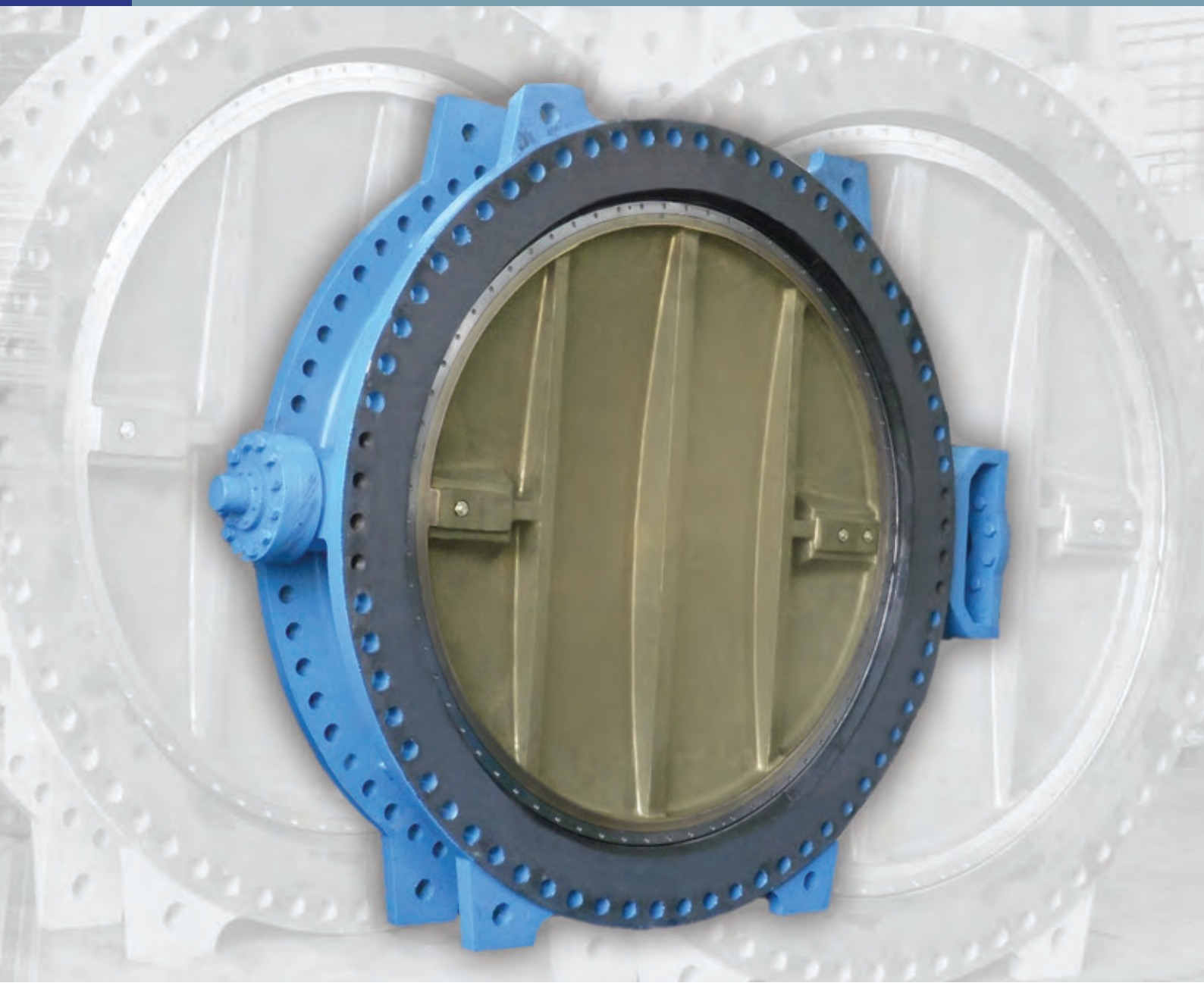
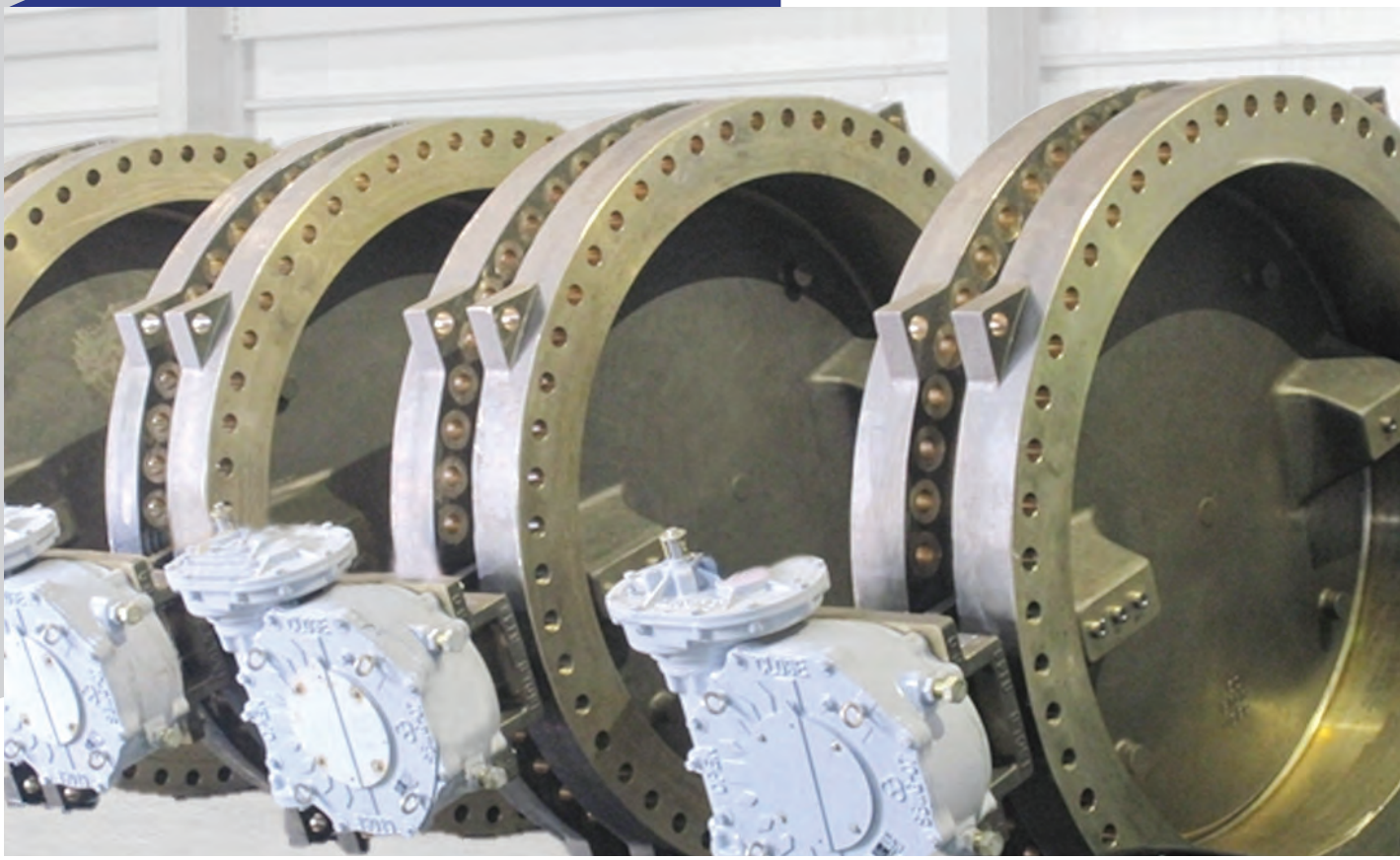
Butterfly Valve



