carbon steel	ASTM A 216 WCB
	Stainless steel	ASTM A 351 Gr CF8-CF8M
	Aluminum bronze	ASTM B 148 C95500
Disc	Stainless steel	ASTM A 351 Gr CF8-8M
	Aluminum bronze	ASTM B 148 C95500
Stem	Stainless steel	ASTM A 276 304
	Stainless steel	ASTM A 276 410
	Stainless steel	ASTM A 276 316
	Stainless steel	17-4PH ASTM A 564 TYPE 630
	K-Monel	ASTM B 164
Seat	Elastomer	
	Teflon®	
	Metal	

Fire-safe seat

After a fire when the R-PTFE seat has burned away, the supplementary metal sealing seat will be activated automatically and prevent from excessive flow



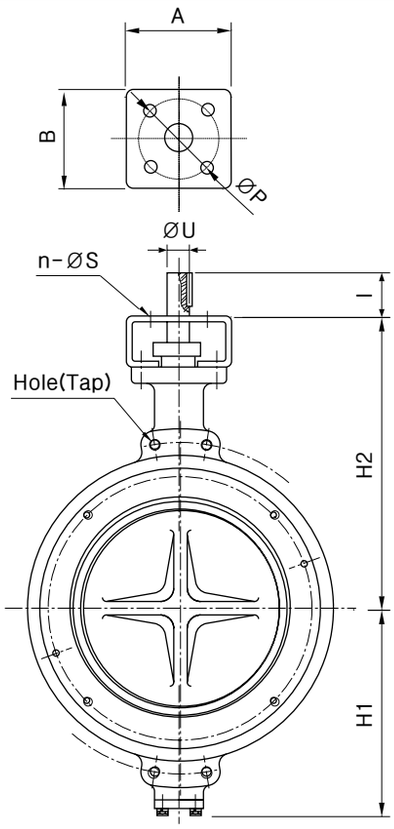
Before burnt | After burnt

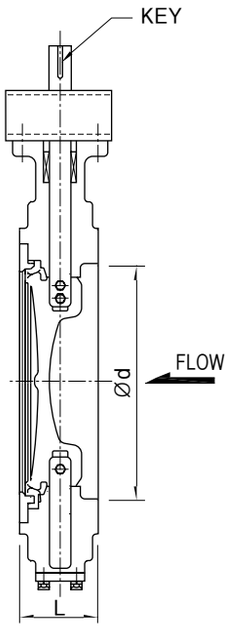
Features

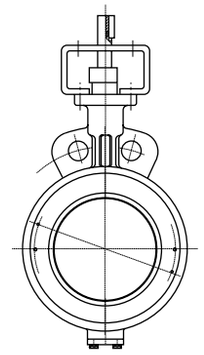
- Double eccentric disc and stem
- Spherical sealing structure
- Low operating torque
- Low friction and wear
- Renewable catridge seat

Application

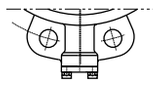
- Chemical processing
- Power plant
- Hydrocarbon processing
- Shipbuilding







Size 2″~ 6″

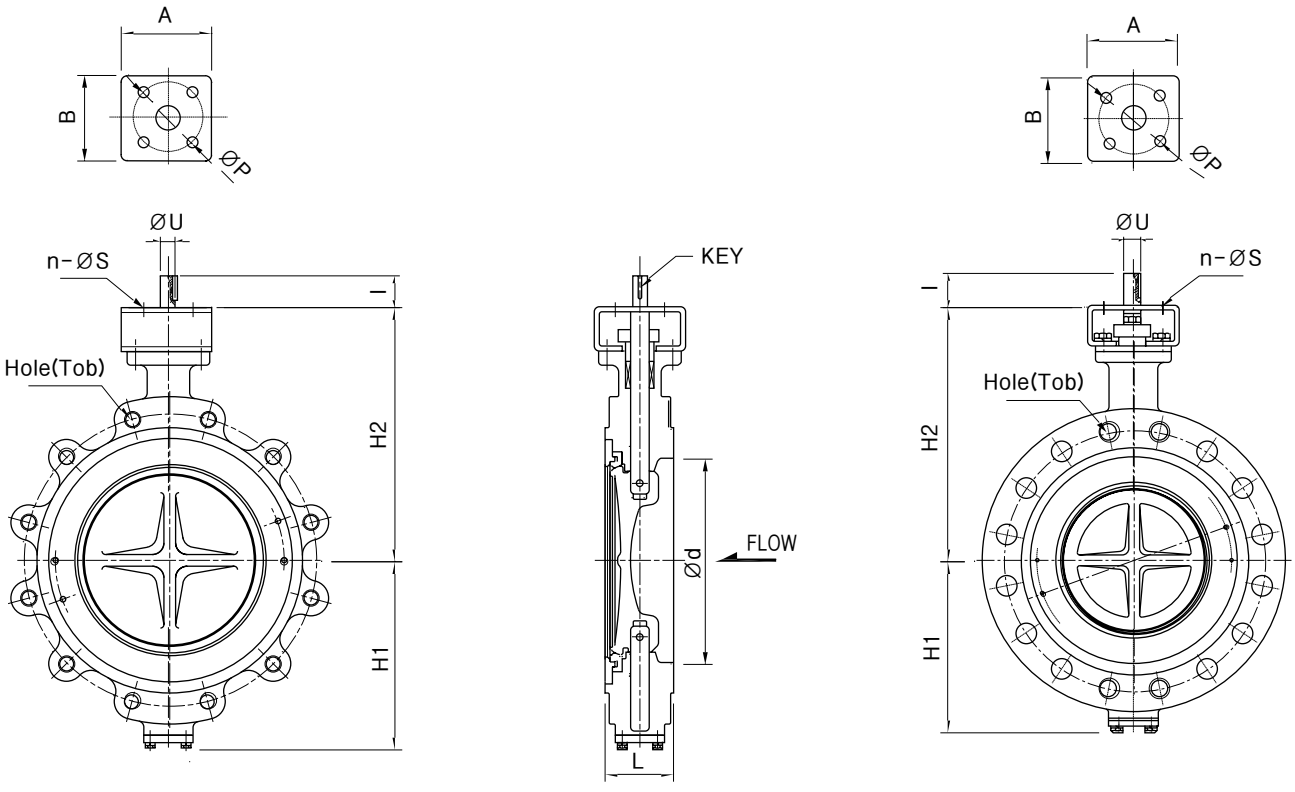


Size 8″~ 12″

Valve dimensions

Unit(mm)

Size		Ød	L	H1	H2	Stem			Top flange to ISO 5211					
Inch	mm					l	ØU	Key	Type	A	B	ØP	n	Øs
2″	50	55	60	62	182	40	14	5×5×29	F07	82	70	70	4	10
2½″	65	70	48	72	192	40	14	5×5×29	F07	82	70	70	4	10
3″	80	84	48	82	202	40	14	5×5×29	F07	82	70	70	4	10
4″	100	104	54	92	212	40	14	5×5×29	F07	82	70	70	4	10
5″	125	130	57	110	232	40	18	5×5×29	F07	82	70	70	4	10
6″	150	155	57	130	247	40	18	5×5×29	F07	82	70	70	4	10
8″	200	205	63	180	297	55	22	6×6×44	F07	111	96	102	4	10
10″	250	225	71	238	350	60	28	8×7×44	F10	132	114	102	4	10
12″	300	305	81	275	370	65	32	8×7×44	F10	132	114	102	4	10
14″	350	340	92	310	445	80	35	10×8×44	F10	156	136	140	4	10
16″	400	380	102	325	480	80	40	10×8×69	F14	156	136	140	4	10
18″	450	430	114	365	510	80	45	14×9×69	F14	156	136	140	4	10
20″	500	480	127	405	525	95	50	18×11×99	F16	200	180	165	4	10
22″	550	540	170	410	555	95	60	18×11×99	F16	200	180	165	4	10
24″	600	590	154	470	580	95	60	18×11×99	F16	200	180	165	4	10
26″	650	640	210	487	664	95	65	18×11×99	F16	200	180	165	4	10
28″	700	690	220	510	686	95	70	20×12×99	F25	300	270	254	8	18
30″	750	736	197	574	735	95	75	20×12×99	F25	300	270	254	8	18
32″	800	786	190	580	735	95	80	20×14×99	F25	300	270	254	8	18
36″	900	890	216	678	890	95	90	25×14×119	F30			298	8	22
40″	1000	980		724	950	95	100	28×16×129	F30			298	8	22



Valve dimensions

Unit(mm)

Size		Ød	L	H1	H2	Stem			Top flange to ISO 5211					
Inch	mm					I	ØU	Key	Type	A	B	ØP	n	Øs
2″	50	55	60	62	182	40	14	5×5×29	F07	82	70	70	4	10
2½″	65	70	48	72	192	40	14	5×5×29	F07	82	70	70	4	10
3″	80	84	48	82	202	40	14	5×5×29	F07	82	70	70	4	10
4″	100	104	54	92	212	40	14	5×5×29	F07	82	70	70	4	10
5″	125	130	57	110	232	40	18	5×5×29	F07	82	70	70	4	10
6″	150	155	57	130	247	40	18	5×5×29	F07	82	70	70	4	10
8″	200	205	63	180	297	55	22	6×6×44	F07	111	96	102	4	10
10″	250	225	71	238	350	60	28	8×7×44	F10	132	114	102	4	10
12″	300	305	81	275	370	65	32	8×7×44	F10	132	114	102	4	10
14″	350	340	92	310	445	80	35	10×8×44	F10	156	136	140	4	10
16″	400	380	102	325	480	80	40	10×8×69	F14	156	136	140	4	10
18″	450	430	114	365	510	80	45	14×9×69	F14	156	136	140	4	10
20″	500	480	127	405	525	95	50	18×11×99	F16	200	180	165	4	10
22″	550	540	170	410	555	95	60	18×11×99	F16	200	180	165	4	10
24″	600	590	154	470	580	95	60	18×11×99	F16	200	180	165	4	10
26″	650	640	210	487	664	95	65	18×11×99	F16	200	180	165	4	10
28″	700	690	220	510	686	95	70	20×12×99	F25	300	270	254	8	18
30″	750	736	197	574	735	95	75	20×12×99	F25	300	270	254	8	18
32″	800	786	190	580	735	95	80	20×14×99	F25	300	270	254	8	18
36″	900	890	216	678	890	95	90	25×14×119	F30			298	8	22
40″	1000	980		724	950	95	100	28×16×129	F30			298	8	22

Specifications

Product range
80mm ~ 1200mm

Design standard
ANSI B16.34 BS5155, MSS SP68, API609

Flange connections
API 609, BS 5155, DIN 3840

Pressure Temperature range
ASME/ANSI 16.34

Face to Face Dimension
ANSI B16.10 ISO 5752, API 609 BS 5155

Testing
API 598, MSS-SP 61, ANSI 16.104

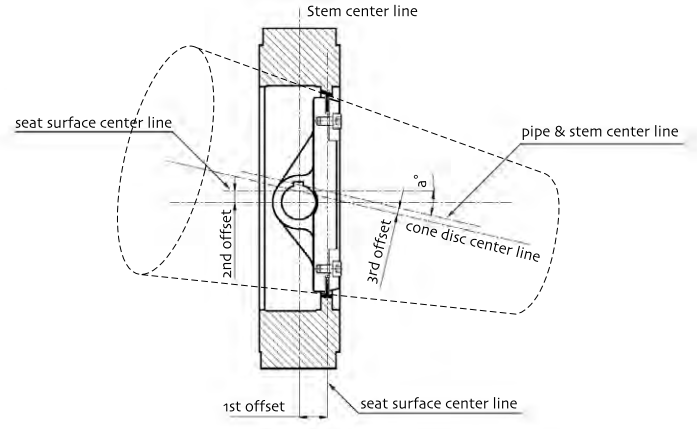
Material

Body	Carbon Steel, Ductile iron, Stainless Steel
Disc	Aluminium Bronze
Stem	Stainless steel
Seat	Stellite overlay, Laminated Metal Seat, Solid Metal Seat

Features

Zero leakage (bubble tightness)
Shut off and throttling of gaseous and liquid media
Low operating torque
Long sevice life
High temperature compatibility

Triple offset Design Princlples



Characteristics and Merits

Excellent durability of seat part and low operating torque by non-rubbing characteristics with triple offset construction

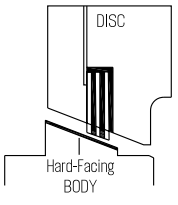
Bi-directional zero leakage service by resilient metal sealing and torque seating

Unrestricted selection of face to face dimensions for API, ASME(ANSI), BS, ISO, etc. and perfect interchangeability of gate, ball, plug, high performance butterfly, and other valves

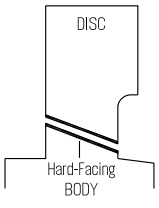
Low emission by quarter turn construction and good performance at automation by virtue of low operating torque and low cost

The valve stem is offset by seat(1st offset) and the valve seat surface center line is offset against the center line of pipe (2nd offset) and the conical axis is offset by valve center line (3rd offset: inclined cone) The 3rd offset completely eliminates rubbing.

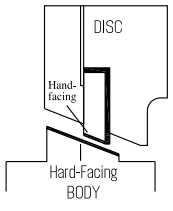
The seat surfaces of body and seal ring in triple offset valve contact with the inclined “cone-in cone” and this design provides excellent sealing and seat part durability by slight wedging effect.



Laminated Metal Seat
316ss+ Graphite Laminated



Hard Faced Seat



Solid Metal Seat

Body Seat

The valve seat shall be integrated with the body

Stellite or stainless steel shall be applied on the seating surfaces of valve body

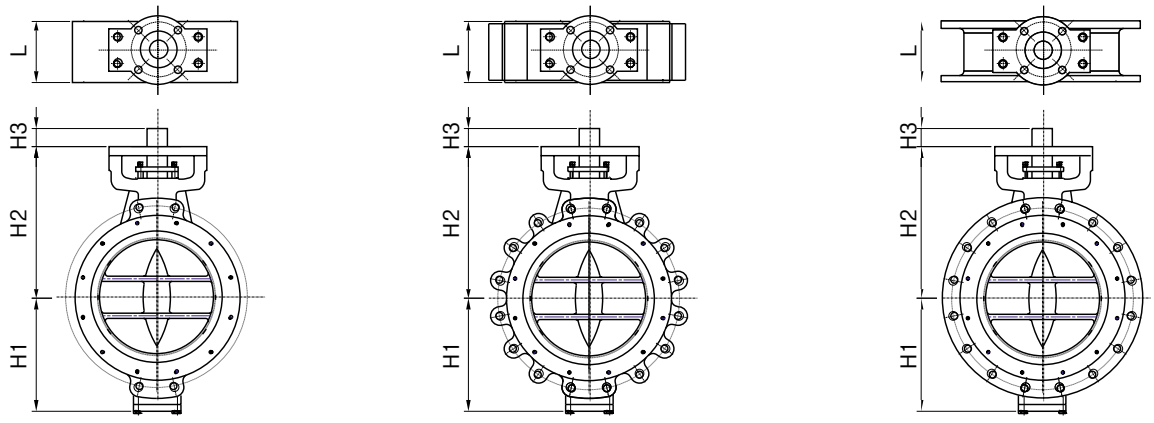
The valve seat is designed for inclined cone to ensure non-rubbing, non-jamming, bi-directional shutoff, and zero leakage

Seal Ring (Laminated)

The seal ring shall be resilient stainless steel lamalla, alternated by graphite, aramid fiber and cermic fiber layers

The surface contacting between seal ring and body seat is an inclined cone type and the inclined angle generates a slight wedging effect

With a seat retainer ring bolted to the disc, the seal ring is fixed to disc not so tightly that it can be replaced easily



150LB Manual Gear Operating Type

Unit(mm)

Size		H	H1	H2	H3	L (F TO F)			P	ØW	WEIGHT (kg)		
Inch	mm					WAFER	LUG	FLANGE			WAFER	LUG	FLANGE
6″	150	300	245	180	35	57	57	140	206	300	20	22	48
8″	200	310	260	195	35	64	64	152	206	300	45	47	89
10″	250	335	285	225	65	71	71	165	206	300	57	61	112
12″	300	390	335	265	80	81	81	178	230	400	85	91	161
14″	350	420	365	290	80	92	92	190	230	400	133	142	228
16″	400	500	435	340	80	102	102	216	279	450	186	199	303
18″	450	515	452	360	80	114	114	222	279	450	213	229	364
20″	500	565	500	395	80	127	127	229	312	560	334	364	499
24″	600	635	570	465	110	154	154	267	312	560	455	492	699
28″	700	775	685	570	130	165	165	292	371	630	718	777	860
30″	750	785	695	600	130	165	165	318	371	630	864	934	1085
32″	800	840	750	630	130	190	190	318	425	710	1090	1119	1241
36″	900	910	820	690	160	200	200	330	425	710	1418	1553	1716
40″	1000	925	835	720	175	216	216	410	425	710	1743	1943	2208
42″	1050	980	860	750	175	251	251	410	513	800	2108	2343	2488
48″	1200	1140	1020	845	200	276	276	470	513	800	3004	3284	3440