DK VALVE CO.,LTD.



DK VALVE CO.,LTD.

'We do not sell a product, but provide you a solution'

There are a lot of products in the world, but it is difficult to find the optimum taste product. Always, we preserve our efforts in order to grasp what our customer needs and furnish the optimum solution.

To have a thorough grasp of the requirement, we listen to our customer with strained ear and have an open mind so that we can make better communication with him. In addition, so as to offer a suitable solution, we are fully furnished with a variety of products and spare no effort to develop new products which are optimally tailored to customer needs and desires.

We dare to be proud of that we are your optimum answer.

Your faithfully, All the staff of DK

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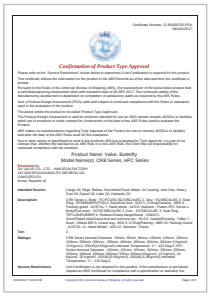
Certificates

- ISO 9001 : 2008
- CE PED Certificate of Conformity
- Fire Safe API 607
- ABS Product Design Assessment
- ABS Manufacturing Assessment
- ABS Type Approval

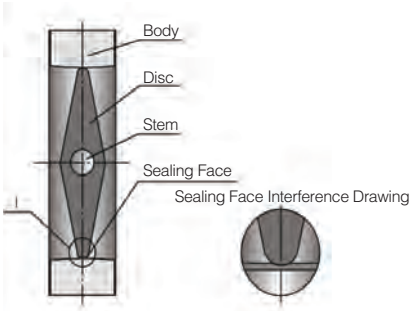


Butterfly Valve Sealing Principle

A butterfly valve is constructed to centered seal, single eccentric, double eccentric and triple eccentric seal. The sealing principles of those structures are illustrate as below.

● Centered seal butterfly valve

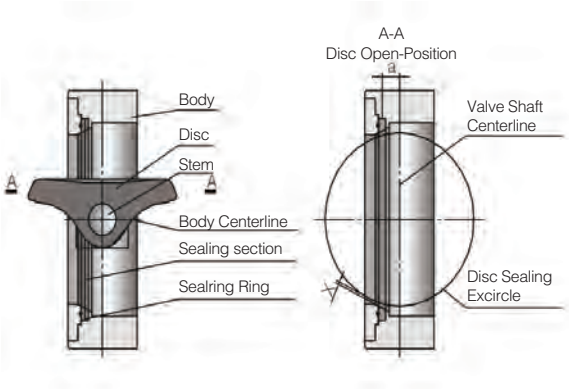
With the disc seal center of butterfly valve and rotation center of stem overlapped, sealing load will be produced between the sealing faces of seat and disc under certain magnitude of interference, thus to ensure effective seal of valve. Lined with rubber on body, this structure is applicable for medium and small-bore butterfly valves. Due to the deformation under extrusion, during the process of opening and closing, the disc is always under extrusion. So, the upper and lower valve shafts are seriously extruded, which can be bad to the service life of the valve. And, the open-close moment of the valve is relatively high. The defect is that disc and seat are always under extrusion, scratch, high resistance and serious abrasion. To overcome extrusion and scratch and to ensure good sealing performance, the seat basically uses rubber or other elastic materials.



Sealing Structure of
Centered Seal Butterfly Valve

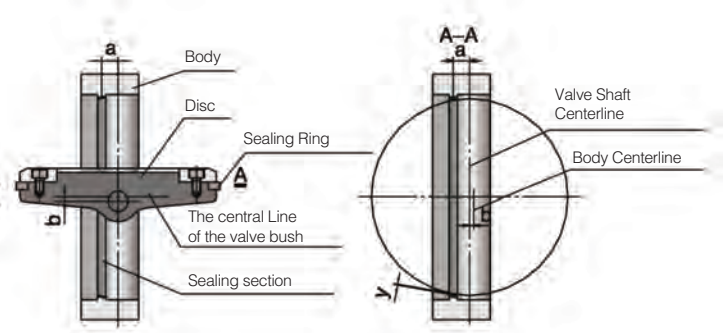
● Single eccentric butterfly valve

The rotation center of the disc (namely center of valve shaft) and the sealing section of the disc form up an 'a' eccentric, making disc sealing face gradually disengaged from seat sealing face. Once the disc turns to 15° ~ 25°, the disc sealing face will be completely disengaged from the seat sealing face. Once fully opened, a gap 'X' will be formed up between the two sealing faces, making the relative mechanical wear and extrusion between the two sealing faces greatly lowered during the process of open and close, thus to ensure the seal of butterfly valve. However, as the scratch between the disc and seat does not disappear during the whole process of open and close, they are almost similar to concentric butterfly valves in the area of application, this is why they have not been popularly used.