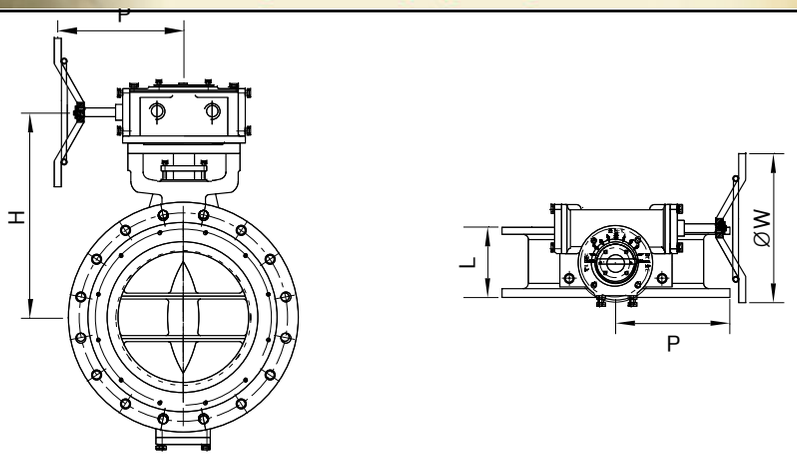
Weight and dimensions are approximate

300LB Manual Gear Operating Type

Unit(mm)

Size		H	H1	H2	H3	L (F TO F)			P	ØW	WEIGHT (kg)		
Inch	mm					WAFER	LUG	FLANGE			WAFER	LUG	FLANGE
6″	150	330	280	199	65	59	59	140	206	300	36	39	76
8″	200	350	295	218	80	73	73	152	230	400	51	56	93
10″	250	395	340	251	80	83	83	165	230	400	100	112	164
12″	300	450	395	296	80	92	92	178	230	400	134	150	222
14″	350	490	425	331	80	117	117	190	279	450	196	229	298
16″	400	545	480	377	110	133	133	216	279	450	232	277	357
18″	450	605	540	410	110	149	149	222	312	560	360	433	499
20″	500	645	580	440	130	159	159	229	312	560	457	549	621
24″	600	740	650	515	130	181	181	267	371	630	670	805	916
28″	700	910	820	640	200	229	229	292	371	630	1193	1363	1417
30″	750	940	850	690	200	241	241	318	425	710	1463	1658	1715
32″	800	970	880	720	200	241	241	318	425	710	1661	1856	1957
36″	900	1050	960	780	200	260	260	330	425	710	2281	2511	2590
40″	1000	1110	990	800	200	300	300	410	513	800	2214	2425	2585
42″	1050	1160	1050	840	200	300	300	410	513	800	2439	2649	2849
48″	1200	1270	1150	950	250	320	320	470	536	900	3384	3684	4106

Weight and dimensions are approximate



600LB Manual Gear Operating Type

Unit(mm)

Size		H	H1	H2	H3	L (F TO F)			P	ØW	WEIGHT (kg)		
Inch	mm					WAFER	LUG	FLANGE			WAFER	LUG	FLANGE
6″	150	365	310	238	80	78	78	210	230	400	65	72	135
8″	200	380	325	248	80	102	102	230	230	400	92	102	162
10″	250	465	400	316	80	117	117	250	279	450	134	187	268
12″	300	520	455	349	110	140	140	270	312	560	224	259	369
14″	350	535	470	374	110	155	155	290	312	560	285	329	364
16″	400	675	585	474	130	178	178	310	371	630	455	520	632
18″	450	715	625	476	130	200	200	330	371	630	555	635	739
20″	500	760	670	504	130	216	216	350	425	710	694	804	879
24″	600	840	750	55	180	232	232	390	425	710	1093	1243	1423

Weight and dimensions are approximate

900LB Manual Gear Operating Type

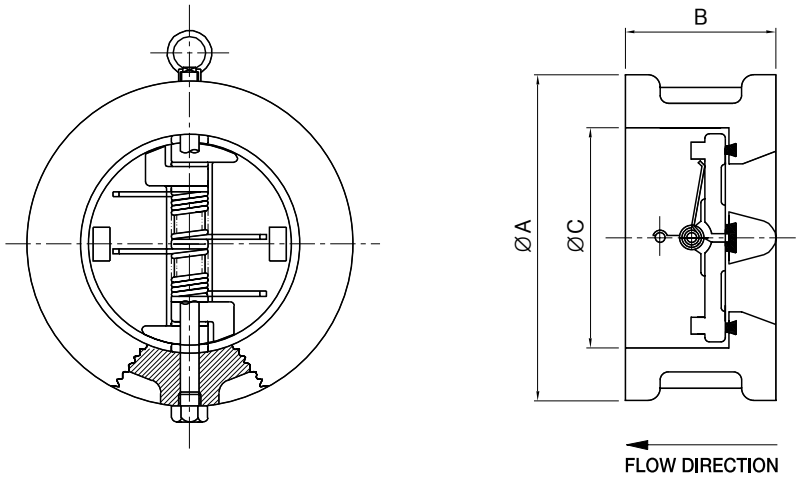
Unit(mm)

Size		H	H1	H2	H3	L (F TO F)			P	ØW	WEIGHT (kg)		
Inch	mm					WAFER	LUG	FLANGE			WAFER	LUG	FLANGE
6″	150	400	335	238	80	104	104	250	279	450	89	100	184
8″	200	445	380	281	80	112	112	310	312	560	134	151	256
10″	250	500	435	358	110	135	135	350	312	560	224	256	425
12″	300	590	500	383	110	170	170	380	371	630	298	352	496
14″	350	635	545	419	130	173	173	400	371	630	376	440	656
16″	400	730	640	455	130	210	210	430	425	710	570	663	834
18″	450	780	690	503	180	228	228	460	425	710	691	824	1044
20″	500	830	710	550	180	250	250	490	513	800	905	1069	1273
24″	600	950	820	656	200	275	275	530	513	800	1317	1704	2506

Weight and dimensions are approximate

* Not specified class and size, please contact sales department

Wafer Type Class 125~500



Unit(mm)

Size	Series	Flange Face	Dimensions			Flange Bolt Circle	Number of Bolts	Bolts Diameter	Bolts Length		Weight (kg)
			ØA	B	ØC				FF · RF	RJ	
50 (2″)	125	FF	105	54	60	120.6	4	5/8	145	–	3
	250	FF	111	54	60	127.0	8	5/8	170	–	4
	150	RF · R-22	105	60	60	120.6	4	5/8	155	155	3
	300	RF · R-23	111	60	60	127.0	8	5/8	155	175	3
	400-600	RF · R-23	111	60	60	127.0	8	5/8	175	180	3
	900	RF · R-24	143	70	60	165.1	8	7/8	225	225	6
	1500	RF · R-24	143	70	60	165.1	8	7/8	225	225	7
65 (2½″)	125	FF	124	60	73	139.7	4	5/8	150	–	4
	250	FF	130	60	73	149.3	8	3/4	180	–	5
	150	RF · R-25	124	67	73	139.7	4	5/8	165	165	4
	300	RF · R-26	130	67	73	149.3	8	3/4	175	195	4
	400-600	RF · R-26	130	67	73	149.3	8	3/4	195	195	4
	900	RF · R-27	165	83	73	190.5	8	1	250	250	7
	1500	RF · R-27	165	83	73	190.5	8	1	250	250	8
80 (3″)	125	FF	137	67	89	152.4	4	5/8	160	–	5
	250	FF	149	67	89	168.4	8	3/4	195	–	7
	150	RF · R-29	137	73	89	152.4	4	5/8	175	180	6
	300	RF · R-31	149	73	89	168.4	8	3/4	190	205	7
	400-600	RF · R-31	149	73	89	168.4	8	3/4	210	210	7
	900	RF · R-31	168	83	89	190.5	8	7/8	240	235	13
	1500	RF · R-35	175	83	89	203.2	8	1 1/8	270	270	14
100 (4″)	125	FF	175	67	114	190.5	8	5/8	170	–	6
	250	FF	181	67	114	200.1	8	3/4	205	–	8
	150	RF · R-36	175	73	114	190.5	8	5/8	175	180	8
	300	RF · R-37	181	73	114	200.1	8	3/4	195	210	8
	400	RF · R-37	178	79	114	200.1	8	7/8	220	220	11
	600	RF · R-37	194	79	114	215.9	8	7/8	245	245	12
	900	RF · R-37	206	102	114	234.9	8	1 1/8	285	280	18
	1500	RF · R-39	210	102	114	241.3	8	1 1/4	310	305	21
125 (5″)	125	FF	197	83	141	215.9	8	3/4	185	–	9
	250	FF	216	83	141	234.9	8	3/4	220	–	14
	150	RF · R-41	197	86	141	215.9	8	3/4	195	195	10
	300	RF · R-41	216	86	141	234.9	8	3/4	215	230	14
	400	RF · R-41	213	105	141	234.9	8	7/8	260	260	19
	600	RF · R-41	241	105	141	266.7	8	1	280	280	23
150 (6″)	125	FF	222	95	168	241.3	8	3/4	190	–	10
	250	FF	257	95	168	269.9	12	3/4	240	–	19
	150	RF · R-43	222	98	168	241.3	8	3/4	210	210	16
	300	RF · R-43	251	98	168	269.9	12	3/4	235	250	19
	400	RF · R-45	248	136	168	269.9	12	7/8	300	300	31
	600	RF · R-45	267	136	168	292.1	12	1	315	320	33
	900	RF · R-45	289	159	168	317.5	12	1 1/8	370	360	53
	1500	RF · R-46	283	159	168	317.5	12	1 3/8	430	425	59
200 (8″)	125	FF	279	127	219	298.4	8	3/4	215	–	19
	250	FF	308	127	219	330.2	12	7/8	280	–	36
	150	RF · R-48	279	127	219	298.4	8	3/4	245	250	32
	300	RF · R-49	308	127	219	330.2	12	7/8	280	290	36
	400	RF · R-49	305	165	219	330.2	12	1	350	345	36
	600	RF · R-49	321	165	219	349.2	12	1 1/8	375	370	68
	900	RF · R-49	359	206	219	393.7	12	1 3/8	435	440	89
	1500	RF · R-50	352	206	219	393.7	12	1 5/8	505	510	97
250 (10″)	125	FF	340	140	274	361.9	12	7/8	240	–	31
	250	FF	362	140	274	387.5	16	1	315	–	51
	150	RF · R-52	340	146	274	361.9	12	7/8	280	280	47
	300	RF · R-53	362	146	274	387.5	16	1	315	325	51
	400	RF · R-53	359	213	274	387.5	16	1 1/8	410	415	96
	600	RF · R-53	400	213	274	431.8	16	1 1/4	435	440	104
	900	RF · R-53	435	241	274	469.9	16	1 1/4	490	485	132
	1500	RF · R-54	435	248	274	482.6	12	1 7/8	605	600	140

Unit(mm)

Size	Series	Flange Face	Dimensions			Flange Bolt Circle	Number of Bolts	Bolts Diameter	Bolts Length		Weight (kg)
			ØA	B	ØC				FF · RF	RJ	
300 (12″)	125	FF	410	181	324	431.8	12	7/8	280	–	56
	250	FF	422	181	324	450.8	16	1 1/8	370	–	90
	150	RF · R-56	410	181	324	431.8	12	7/8	310	315	84
	300	RF · R-57	422	181	324	450.8	16	1 1/8	360	375	88
	400	RF · R-57	419	229	324	450.8	16	1 1/4	445	440	133
	600	RF · R-57	457	229	324	488.9	20	1 1/4	465	460	144
	900	RF · R-57	498	292	324	533.4	20	1 3/8	560	555	169
	1500	RF · R-58	521	305	324	571.5	16	2	700	700	178
350 (14″)	125	FF	451	184	356	476.2	12	1	315	–	71
	250	FF	486	222	356	514.3	20	1 1/8	425	–	176
	150	RF · R-59	451	184	356	476.2	12	1	315	350	97
	300	RF · R-61	486	222	356	514.3	20	1 1/8	425	415	176
	400	RF · R-61	483	273	356	514.3	20	1 1/4	495	485	198
	600	RF · R-61	492	273	356	527	20	1 3/8	520	510	198
	900	RF · R-62	521	356	356	558.8	20	1 1/2	645	650	198
	1500	RF · R-63	578	356	356	635	16	2 1/4	785	800	198
400 (16″)	125	FF	514	191	406	539.7	16	1	350	–	99
	250	FF	540	232	406	517.5	20	1 1/4	435	–	227
	150	RF · R-64	514	191	406	539.7	16	1	350	340	159
	300	RF · R-65	540	232	406	571.5	20	1 1/4	435	425	227
	400	RF · R-65	537	305	406	571.5	20	1 3/8	550	540	268
	600	RF · R-65	565	305	406	603.2	20	1 1/2	585	575	288
	900	RF · R-66	575	384	406	615.9	20	1 5/8	690	695	550
	1500	RF · R-67	641	384	406	704.8	16	2 1/2	855	870	750
450 (18″)	125	FF	549	203	457	577.8	16	1 1/8	370	–	118
	250	FF	597	264	457	628.6	24	1 1/4	495	–	301
	150	RF · R-68	549	203	457	577.8	16	1 1/8	370	390	185
	300	RF · R-69	579	264	457	628.6	24	1 1/4	495	485	301
	400	RF · R-69	594	362	457	628.6	24	1 3/8	635	625	401
	600	RF · R-69	613	362	457	654	20	1 5/8	635	625	401
	900	RF · R-70	638	451	457	685.8	20	1 7/8	800	800	770
	1500	RF · R-71	705	468	457	774.7	16	2 3/4	985	1005	980
500 (20″)	125	FF	606	213	508	635	20	1 1/8	375	–	180
	250	FF	654	292	508	685.8	24	1 1/4	520	–	373
	150	RF · R-72	606	219	508	635	20	1 1/8	380	395	243
	300	RF · R-73	654	292	508	685.8	24	1 1/4	520	510	373
	400	RF · R-73	648	368	508	685.8	24	1 1/2	670	660	421
	600	RF · R-73	683	368	508	723.9	24	1 5/8	670	660	640
	900	RF · R-74	699	451	508	749.3	20	2	740	745	1055
600 (24″)	125	FF	718	222	610	749.3	20	1 1/4	435	–	258
	250	FF	775	318	610	812.8	24	1 1/2	585	–	541
	150	RF · R-72	718	222	610	749.3	20	1 1/4	435	425	394
	300	RF · R-73	775	318	610	812.8	24	1 1/2	582	575	598
	400	RF · R-73	768	394	610	812.8	24	1 3/4	685	675	743
	600	RF · R-73	791	438	610	838.12	24	1 7/8	785	775	981
	900	RF · R-78	838	495	610	901.7	20	2 1/2	950	965	1700
700 (28″)	125	FF	832	321	711	840	24	1 1/4	505	–	634
	150	RF	832	321	711	840	24	1 1/4	505	–	692
750 (30″)	125	FF	883	305	762	914.4	28	1 1/4	495	–	450
	150	RF	883	330	762	914.4	28	1 1/4	580	–	580
	300	RF RJ95	953	398	762	966.5	28	1 3/4	675	750	928
800 (32″)	125	FF	920	356	813	950	28	1 1/2	550	–	533
	150	RF	940	356	813	950	28	1 1/2	550	–	635
900 (36″)	125	FF	1048	368	914	1085.8	32	1 1/2	580	–	656
	150	RF	1048	387	914	1085.8	32	1 1/2	605	–	685
	300	RF 98	1117	489	914	1168.4	32	2	835	–	1609
1000 (40″)	125	FF	1162	419	1016	1160	28	1 1/2	645	–	1065
	150	RF	1162	419	1016	1160	28	1 1/2	645	–	1190
1050 (42″)	125	FF	1219	432	1067	1257.3	36	1 1/2	650	–	1260
	150	RF	1219	432	1067	1257.3	36	1 1/2	650	–	1386
	300	RF	1289	568	1067	1339.8	36	2	890	–	2630
1200 (48″)	125	FF	1384	524	1219	1422.4	44	1 1/2	750	–	2055
	150	RF	1384	524	1219	1422.4	44	1 1/2	750	–	2180
	300	RF	1366	629	1219	1543	44	2	–	–	2755
1350 (54″)	150	RF	1549	540	1372	1593.8	44	1 3/4	815	–	2800
1500 (60″)	150	RF	1715	660	1524	1759	52	1 3/4	–	–	3538
1800 (72″)	150	RF	2051	914	1829	2096	60	1 3/4	–	–	6350
2250 (90″)	150	RF	2493	1289	2270	2550	68	1 1/4	–	–	–
VALVE SIZE	**1 1/2″, 2″, 3″, ·····, 24″**			**26″, 28″, ·····, 60″**				**72″, 90″**			
FLANGE STANDARD	**ANSI B 16.5**			**ASME B 16.47 SERIES A (MSS SP44)**				**AWWA C207 CLASS D (175 ~150PSI)**			