Sealing Structure of Single
Eccentric Seal Butterfly Valve

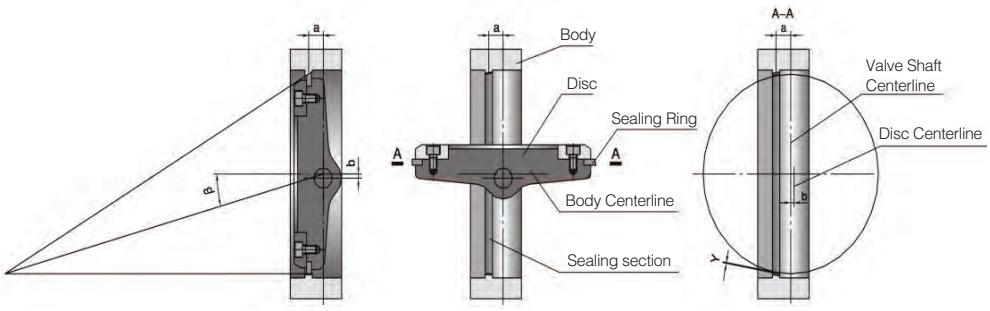
● Double eccentric butterfly valve



Sealing Structure of Double
Eccentric Seal Butterfly Valve

The rotation center of the disc (namely the center of valve shaft) and the centerline of body form up a 'b' eccentric on the base of single eccentric butterfly valve, making the sealing face of disc disengaged from seat sealing face more quickly than single eccentric butterfly valves during the process of open and close. Once the disc turns to 8° ~ 12°, the disc sealing face will be completely disengaged from the seat sealing face. Once fully opened, a gap 'Y' will be formed up between the two sealing faces. This type of butterfly valves are designed to have greatly lowered the mechanical wear and extrusion deformation between the two sealing faces, making the sealing performance of butterfly valve much better.
The characteristic of this structure is to make stem axis not only deviated from the center of the disc, but also the center of the body. The effect of double eccentric is that, when a valve is opened, the disc can be quickly disengaged from the seat, thus to greatly eliminate the unnecessary excessive extrusion and scratch between the disc and seat, reduce opening resistance, lower the abrasion and improve the service life of the seat. As scratch has been greatly lowered, metal seat can be used for a double eccentric butterfly valve, so that butterfly valves are able to be used in high temperature. However, as its seal is positioned sealing construction, i.e. the sealing face between the disc and seat is lineal contact, disc extruding seat to produce elastic deformation, thus to effect the sealing performance. This has high requirement on close position, especially for those with metal seat, and is given poor pressure endurance.

● Triple eccentric butterfly valve



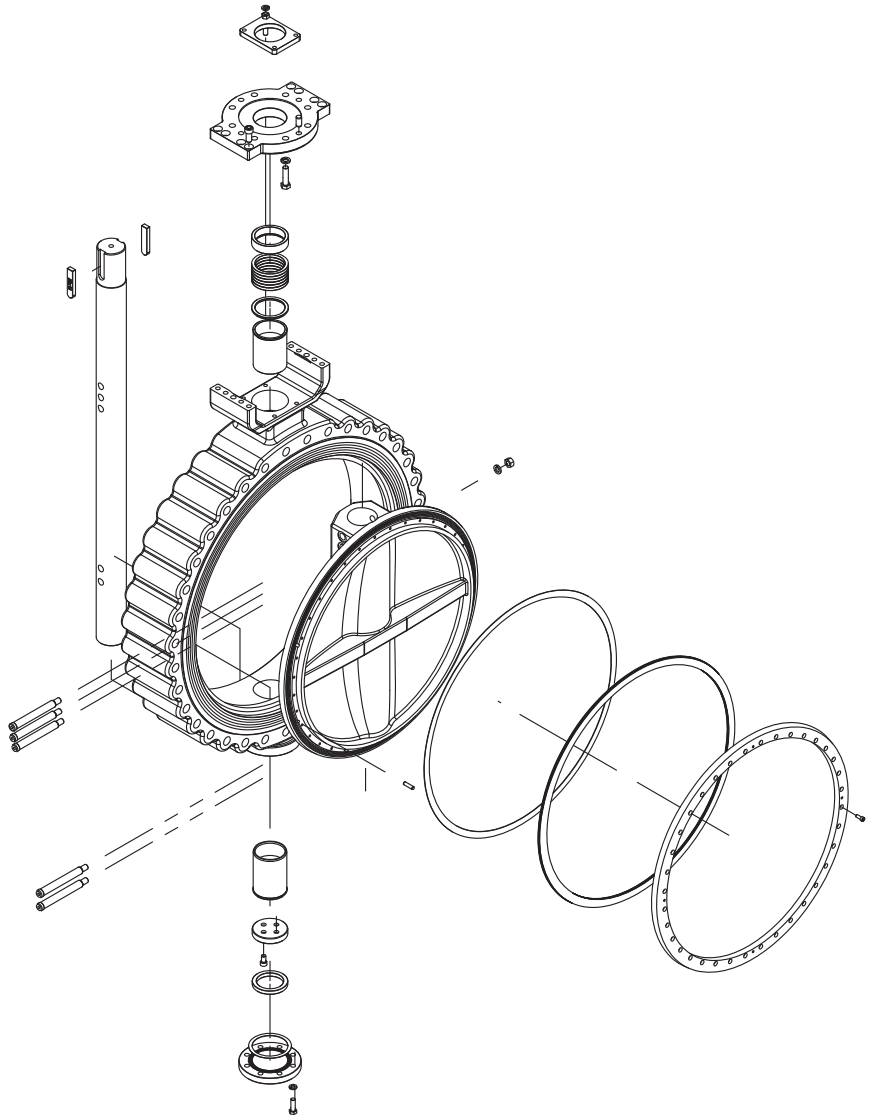
Close State Diagram of
Triple Eccentric Seal Butterfly Valve

Open State Diagram of
Triple Eccentric Seal Butterfly Valve

Sealing Principle of Triple Eccentric Seal Butterfly Valve

A β eccentric is formed up between the centerline of the seat and the centerline of the body on the base of a double eccentric butterfly valve, making the disc sealing face immediately disengaged from the seat sealing face upon the opening of a butterfly valve, and in close contact with the seat sealing face upon closing.
When fully opened, a gap 'Y', which is the same as that in a double eccentric butterfly valve, is formed up between the two sealing faces. The design of this type of valves has thoroughly eliminated the mechanical wear and scratch between the two sealing faces, making the sealing performance and service life of butterfly valves greatly improved. When a valve is closed, with the sealing ring under the extrusion of the body sealing face and disc, two upward elastic deformations are produced. The sealing face is fallen under outward tension at long shaft and inward compressive stress at short shaft. The long and short shafts produce elastic deformation of different directions, thus to maximize the sealing force between the sealing faces of the valve. This distinctive eccentric combination not only uses cam effect, but also eliminates friction completely, thus to ensure no friction between the seat and the sealing ring on the disc during the 90° stroke of the valve, a perfect solution to clear away the possibilities of abrasion and leakage.