Seat Materials		Spring Materials
Buna-N	410 Stainless steel (Weld)	316 Stainless steel
Neoprene	316 Stainless steel (Weld)	Inconel 625
Viton A	316L Stainless steel (Weld)	Inconel x 750
Viton B (FR 58/90 Anti	Stellite No 6 (Weld)	Monel
Decompression)	Same as body	As specified on Purchase Order
Teflon	To be specified on P.O	

Butterfly valve manufactured according to most severe quality control standards

ANSI	B 16.1	Cast iron pipe flanges and flanged fittings
	B 16.5	Steel pipeline flanges
	B 16.34	Steel valves
MSS	SP- 6	Standard finishes for pipe flanges
	SP- 25	Standard marking system for valves
	SP- 44	Steel pipeline flanges
	SP- 55	Quality standard for steel castings
	SP- 61	Pressure testing of steel valves
	SP- 67 narrow (C1-D1)	Butterfly valves
	SP- 68	High pressure - offset seat butterfly valve
API	598	Valve inspections and testing
	609	Butterfly valves Wafer and LUG type (face-to-face on valve)
ISO	7005	Metallic flanges
	5208	Industrial valves - pressure testing of valves
	5209	General purpose industrial valves - marking
	5211/1	Part - turn valve actuator attachment - top flange dimensions
	5752 Tab. 5 (20 series)	Face - to - face and centre - to - face dimensions
DIN	3202 - K1	Face - to - face dimensions
	50049 - 2.2	Certificates on material tests (standard)
	50049 - 3.1B	Certificates on material tests (on request)
BS	5155 short	Butterfly valves for general purposes
AWWA	C504	Rubber seated butterfly valves
JIS	B2002	Face to face dimensions
	B2003	valve test
EN	10204	Types of inspection documents

Inspection and testing according as ISO 5208, MSS SP61, AWWA C504, JIS B 2003 API 598 and BS 5155

The body test is performed at 1.5 times of the nominal pressure while the seat test at 1.1 time of the nominal pressure, using for both emulsified water at room temperature. While testing, no leakage shall be noticed from the stems, as for the seat test. For the pneumatic test with closed disc, the butterfly is covered with water and soap on that side where the visual control of the seal is performed, in order to show up a possible leak. DK's valves are tested 100% before deilvery

Seat Leakage Allowance

In accordance with ANSI B 16 - 104

Leakage Class Designation	Test Medium	Test Medium	Test Pressure	Testing Procedures Required for Establishing Ration
Ⅰ	—	—	—	No test required provided user and supplier so agree
Ⅱ	0.5% of rated capacity	All or water at 50~125℉(10~52℃)	45~60psig or max. operating differential whichever is lower	Pressure applied to valve inlet, with outlet open to atmosphere or concerned to a low head loss measuring device, full normal closing thrust provided by actuator.
Ⅲ	0.1% of rated capacity	As above	As above	As above
Ⅳ	0.01% of rated capacity	As above	As above	As above
Ⅴ	0.05ml per minute of water inch of port diameter per psi differential	Water at 50~125℉ (10~52℃)	Max. service pressure drop across valve plug not to exceed ANSI body rating (100psi pressure drop minimum)	Pressure applied to valve inlet after filling entire body cavity and connected piping with water and storking valve plug closed. Use net specified max. actuator thrust, but no more, even if available during test Allow time for leakage flow to be stablized.
Ⅵ	Not to exceed amounts shown in following table based on port diameter	Air or Nitrogen at 50~125℉(10~52℃)	50 psig or max. rated differential pressure across valve plug whichever is lower	Actuator should be adjusted to operating conditions specified with full normal closing thrust applied to valve plug seat. Allow time for leakage flow to be stablized and use suitable measuing device.

Calculated Values of Seat Leakage (Class V)

In accordance with ANSI B 16 - 104, FCI 70-2 (Test Procedure Type B)

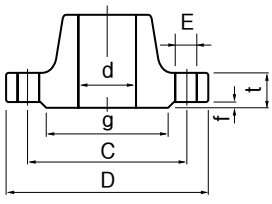
Unit(cc/minute)

Size		△P(bar)		
Inch	mm	10	16	20
2″	50	0.15	0.24	0.3
3″	80	0.24	0.38	0.48
4″	100	0.3	0.48	0.6
5″	125	0.38	0.6	0.75
6″	150	0.45	0.72	0.9
8″	200	0.6	0.96	1.2
10″	250	0.75	1.2	1.5

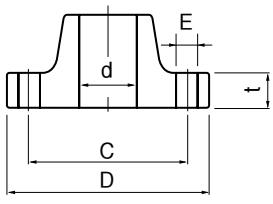
Unit(cc/minute)

Size		△P(bar)		
Inch	mm	10	16	20
12″	300	0.9	1.44	1.8
14″	350	1.05	1.68	2.1
16″	400	1.2	1.92	2.4
18″	450	1.35	2.16	2.7
20″	500	1.5	2.4	3.0
22″	550	1.65	2.64	3.3
24″	600	1.8	2.88	3.6

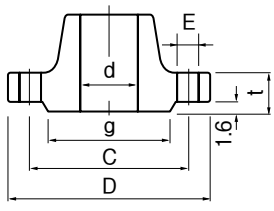
Qa(allowable leckage) (cc/minute)= 3×10^{-4}, nominal size(mm)× △P(bar) or 0.0075nominal size(inch)× △P(bar)
△P = max. differential pressure



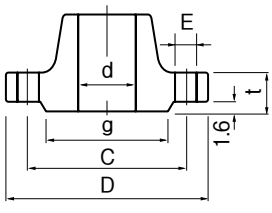
5. 10. 16
JIS 20. 30. 40. 63K



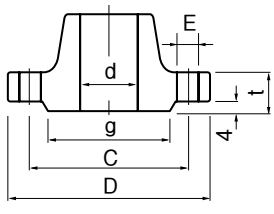
ANSI 125
BRONZE FLANGES : ANSI 150 &300



ANSI 150



ANSI 250, 300



ANSI 400, 600, 900

Flange drillings

Unit(mm)

Size		JIS 5K			JIS 10K			JIS 16K			BS 4504 PN 10			BS 4504 PN 16			ANSI CLASS 125LB			ANSI 150LB		
Inch	mm	ØC	F	ØE	ØC	F	ØE	ØC	F	ØE	ØC	F	ØE	ØC	F	ØE	ØC	F	ØE	ØC	F	ØE
1 ½″	40	95	4	15	105	4	19	105	4	19	110	4	18	110	4	18	98	4	16	98.5	4	16
2″	50	105	4	15	120	4	19	120	8	19	125	4	18	125	4	18	121	4	20	120.5	4	19
2 ½″	65	130	4	15	140	4	19	140	8	19	145	4	18	145	4	18	140	4	20	139.5	4	19
3″	80	145	4	19	150	8	19	160	8	23	160	8	18	160	8	18	152	4	20	152.5	4	19
4″	100	165	8	19	175	8	19	185	8	23	180	8	18	180	8	18	191	8	20	190.5	8	19
5″	125	200	8	19	210	8	23	225	8	25	210	8	18	210	8	18	216	8	23	216	8	22
6″	150	230	8	19	240	8	23	260	12	25	240	8	18	240	8	23	241	8	23	241.5	8	22
8″	200	280	8	23	290	12	23	305	12	25	295	8	23	295	12	23	299	8	23	298.5	8	22
10″	250	345	12	23	355	12	25	380	12	27	350	12	23	355	12	27	362	12	26	362	12	25
12″	300	390	12	23	400	16	25	430	16	27	400	12	23	410	12	27	432	12	26	432	12	25
14″	350	435	12	25	445	16	25	480	16	33	460	16	23	470	16	27	–	–	–	476	12	29
16″	400	495	16	25	510	16	27	540	16	33	515	16	27	525	16	30	–	–	–	539.5	16	29
18″	450	555	16	25	565	20	27	605	20	33	565	20	27	585	20	31	–	–	–	578	16	32
20″	500	605	20	25	620	20	27	660	20	33	620	20	27	650	20	33	–	–	–	635	20	32
24″	600	715	20	27	730	24	33	770	24	39	725	20	30	770	20	36	–	–	–	749.5	20	35
28″	700	820	24	27	840	24	33	875	24	42	840	24	30	840	24	36	–	–	–	863.6	28	35
30″	750	880	24	33	900	24	33	935	24	42	–	–	30	–	–	–	–	–	–	914.4	28	35
32″	800	930	24	33	950	28	33	990	24	48	950	24	33	950	24	39	–	–	–	978	28	41
36″	900	1030	24	33	1050	28	33	1090	28	48	1050	28	33	1050	28	39	–	–	–	1086	32	41
40″	1000	1130	28	33	1160	28	39	1210	28	56	1160	28	36	1170	28	42	–	–	–	1200	36	41

ØC : Bolt Circle Diameter F : Number of holes ØE : Diameter of holes

Operating Characteristics For Sizing

Torques for resilient seated butterfly valve

The factors affect the torque required to operate the valves

· Valve diameter · Shaft diameter · Bearing friction coefficient · Type of seat material

Unit(N.m)

Size	Inch	1 ½″	2″	2 ½″	3″	4″	5″	6″	8″	10″	12″	14″	16″	18″	20″	24″	28″	30″	32″	36″	40″
	mm	40	50	65	80	100	125	150	200	250	300	350	400	450	500	600	700	750	800	900	1000
Shut off Pressure in Bar	3.5Bar	10	12	17	25	41	58	87	156	243	342	488	667	887	1146	2386	2710	3000	3540	4640	6300
	6Bar	10	22	23	35	40	66	91	170	276	389	544	762	1023	1322	2781	3300	3940	4340	5360	7800
	10Bar	13	25	28	31	52	74	109	180	320	484	680	880	1261	1630	3256	4050	4590	4990	6940	9940
	16Bar	14	25	29	37	59	89	126	260	390	560	1520	2030	2493	3076	4150	5650	6040	6640	9490	13240

Torques For High Performance(Double Eceentric)

Unit(kgf.m)

Size	Inch	2″	2 ½″	3″	4″	5″	6″	8″	10″	12″	14″	16″	18″	20″	24″	28″	32″	36″	40″
	mm	50	65	80	100	125	150	200	250	300	350	400	450	500	600	700	800	900	1000
Class 150 Differential Pressure (Bar)	10 Bar	2.3	2.5	2.7	4.2	9.0	11.2	21.3	34.0	49.2	86.4	119.2	146.3	190.1	302.9	350.1	715.1	917.0	1070
	16 Bar	3.0	3.4	3.6	5.8	11.3	14.0	24.6	41.2	60.3	105.0	144.0	183.0	235.2	374.4	432.2	917.7	1214.5	1459.0
Class 300 Differential Pressure (Bar)	10 Bar	2.3	3.0	3.8	5.4	12.1	14.0	28.0	43.0	65.2	95.8	136.8	173.0	238.3	372.3	–	–	–	–
	16 Bar	3.2	3.8	4.3	7.3	14.6	18.0	26.0	51.6	78.3	121.2	176.2	232.3	319.7	491.0	–	–	–	–
	20 Bar	3.6	4.0	4.9	7.9	17.7	19.4	36.7	58.8	89.0	138.3	228.3	270.4	380.0	574.6	–	–	–	–
	25 Bar	3.8	5.2	6.4	10.8	22.4	27.6	53.7	86.8	130.1	210.3	339.6	408.1	580.3	879.3	–	–	–	–

Triple Offset Torque

Unit(N.m)

Size	Inch	3″	4″	5″	6″	8″	10″	12″	14″	16″	18″	20″	24″
	mm	80	100	125	150	200	250	300	350	400	450	500	600
Differential Pressure (Bar)	10 Bar	30	53	73	118	204	319	549	661	927	1540	1949	2921
	20 Bar	59	104	144	234	403	633	1087	1310	1836	3050	3859	5784
	30 Bar	118	206	286	463	799	1252	2152	2593	3635	6039	7640	11452
	52 Bar	233	408	566	916	1581	2480	4260	5134	7198	11958	15128	22675

The torque is actuator sizing torque at pressure differential.
Minimum 20% additional safety factor to be considered and hydrodynamic torque may be considered at given flow condition

Torque Conversion Ratio

Factors				
N.m	KN.m	Kgf.m	lbf.in	lbf.ft
1	0.001	0.102	8.85	0.738
1000	1	101.972	8851	737.6
9.807	0.0098	1	86.8	7.233
0.113	1.13 X 10 - 4	0.01155	1	0.083
1.356	0.0014	0.138	12	1

Torque To Be Considered

Torque plays an important part in the cost, operation and life span of butterfly valves. The following explains why.
Bearing friction, seal or seating friction, and fluid dynamic effects on the disc are primary factors in determining requirements for a butterfly valve. These are described below.
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, this bearing friction varies from maxium as the disc rotates from the closed to the fully open position.
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.
From the dynamic standpoint, a butterfly valve disc is torque balanced only when totally closed for fully open. In all intermediate positions, a fluid dynamic torque is present because the fluid velocity over the disc surface is always higher on the trailing edge of the disc than on the leading edqe. This torque acts in a valve “disc - closing” direction, tending to reach its highest point at about 70 degrees open.

Material Seletion Guide

E-Excellent
G-Good
F-Fair
U-Unsatisfactory

Chemiacl agents

Chemiacl agents	Metal Iron	Metal 316SS	Metal AL Bronze	Metal Monel	Elastomer EPDM	Elastomer NBR	Elastomer Viton	Elastomer Natural Rubber
Acetaidihyde	U	E	U	F	G	U	-	F
Acetic acid 50% 50℃	U	E	U	F	G	U	U	F
Acetic acid-Anhydirde	U	E	U	F	U	U	U	F
Acetone	G	E	E	E	G	U	U	E
Acetylene	G	E	E	-	U	F	U	-
Acrylonitrile	G	E	E	E	U	U	U	U
Air(Duy)	E	E	E	E	E	E	-	-
Alcohol-Amyl	F	E	E	E	-	F	G	-
Alcohol-Butyl	F	E	E	E	-	F	-	-
Alcohol-Ethyl	U	E	E	E	E	G	G	G
Alcohol-Methyl	U	E	E	E	E	G	U	G
Alum-Ammonium	U	G	-	-	-	G	G	F
Alum-Chrome	U	G	-	-	-	G	G	F
Alum-Potassium	U	G	-	-	-	-	-	-
Alumina	G	G	G	G	E	E	G	G
Aluminum Chloride	U	U	U	E	E	E	E	E
Aluminum Fluoride	U	G	-	G	-	G	G	-
Aluminum Hydroxide	U	G	-	-	-	G	G	-
Aluminum Sulphate	U	G	U	-	-	E	-	-
Amines	U	E	-	-	-	F	-	-
Ammonia, Anhydrous	F	E	U	-	E	G	U	-
Ammonia gas 150° F	U	E	U	-	G	-	-	-
Ammonia solutions	F	E	U	G	E	G	U	G
Ammonia Chloride 50% 180° F	U	G	U	G	-	-	-	-
Ammonia Hydroxide	U	E	U	F	E	U	G	U
Ammonia Nitrate 5% 60° F	F	E	U	G	-	E	-	-
Ammonia Phosphate	U	G	U	G	E	E	-	G
Ammonia Sulphate	U	G	U	G	E	E	E	-
Amyl Acetate	F	E	E	G	-	U	F	U
Amylchloride	F	E	E	-	U	U	U	U
Anillne 90% 70° F	F	E	F	-	G	U	G	U
Asphalt	E	E	E	E	-	U	E	U
Barium Carbonate 60° F	U	-	G	G	E	E	-	-
Barium chloride	U	-	-	G	E	E	E	E
Barium Hydroxide	F	E	U	-	-	E	-	U
Barium Sulphate	U	E	G	G	E	E	E	E
Barium Sulphate	F	E	U	-	-	E	-	-
Beer (beverage)	U	E	U	-	E	-	-	-
Beer sugar solution	U	E	U	-	-	E	-	-
Benzaldehyde	F	E	E	-	G	U	U	U
Benzene(benzol) 70° F	F	E	E	G	U	U	G	U
Benzoic Acid 5%	U	E	-	G	-	F	-	-
Borax	U	E	U	E	-	G	-	G
Boric acid 5% 200° F	U	E	F	G	E	E	-	-
Brine	U	-	-	G	E	E	-	-
Bromine-Gas	U	U	U	F	U	U	G	U
Bromine-Water	U	U	U	F	U	U	G	U
Butadiene	F	E	E	-	-	G	G	-
Butane-Butyleae	G	E	E	E	U	G	G	U
Butyl Acetate	G	E	E	-	E	U	U	U
Butyric Acid 5%	U	E	-	-	U	U	U	U
Calcium carbonate 60° F	F	-	-	E	E	E	E	E
Calcium chlorate 20%	-	E	-	G	-	-	-	-
Calcium chloride	F	G	F	G	E	E	E	G
Calcium chloride solution	F	E	F	-	E	E	E	G
Calcium Hydroxide 50% 175° F	F	E	U	E	E	E	E	E
Calcium Hypochlorite	-	G	-	-	-	F	-	-
Calcium Sulphate	F	E	E	G	E	E	E	E
Carbon Dioxide	F	E	E	-	G	G	E	G
Carbon Tetrachloride	U	G	F	G	U	U	E	U
Carbonic Acid	U	G	-	G	-	E	-	-
Chlorine gas-dry 70° F	U	G	F	F	U	U	E	U
Chlorobenzene 90%	F	E	E	E	U	U	E	U
Chromin Acid 5% 70° F	U	E	U	-	U	U	E	U
Citric acid 5% 150° F	U	E	F	G	E	G	E	U
Coffee(food)	U	E	U	-	E	U	E	E
Copper Sulphate	F	E	U	U	E	E	E	G
Cyclohexane	F	E	E	-	U	E	E	U
Deztrose(food)	U	E	-	-	-	E	-	-
Diacetone	U	-	E	-	E	U	U	U
Dichloroethane	U	F	-	-	U	U	G	U
Diesel Fuels	F	E	G	E	U	E	U	-
Diethyl Amine	F	E	E	-	F	U	U	F
Dowtherms	G	E	E	-	U	U	E	U
Drilling Mud	G	E	-	E	U	E	-	U
Ethers	U	E	E	G	U	U	-	U
Ethyl Acetate	F	E	-	E	G	U	U	U
Ethyl Dhloride 5%	F	E	E	G	E	E	E	F
Ethyl Glycol	G	E	E	E	E	E	E	G
Ethylene Oxide	G	E	-	-	U	U	U	U
Fats	E	E	E	-	U	E	-	-
Ferric Chloride	U	-	U	E	-	F	-	-
Ferric Nitrate	U	E	-	E	G	F	-	-
Ferric Sulphate 5%	U	G	U	E	-	E	E	-
Ferric Sulphate	F	E	U	-	G	E	G	G
Fluorine	U	U	U	G	-	G	-	-
Fluosillicic Acid	U	G	E	-	-	E	-	-
Formaldehyde 70° F	U	E	E	G	E	G	E	-
Formic acid 5% 150° F	U	E	E	G	-	U	U	U
Freon	F	E	E	E	U	G	G	U
Fruit Juices(food)	U	E	U	-	G	G	-	-
Fuel Oil	F	E	E	G	U	F	E	U
Gallic Acid 5% 200° F	U	E	-	-	-	G	G	-
Gasoline	F	E	G	G	U	E	E	U
Glucose	U	E	G	G	-	E	E	-
Glycerine/Glycerol	F	E	G	G	-	E	E	-
Heptane	F	E	E	-	U	E	E	U
Hexane	F	E	E	-	U	G	U	U
Hydrobromic Acid 200° F	U	U	U	U	U	U	U	U
Hydrochloric Acid 15% 60° F	U	U	U	U	E	U	E	-