Standard Specifications



- **DESIGN**
  API 609 Cat. B
  ASME B 16.34
- **FACE TO FACE**
  API 609 Cat. B
  Wafer and Lugged
  Double flange Short/Long
- **FLANGE STANDARD**
  ASME B 16.5/16.47
  BS 4504/EN 1092-1
  JIS B2220
  Others on request
- **PRESSURE RATING**
  ASME B 16.34
  Class 150/300/600
  Class 900/1500
- **NOMINAL DIAMETER**
  3" to 144"
  DN 80 to 3600
- **OTHER OPTIONS**
  Anti-static device
  Cryogenic design
  Others on request
- **TESTING**
  API 598
  ASME B 16.104/FCI 70-2
  ISO 5208

Applicable Materials

Carbon Steel	A105, A216 WCB/WCC/WC6/WC9
Low Temp. Carbon Steel	A350 LF2, A352 LCB/LCC
Austenitic Stainless Steel	A182 F304/F316, A351 CF8/CF8M/CF3/CF3M
Duplex Stainless Steel	A182 F51/F53/F55, A995 4A/5A/6A
Special Alloy	Inconel® 625(UNS N06625), 254SMO®(UNS S31254) Monel® K400/500(UNS N04400/N05500)

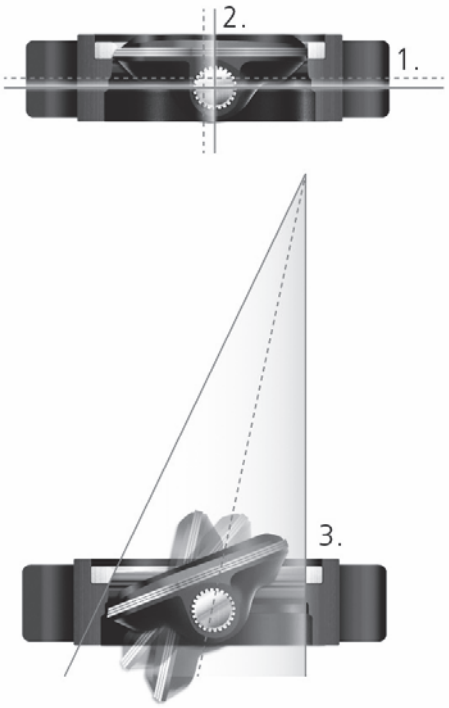
Triple-Eccentric Geometry

1st offset :
The valve stem is offset behind the seat axis to allow complete sealing contact around the entire seat.

2nd offset :
The shaft centerline is offset from the pipe and valve which provides interference free opening and closing of the valve

3rd offset :
The seat cone axis is offset from the shaft centerline to eliminate friction during closing and opening and to achieve uniform compressive sealing around the entire seat.

With this geometry, seat seal interference is completely eliminated ensuring long sealing life. The result is torque seating, 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.

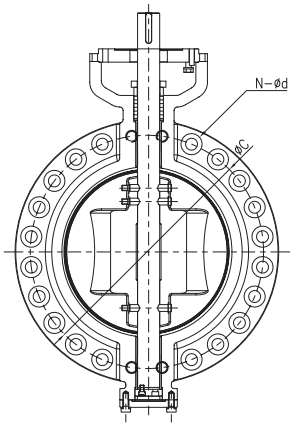


Features and Benefits

- Friction-free sealing
- Bubble tight shut-off
- Low operating torque
- Extended life cycle
- Inherently fire-safe satisfying API 607
- Wide range of service temperature
- Excellent flow characteristics
- Easy replacement of the disc seat ring
- Anti blow-out stem with retaining systems
- ISO mounting flange suitable for various operator

Variety of seat designs

Double Flanged Type

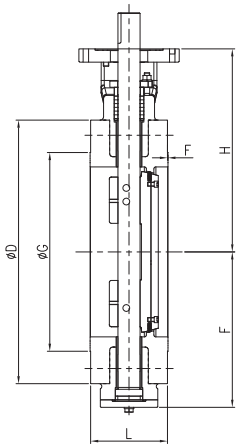


Elevation

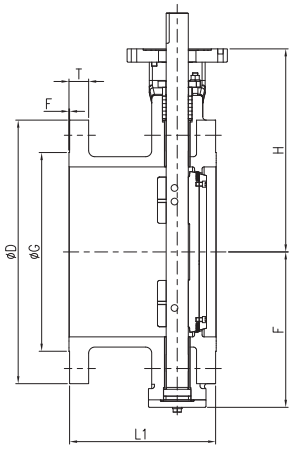
Size		CLASS	L (SHORT)	L1 (LONG)	F	H	ΦD	ΦG	T	F	ΦC	N	Φd	Bolt Diameter
Inch	mm													
3	80	150	114	203	137	208	190	127.0	23.9	2	152.4	4	19	5/8"
		300	180	282	139	208	210	127.0	28.4	2	168.3	8	23	3/4"
		600	180	356	143	208	210	127.0	31.8	7	168.3	8	23	3/4"
4	100	150	127	229	155	213	230	157.2	23.9	2	190.5	8	19	5/8"
		300	190	305	166	233	255	157.2	31.8	2	200.0	8	23	3/4"
		600	190	432	182	275	275	157.2	38.1	7	215.9	8	26	7/8"
6	150	150	140	267	170	263	280	215.9	25.4	2	241.3	8	23	3/4"
		300	210	403	203	293	320	215.9	36.6	2	269.9	12	23	3/4"
		600	210	559	222	300	355	269.7	47.8	7	292.1	12	29	1"
8	200	150	152	292	210	308	345	269.7	28.4	2	298.5	8	23	3/4"
		300	230	418	240	330	380	269.7	41.1	2	330.2	12	26	7/8"
		600	230	660	248	350	420	269.7	55.6	7	349.2	12	32	1-1/8"
10	250	150	165	330	230	340	405	323.9	30.2	2	362.0	12	26	7/8"
		300	250	457	264	375	445	323.9	47.8	2	387.4	16	29	1"
		600	250	787	325	436	508	323.9	63.5	7	431.8	16	35	1-1/4"
12	300	150	178	356	280	394	483	381.0	31.8	2	431.8	12	26	7/8"
		300	270	502	299	419	521	381.0	50.8	2	450.8	16	32	1-1/8"
		600	270	838	348	455	559	381.0	66.5	7	489.0	20	35	1-1/4"
14	350	150	190	381	308	435	533	412.8	35.1	2	476.3	12	29	1"
		300	290	762	349	485	584	412.8	53.8	2	514.4	20	32	1-1/8"
		600	290	889	378	485	603	412.8	69.9	7	527.0	20	38	1-3/8"
16	400	150	216	406	345	480	597	469.9	36.6	2	539.8	16	29	1"
		300	310	838	389	499	648	469.9	57.2	2	571.5	20	35	1-1/4"
		600	310	991	425	515	686	469.9	76.2	7	603.2	20	42	1-1/2"
18	450	150	222	432	383	517	635	533.4	39.6	2	577.9	16	32	1-1/8"
		300	330	914	460	530	711	533.4	60.5	2	628.6	24	35	1-1/4"
		600	330	1092	458	552	743	533.4	82.6	7	654.0	20	45	1-5/8"
20	500	150	229	457	393	543	699	584.2	42.9	2	635.0	20	32	1-1/8"
		300	350	991	471	597	755	584.2	63.5	2	685.8	24	35	1-1/4"
		600	350	1194	500	658	813	584.2	88.9	7	723.9	24	45	1-5/8"
24	600	150	267	508	470	622	813	692.2	47.8	2	749.3	20	35	1-1/4"
		300	390	1143	553	695	914	692.2	69.9	2	812.8	24	42	1-1/2"
		600	390	1397	560	725	940	692.2	101.6	7	838.2	24	51	1-7/8"