Chemiacl agents	Metal Iron	Metal 316SS	Metal AL Bronze	Metal Monel	Elastomer EPDM	Elastomer NBR	Elastomer Viton	Elastomer Natural Rubber
Hydrochloric Acid 37% 60° F	U	U	U	U	U	U	E	U
Hydrochloric Acid 20%	U	U	U	F	-	U	E	U
Hydrochloric Acid 20-60%	U	U	U	U	-	U	E	U
Hydrogen	F	E	F	-	E	E	E	E
Hydrogen Peroxide 90%	U	G	U	E	-	U	G	U
Hydrogen Sulfide	F	G	F	-	E	U	U	U
Iodine Solution	U	U	U	E	-	U	F	U
Iso-octane	F	E	E	E	U	E	E	-
Isopropyl Alcohol	F	E	E	E	-	G	E	-
Sopropyl Ether	F	E	E	E	U	E	E	U
Kerosene	E	E	E	E	U	E	E	U
Lactic Acid 5%	U	G	U	G	-	F	-	-
Lubricating Oil	E	E	E	E	U	E	E	U
Magnesium Chloride 4%	F	G	F	G	E	E	E	E
Magnesium Hydroxide	F	E	G	-	E	G	E	G
Magnesium Sulphate	F	E	E	E	E	E	E	G
Mercuric Chioride 3%	U	F	U	G	E	E	-	-
Mercuriy	E	E	U	E	E	E	E	E
Methane	U	E	E	-	U	E	E	U
Methyl Acetate	F	E	E	-	F	U	U	U
Methyl Acetone	F	E	E	-	G	U	U	U
Methyl Chloride	G	E	E	-	U	U	E	U
Methyl Etherl Kotone	E	E	E	-	U	U	U	U
Milk(food)	U	E	-	-	E	E	U	E
Mineral Oil	F	F	-	-	U	E	E	U
Molasses(food)	U	E	U	-	E	-	-	-
Napthalene	F	E	E	-	U	U	G	U
Natural gas	G	E	E	-	U	E	E	U
Nickel Chloride	U	F	-	-	-	E	-	-
Nitric acid less 40% 70° F	U	-	U	U	U	U	E	U
Nitric acid more 40% 70° F	U	U	U	U	U	U	F	U
nitrobenzene	U	E	-	-	U	U	G	U
Oleum	U	F	-	-	U	U	E	U
Olive Oil	-	E	-	-	G	E	E	U
Oxalic Acid	U	G	U	-	G	U	G	U
Oxygen 200° F	E	E	E	E	E	G	E	F
Oxygen 300° F	E	E	E	E	U	E	G	U
Palmitic acid	U	E	E	G	-	F	-	-
Perchloroethlene	-	E	-	-	U	E	E	U
Petroleum	U	G	F	G	U	E	E	U
Phenol	U	E	-	E	U	U	E	U
Phosphoric Acid 5%	U	G	U	G	F	F	E	F
Phosphoric Acid 85% 70° F	U	G	U	-	F	F	-	F
Picric Acid 80%	U	E	-	F	U	-	-	-
Potassium Cyanide	F	E	U	-	-	E	E	-
Potassium Hydroxide 5%	F	E	U	E	-	E	E	-
Potassium Nitrate	F	E	F	G	E	E	E	E
Potassium Phosphate	U	G	-	-	-	E	E	-
Potassium Sulfide	U	E	-	-	-	E	-	-
Potassium Sulfite	U	E	-	-	G	F	-	-
Propane	F	E	E	-	U	E	E	-
Resins	U	E	E	-	-	-	G	F
Sea Water 70° F	U	G	G	E	E	G	E	-
Soap Solution(Slearate)	U	E	E	G	E	E	E	-
Sodium Acetate 5%	U	E	E	G	E	G	U	-
Sodium Bisulfate	U	E	-	-	-	E	E	-
Sodium Carbonate	U	E	G	E	E	E	E	E
Sodium Chloride 30% 180° F	U	E	E	E	E	E	E	E
Sodium Cyanide	U	E	U	-	-	E	E	-
Sodium Fluoride 5% 60° F	U	-	F	G	-	-	E	-
Sodium Hydroxide 50% 122° F	U	G	U	G	E	U	U	U
Sodium Hydroxide 50% 176° F	U	G	U	G	G	U	U	U
Sodium Hypochlorite 50% 60° F	U	G	U	E	G	U	E	U
Sodium Nitrate	U	E	G	G	E	G	-	G
Sodium Perborate	U	E	-	-	-	G	E	-
Sodium Peroxide	U	E	U	-	E	G	E	G
Sodium Phosphate 5%	U	E	-	G	E	E	E	E
Sodium Sillicate	U	E	G	G	E	E	E	E
Sodium Sulfitde 70%	U	E	U	-	-	-	-	-
Sodium Sulfite	U	-	U	G	G	E	E	-
Sodium Sulphate 80% 60° F	U	F	G	G	E	E	E	G
Steam 300° F	U	E	G	E	E	U	U	U
Steraric Acid 90% 200° F	U	E	F	-	-	G	-	-
Sulphur (Molten)	U	G	U	U	E	-	E	-
Sulphur Dioxide	U	E	F	E	G	U	E	U
Sulphur Trioxide	U	E	-	-	-	U	E	U
Sulfuric Acid 10%	U	G	U	U	E	U	E	F
Sulfuric Acid 50%	U	U	U	U	F	U	E	U
Sulfuric Acid 93% 70° F	U	U	U	U	U	U	E	U
Sulphurous Acid 80% 100° F	U	U	U	U	U	U	E	U
Tannic Acid 10% 150° F	U	E	G	-	-	U	E	F
Tar	F	E	E	E	U	E	G	U
Tartaric Acid 150° F	U	E	E	G	-	E	-	G
Thinner	U	E	E	E	U	U	U	U
Toluol and Toluene	U	E	E	-	U	U	G	U
Tributyl Phosphate	U	E	-	-	U	U	F	F
Trichloroethylene	-	E	E	-	U	U	E	U
Tricresyl Phosphate	U	U	U	-	G	U	E	U
Triethanolamine	U	-	-	G	E	G	U	U
Turpermtine	U	E	G	-	U	U	E	U
Vinegar 70° F	U	E	-	-	G	E	E	-
Water-Demineralized	U	E	E	E	E	G	E	G
Water-distilled	U	E	U	-	E	G	-	-
Water Fresh	F	E	E	E	E	G	-	E
Water Minera	F	E	E	E	E	G	-	-
Water-Sewage	U	E	E	E	E	G	-	-
Whiskey and Wines	U	E	G	E	E	E	-	-
Xylene, Xylol	F	E	E	-	U	U	E	U
Zinc Chloride 5% 160° F	U	F	U	G	E	E	E	E
Zinc Sulphate 25% 180° F	U	E	E	G	-	E	-	-

Feature of Rubber	Commom Name	ASTM Code	Max Temp	Abrasion	Aging	Sun light Resistance	Water Resistance	Oil Resistance	Solvent	Strong Acid	Weak Acid	Strong Alkali	Weak Alkali
	Buna-N	NBR	70℃	◎	◎	○	◎	◎	△	×	○	○	◎
	Neoprene	CR	70℃	◎	◎	◎	◎	○	×	×	○	○	◎
	Natural Rubber	NR	65℃	◎	○	○	◎	×	×	×	○	○	◎
	EPT	EPDM(EPT)	80℃	○	◎	◎	◎	×	×	○	◎	◎	◎
	Silicon	SI	130℃	○	◎	◎	○	×	△	×	○	○	◎
	Viton	FPM	150℃	○	◎	◎	◎	○	◎	◎	◎	◎	◎

◎Excellent ○Good △Fair ×Poor *(The table shows only relatively comparison befween rubbers)*

Material Comparison

Unit(N.m)

ASME(ASTM)		KS	JIS	DIN
SPEC	GRADE	SYMBOL	SYMBOL	
A-47	NO. 32510 NO. 35018	BMC 35 BMC 37	FCMB 35 FCMB 37	DIN 1692 GTS - 10 DIN 1692 GTS - 45
A-48	Cl. NO. 35A~C Cl. NO. 40A~C	GC 20 GC 25	FC 20 FC 25	DIN 1691 GG - 20 DIN 1691 GG - 25
A-53	Type S. Gr. A Type S. Gr. B	SPPS 38 - S SPPS 42 - S	STPG 38 - S STPG 42 - S	DIN 1629 St 35, 37 DIN 1629 St 42, 45
A-105		SF 45 SM 25C	SF 45A S 25C	
A-106	Gr. A Gr. B Gr. C	SPPH 38 SPPH 42 SPPH 49	STS 38 STS 42 STS 49	DIN 1629 St 35.4 DIN 1629 St 45.4 DIN 1629 St 35.4
A-126	Cl. B Cl. C	GC 20 GC 25	FC 20 FC 25	DIN 1691 GG - 20 DIN 1691 GG - 25
A-182	F 11 F 22 F 304 F 304L F 316 F 316L	SFHV 23B SFHV 24B SFSF 304 SFSF 304L SFSF 316 SFSF 316L	SFHV 23B SFHV 24B SFHV 304 SFHV 304L SFHV 316 SFHV 316L	SEW 610 - 13CrMo 44 SEW 610 - 10CrMo 9 10 DIN 17440 - 5CrNi 18 9 DIN 17440 - 2CrNi 18 9 DIN 17440 - 2CrNiMo 18 10 DIN 17440 - 2CrNiMo 18 10
A-193	Gr. B7	SNB 7	SNB 7	DIN 17240 - 24 CrMo5
A-194	Gr. 2H	SM 45C	S 45C	DIN 17100 St 50-2
A-216	Gt. WCA Gr. WCB	SC 42 SCPH 1 SC 49 SCPH 2 SCPH 2	SC 42 SCPH 1 SC 42 SCPH 2 SCPH 2	DIN 1681 GS - 38 DIN 1681 GS - 38 DIN 1681 GS - 52 DIN 1681 GS - 52 DIN 17245 GS - C25
A-217	Gr. WC 1 Gr. WC 6 Gr. WC 9	SCPH 11 SCPH 21 SCPH 22	SCPH 11 SCPH 21 SCPH 22	DIN 17245 GS - 22Mo4 DIN 17245 GS - 17CrMo55
A-234	Gr. WPA (W) Gr. WPB (W) Gr. WPC (W)			DIN St 35.8 Ws No. 305 DIN St 45.8 Ws No. 405
A-240	Type 304 Type 304L Type 316 Type 316L Type 321 Type 410 Type 430	STS 304 STS 304L STS 316 STS 316L STS 321 STS 410 STS 430	SUS 304 SUS 304L SUS 316 SUS 316L SUS 321 SUS 410 SUS 430	DIN 17440 5CrNi 18 9, 18 10 DIN 17440 2CrNi 18 9 DIN 17440 5CrNiMo 18 10 DIN 17440 2CrNiMo 18 12 DIN 17440 10CrNiTi 18 9 DIN 17440 10Cr 13 DIN 17440 8Cr 17
A-278	Cl. NO. 30 Cl. NO. 35	GC 20 GC 25	FC 20 FC 25	DIN 1691 GC - 20 DIN 1691 GC - 25
A-283	Gr. D	SB 41	SS 41	DIN 17100 USt 42-1
A-312	Gr. TP 304 Gr. TP 304L Gr. TP 316 Gr. TP 316L	STS 304TP STS 304LTP STS 316TP STS 316LTP	SUS 304TP SUS 304LTP SUS 316TP SUS 316LTP	DIN 2462 5CrNi 18 9 DIN 2462 5CrNi 18 12 DIN 2462 2CrNiMo 18 10
A-320	Gr. B 8 Gr. B 8M	STS 304B STS 316B	SUS 304B SUS 316B	SEW 680 5CrNi 18 10 A2 DIN 267 A4
A-351	Gr. CF 3 Gr. CF 3M Gr. CF 8 Gr. CF 8M Gr. CN 7M	SSC 19A SSC 16A SSC 13A SSC 14A SSC 23	SCS 19A SCS 16A SCS 13A SCS 14A SCS 23	 DIN 17445G 6CrNi 18 9 DIN 17445G 7CrNiMo 18 10
A-352	Gr. LCB Gr. LCC Gr. LC1 Gr. LC2 Gr. LC3	SCPL 1 SCPL 1 SCPL 11 SCPL 21 SCPL 31	SCPL 1 SCPL 1 SCPL 11 SCPL 21 SCPL 31	SEW 685GS - CK24 SEW 685GS - CK24 SEW 685GS - 26CrMo4 SEW 685GS - 10Ni14
A-356	Gr. 1 Gr. 2 Gr. 6	SCPH 2 SCPH 11 SCPH 21	SCPH 2 SCPH 11 SCPH 21	DIN 1681 GS - 52 DIN 17245 GS - C25 DIN 17245 GS - 22Mo4 DIN 17245 GS - 17CrMo4
A-395		DC 40 DC 50	FCD 40 FCD 45	DIN 1693 GGG - 40 DIN 1693 GGG - 50
A-536	Gr. 60 - 40 -18 Gr. 65 - 45 -12	GCD 42 GCD 50	FCD 40 FCD 50	DIN 1693 GGG - 40 DIN 1693 GGG - 50
B-16	C36000	C3602 C3604	C3602 C3604	DIN 17660 CuEn36Pb1.5 DIN 17660 CuEn36Pb2
B-61	905 922	BrC 1, 2, 3, 4, 5 BrC 1, 2, 3, 4, 4	BC 1, 2, 3, 4, 5, 6, 7 BC 1, 2, 3, 4, 5, 6, 7	
B-62	C83600	BrC 1, 2, 3, 4, 5	BC 1, 2, 3, 4, 5, 6, 7	
B-124	C37700	FBsBE1 FBsBE2	C3771B	DIN 1787 - CuZn40Pb2 DIN 17672 - CuZn40Pb2
B-148	C95200 C95400 C95500 C95800	AlBrC1 AlBrC2 AlBrC2 AlBrC3	ALBC1 ALBC2 ALBC2 ALBC3	DIN 1714 - CuAl10Fe DIN 1714 - CuAl9Ni G - CuAl10Ni DIN 1714 - CuAl10Ni
B-584	C90500 C83600	BrC3 BrC6	BC3 BC6	DIN 1705 - CuSn10Zn DIN 1705 - CuZn5ZnPb