※ Dimensions and weight are subject to change without prior notice.

Class 150/300/600



Cross-sectional (Short)

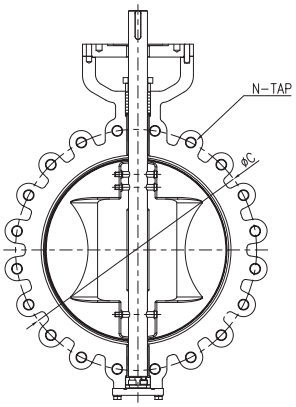


Cross-sectional (Long)

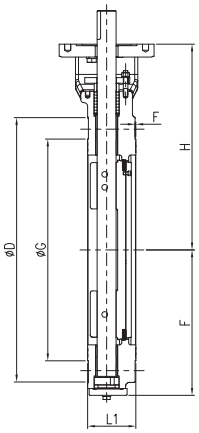
Size		CLASS	L (SHORT)	L1 (LONG)	F	H	ΦD	ΦG	T	F	ΦC	N	Φd	Bolt Diameter
Inch	mm													
26	650	150	292	559	490	635	870	749.0	68.7	2	806.5	24	35	1-1/4"
		300	410	1245			970	749.0	84.6	2	876.3	28	45	1-5/8"
		600		1448			1015	749.0	132.5	7	914.4	28	51	1-7/8"
28	700	150	292	610	555	686	925	800.0	71.9	2	863.6	28	35	1-1/4"
		300	430	1346			1035	800.0	90.9	2	939.8	28	45	1-5/8"
		600		1549			1075	800.0	137.8	7	965.2	28	54	2"
30	750	150	318	610	580	711	985	857.0	75.1	2	914.4	28	35	1-1/4"
		300	450	1397			1090	857.0	95.7	2	997.0	28	48	1-3/4"
		600		1651	705	815	1130	857.0	146.7	7	1022.4	28	54	2"
32	800	150	318	660	620	760	1060	914.0	81.4	2	977.9	28	42	1-1/2"
		300	470	1524			1150	914.0	100.5	2	1054.1	28	51	1-7/8"
		600		1778	725	870	1195	914.0	154.7	7	1079.5	28	61	2-1/4"
34	850	150	318		660	800	1110	965.0	83.0	2	1028.7	32	42	1-1/2"
		300					1205	965.0	105.2	2	1104.9	28	51	1-7/8"
		600					1245	965.0	161.0	7	1130.3	28	61	2-1/4"
36	900	150	330	711	676	845	1170	1022.0	90.9	2	1085.9	32	42	1-1/2"
		300	510	1727			1270	1022.0	111.6	2	1168.4	32	54	2"
		600		2083			1315	1022.0	169.0	7	1193.8	28	67	2-1/2"
38	950	150	410		712	870	1240	1073.0	87.8	2	1149.4	32	42	1-1/2"
		300	530				1170	1029.0	108.4	2	1092.2	32	42	1-1/2"
		600					1270	1054.0	162.0	7	1162.0	28	61	2-1/4"
40	1000	150	410		757	915	1290	1124.0	90.9	2	1200.2	36	42	1-1/2"
		300	550				1240	1086.0	144.8	2	1155.7	32	45	1-5/8"
		600					1320	1111.0	169.0	7	1212.9	32	61	2-1/4"
42	1050	150	410		784	920	1345	1194.0	97.3	2	1257.3	36	42	1-1/2"
		300	570				1290	1137.0	199.5	2	1206.5	32	45	1-5/8"
		600					1405	1168.0	178.5	7	1282.7	28	67	2-1/2"
44	1100	150	470		824	975	1405	1245.0	102.1	2	1314.5	40	42	1-1/2"
		300					1355	1194.0	124.3	2	1263.7	32	48	1-3/4"
		600					1455	1226.0	184.8	7	1333.5	32	67	2-1/2"
48	1200	150	470		862	1052	1510	1359.0	108.4	2	1422.4	44	42	1-1/2"
		300	630				1465	1302.0	133.8	2	1371.6	32	51	1-7/8"
		600					1595	1334.0	202.3	7	1460.5	32	74	2-3/4"

※ Dimensions and weight are subject to change without prior notice.

Lug Type Class 150/300/600



Elevation



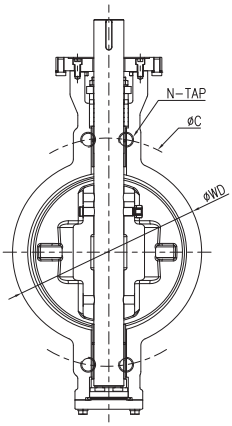
Cross-sectional

Size		CLASS	L	F	H	ΦD	ΦG	F	ΦC	N	Φd	Bolt Diameter
Inch	mm											
3	80	150	48	137	208	190	127.0	2	152.4	4	19	5/8"
		300	48	139	208	210	127.0	2	168.3	8	23	3/4"
		600	54	143	208	210	127.0	7	168.3	8	23	3/4"
4	100	150	54	155	213	230	157.2	2	190.5	8	19	5/8"
		300	54	166	233	255	157.2	2	200.0	8	23	3/4"
		600	64	182	275	275	157.2	7	215.9	8	26	7/8"
6	150	150	57	170	263	280	215.9	2	241.3	8	23	3/4"
		300	59	203	293	320	215.9	2	269.9	12	23	3/4"
		600	78	222	300	355	215.9	7	292.1	12	29	1"
8	200	150	64	210	308	345	269.7	2	298.5	8	23	3/4"
		300	73	240	330	380	269.7	2	330.2	12	26	7/8"
		600	102	248	350	420	269.7	7	349.2	12	32	1-1/8"
10	250	150	71	230	340	405	323.9	2	362.0	12	26	7/8"
		300	83	264	375	445	323.9	2	387.4	16	29	1"
		600	117	325	436	508	323.9	7	431.8	16	35	1-1/4"
12	300	150	81	280	394	483	381.0	2	431.8	12	26	7/8"
		300	92	299	419	521	381.0	2	450.8	16	32	1-1/8"
		600	140	348	455	559	381.0	7	489.0	20	35	1-1/4"
14	350	150	92	308	435	533	412.8	2	476.3	12	29	1"
		300	117	349	485	584	412.8	2	514.4	20	32	1-1/8"
		600	155	378	485	603	412.8	7	527.0	20	38	1-3/8"
16	400	150	102	345	480	597	469.9	2	539.8	16	29	1"
		300	133	389	499	648	469.9	2	571.5	20	35	1-1/4"
		600	178	425	515	686	469.9	7	603.2	20	42	1-1/2"
18	450	150	114	383	517	635	533.4	2	577.9	16	32	1-1/8"
		300	149	430	530	711	533.4	2	628.6	24	35	1-1/4"
		600	200	458	552	743	533.4	7	654.0	20	45	1-5/8"
20	500	150	127	393	543	699	584.2	2	635.0	20	32	1-1/8"
		300	159	471	597	775	584.2	2	685.8	24	35	1-1/4"
		600	216	500	658	813	584.2	7	723.9	24	45	1-5/8"
24	600	150	154	470	622	813	692.2	2	749.3	20	35	1-1/4"
		300	181	553	695	914	692.2	2	812.8	24	42	1-1/2"
		600	232	560	725	940	692.2	7	838.2	24	51	1-7/8"

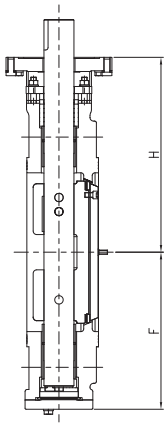
Size		CLASS	L	F	H	ΦD	ΦG	F	ΦC	N	Φd	Bolt Diameter
Inch	mm											
26	650	150	165	490	635	870	749	2	806.5	24	35	1-1/4"
		300	209	640	800	970	749	2	876.3	28	45	1-5/8"
		600				1015	749	7	914.4	28	51	1-7/8"
28	700	150	165	555	686	925	800	2	863.6	28	35	1-1/4"
		300	209	660	810	1035	800	2	939.8	28	45	1-5/8"
		600				1075	800	7	965.2	28	54	2
30	750	150	165	580	711	985	857	2	914.4	28	35	1-1/4"
		300	241	690	825	1090	857	2	997.0	28	48	1-3/4"
		600		705	815	1130	857	7	1022.4	28	54	2"
32	800	150	190	620	760	1060	914	2	977.9	28	42	1-1/2"
		300	241	720	860	1150	914	2	1054.1	28	51	1-7/8"
		600		725	870	1195	914	7	1079.5	28	61	2-1/4"
34	850	150	190	660	800	1110	965	2	1028.7	32	42	1-1/2"
		300	241	740	920	1205	965	2	1104.9	28	51	1-7/8"
		600				1245	965	7	1130.3	28	61	2-1/4"
36	900	150	200	676	845	1170	1022	2	1085.9	32	42	1-1/2"
		300	300	750	930	1270	1022	2	1168.4	32	54	2"
		600				1315	1022	7	1193.8	28	67	2-1/2"
38	950	150	200	712	870	1240	1073	2	1149.4	32	42	1-1/2"
		300				1170	1029	2	1092.2	32	42	1-1/2"
		600				1270	1054	7	1162.0	28	61	2-1/4"
40	1000	150	216	757	915	1290	1124	2	1200.2	36	42	1-1/2"
		300				1240	1086	2	1155.7	32	45	1-5/8"
		600				1320	1111	7	1212.9	32	61	2-1/4"
42	1050	150	251	784	920	1345	1194	2	1257.3	36	42	1-1/2"
		300				1290	1137	2	1206.5	32	45	1-5/8"
		600				1405	1168	7	1282.7	28	67	2-1/2"
44	1100	150	251	824	975	1405	1245	2	1314.5	40	42	1-1/2"
		300				1355	1194	2	1263.7	32	48	1-3/4"
		600				1455	1226	7	1333.5	32	67	2-1/2"
48	1200	150	276	862	1052	1510	1359	2	1422.4	44	42	1-1/2"
		300				1465	1302	2	1371.6	32	51	1-7/8"
		600				1595	1334	7	1460.5	32	74	2-3/4"

※ Dimensions and weight are subject to change without prior notice.

Wafer Type Class 150/300/600



Elevation



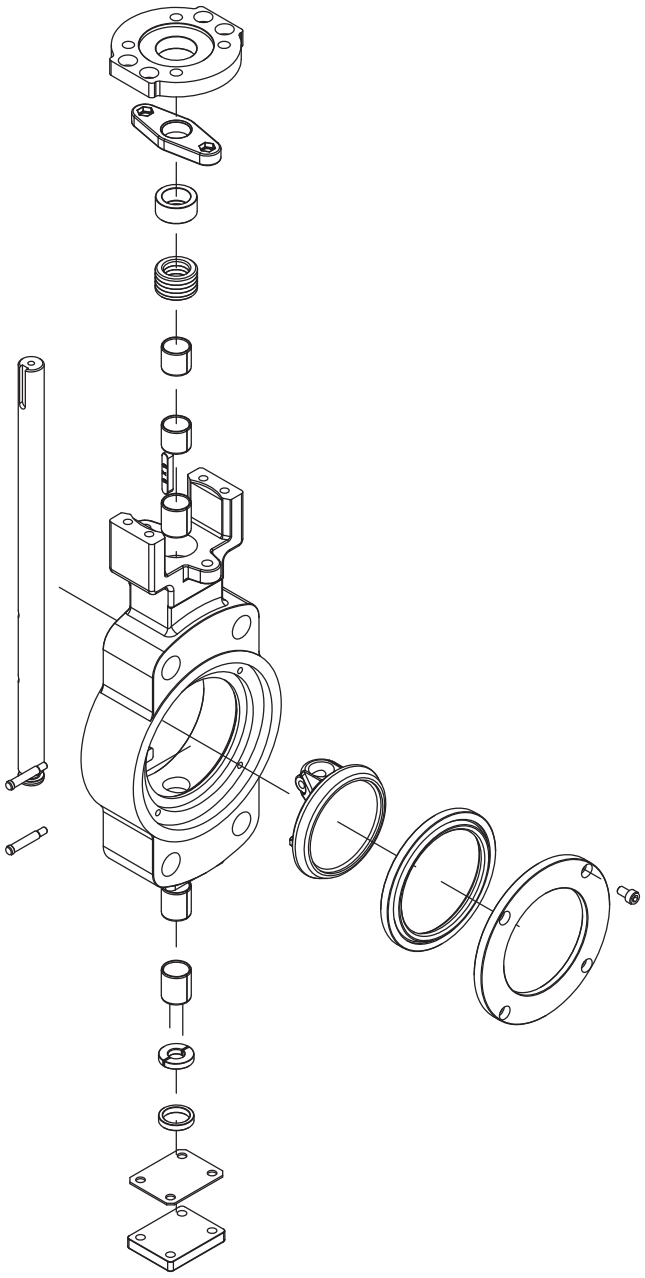
Cross-sectional

Size		CLASS	L	F	H	ΦC	N	Φd	Bolt Diameter
Inch	mm								
3	80	150	48	137	208	152.4	4	19	5/8"
		300	48	139	208	168.3	4	23	3/4"
		600	54	143	208	168.3	4	23	3/4"
4	100	150	54	155	213	190.5	4	19	5/8"
		300	54	166	233	200.0	4	23	3/4"
		600	64	182	275	215.9	4	26	7/8"
6	150	150	57	170	263	241.3	4	23	3/4"
		300	59	203	293	269.9	4	23	3/4"
		600	78	222	300	292.1	4	29	1"
8	200	150	64	210	308	298.5	4	23	3/4"
		300	73	240	330	330.2	4	26	7/8"
		600	102	248	350	349.2	4	32	1-1/8"
10	250	150	71	230	340	362.0	4	26	7/8"
		300	83	264	375	387.4	4	29	1"
		600	117	325	436	431.8	4	35	1-1/4"
12	300	150	81	280	394	431.8	4	26	7/8"
		300	92	299	419	450.8	4	32	1-1/8"
		600	140	348	455	489.0	4	35	1-1/4"
14	350	150	92	308	435	476.3	4	29	1"
		300	117	349	485	514.4	4	32	1-1/8"
		600	155	378	485	527.0	4	38	1-3/8"
16	400	150	102	345	480	539.8	4	29	1"
		300	133	389	499	571.5	4	35	1-1/4"
		600	178	425	515	603.2	4	42	1-1/2"
18	450	150	114	383	517	577.9	4	32	1-1/8"
		300	149	430	530	628.6	4	35	1-1/4"
		600	200	458	552	654.0	4	45	1-5/8"
20	500	150	127	393	543	635.0	4	32	1-1/8"
		300	159	471	597	685.8	4	35	1-1/4"
		600	216	500	658	723.9	4	45	1-5/8"
24	600	150	154	470	622	749.3	4	35	1-1/4"
		300	181	553	695	812.8	4	42	1-1/2"
		600	232	560	725	838.2	4	51	1-7/8"

Size		CLASS	L	F	H	ΦC	N	Φd	Bolt Diameter
Inch	mm								
26	650	150	165	490	635	806.5	4	35	1-1/4"
		300	209	640	800	876.3	4	45	1-5/8"
		600				914.4	4	51	1-7/8"
28	700	150	165	555	686	863.6	4	35	1-1/4"
		300	209	660	810	939.8	4	45	1-5/8"
		600				965.2	4	54	2"
30	750	150	165	580	711	914.4	4	35	1-1/4"
		300	241	690	825	997.0	4	48	1-3/4"
		600		705	815	1022.4	4	54	2"
32	800	150	190	620	760	977.9	4	42	1-1/2"
		300	241	690	825	1054.1	4	51	1-7/8"
		600		725	870	1079.5	4	61	2-1/4"
34	850	150	190	660	800	1028.7	4	42	1-1/2"
		300	241	740	920	1104.9	4	51	1-7/8"
		600				1130.3	4	61	2-1/4"
36	900		200	676	845	1085.9	4	42	1-1/2"
		300	300	750	930	1168.4	4	54	2"
		600				1193.8	4	67	2-1/2"
38	950	150	200	712	870	1149.4	4	42	1-1/2"
		300				1092.2	4	42	1-1/2"
		600				1162.0	4	61	2-1/4"
40	1000	150	216	757	915	1200.2	4	42	1-1/2"
		300				1155.7	4	45	1-5/8"
		600				1212.9	4	61	2-1/4"
42	1050	150	251	784	920	1257.3	4	42	1-1/2"
		300				1206.5	4	45	1-5/8"
		600				1282.7	4	67	2-1/2"
44	1100	150	251	824	975	1314.5	4	42	1-1/2"
		300				1263.7	4	48	1-3/4"
		600				1333.5	4	67	2-1/2"
48	1200	150	276	862	1052	1422.4	4	42	1-1/2"
		300				1371.6	4	51	1-7/8"
		600				1460.5	4	74	2-3/4"

※ Dimensions and weight are subject to change without prior notice.

Standard Specification



- **DESIGN**
  API 609 Cat. B
  ASME B 16.34
- **FACE TO FACE**
  API 609 Cat. B
  Wafer and Lugged
  Double flange Short/Long
- **FLANGE STANDARD**
  ASME B 16.5/16.47
  BS 4504/EN 1092-1
  JIS B2220
  Others on request
- **PRESSURE RATING**
  ASME B 16.34
  Class 150/300
- **NOMINAL DIAMETER**
  2" to 144"
  DN 50 to 3600
- **OTHER OPTIONS**
  Fire safe design
  Anti-static device
  Cryogenic design
  Others on request
- **TESTING**
  API 598
  ASME B 16.104/FCI 70-2
  ISO 5208

Applicable Materials

Carbon Steel	A105, A216 WCB/WCC/WC6/WC9
Low Temp. Carbon Steel	A350 LF2, A352 LCB/LCC
Austenitic Stainless Steel	A182 F304/F316, A351 CF8/CF8M/CF3/CF3M
Duplex Stainless Steel	A182 F51/F53/F55, A995 4A/5A/6A
Special Alloy	Inconel® 625(UNS N06625), 254SMO®(UNS S31254) Monel® K400/500(UNS N04400/N05500)

Double-Eccentric Geometry

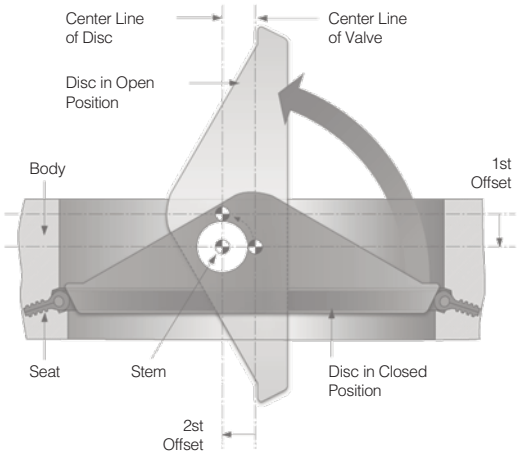
1st offset :

The first offset is achieved by locating the shaft downstream of the center-line of the seat. This allows for a totally unobstructed 360° sealing surface.

2nd offset :

The second offset locates the shafts off-center of the vertical axis of the seat.

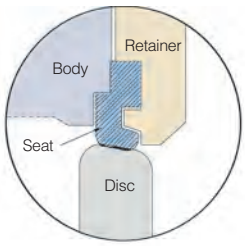
The combination of these two offsets creates a cam effect as the disc swings into and out of the seat. The disc lifts quickly out of the seat in the first few degrees of travel and does not contact the seat again until it is nearly closed. There are no wear points between the seat and disc, while operating torques are reduced and seat life is extended.



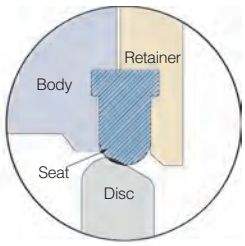
Features and Benefits

- Double eccentric geometry to provide superior sealing with minimal seat contact and wear
- Single piece shaft and disc designed for maximum strength and flow coefficient
- Combination mechanical and pressure energized seat design for repeatable and reliable sealing performance
- Blow-out proof stem prevents injury and product loss
- Seat option includes PTFE, EPDM, NBR and VITON® soft seats and flexible metal seats to suit variety of application
- Long life, easy filed replaceable seat placed in body, away from flow stream, provides bubble tight shut off
- Heavy duty pins connecting valve shaft to disc avoids lost motion under high torque conditions
- Low friction bearings provide maximum radial support for higher shaft loads and minimize operating torque
- Cavity free flow passage offers minimum flow resistance and high Cv.

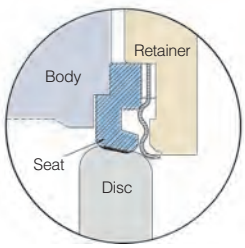
Variety of seat design



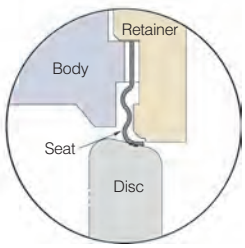
PTFE seat



Rubber seat

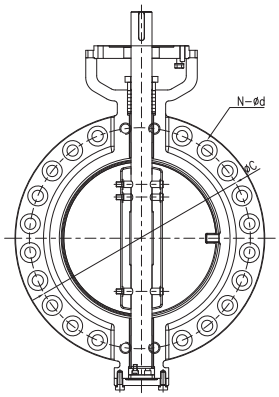


PTFE+Metal seat



Flat metal seat

Double Flanged Type

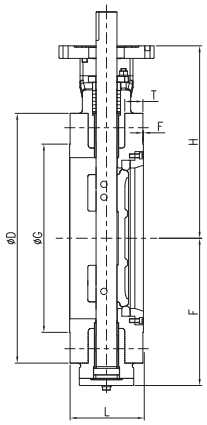


Elevation

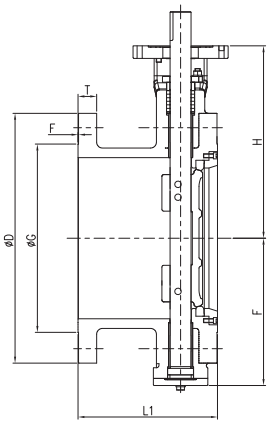
Size		CLASS	L	L1	F	H	ΦD	ΦG	T	F	ΦC	N	Φd	Bolt
Inch	mm		(SHORT)	(LONG)										Diameter
3	80	150	114	203	137	208	190	127.0	23.9	2	152.4	4	19	5/8"
		300	180	282	139	208	210	127.0	28.4	2	168.3	8	23	3/4"
4	100	150	127	229	155	213	230	157.2	23.9	2	190.5	8	19	5/8"
		300	190	305	166	233	255	157.2	31.8	2	200.0	8	23	3/4"
6	150	150	140	267	170	263	280	215.9	25.4	2	241.3	8	23	3/4"
		300	210	403	203	293	320	215.9	36.6	2	269.9	12	23	3/4"
8	200	150	152	292	210	308	345	269.7	28.4	2	298.5	8	23	3/4"
		300	230	418	240	330	380	269.7	41.1	2	330.2	12	26	7/8"
10	250	150	165	330	230	340	405	323.9	30.2	2	362.0	12	26	7/8"
		300	250	457	264	375	445	323.9	47.8	2	387.4	16	29	1"
12	300	150	178	356	280	394	483	381.0	31.8	2	431.8	12	26	7/8"
		300	270	502	299	419	521	381.0	50.8	2	450.8	16	32	1-1/8"
14	350	150	190	381	308	435	533	412.8	35.1	2	476.3	12	29	1"
		300	290	762	349	485	584	412.8	53.8	2	514.4	20	32	1-1/8"
16	400	150	216	406	345	480	597	469.9	36.6	2	539.8	16	29	1"
		300	310	838	389	499	648	469.9	57.2	2	571.5	20	35	1-1/4"
18	450	150	222	432	383	517	635	533.4	39.6	2	577.9	16	32	1-1/8"
		300	330	914	430	530	711	533.4	60.5	2	628.6	24	35	1-1/4"
20	500	150	229	457	393	543	699	584.2	42.9	2	635.0	20	32	1-1/8"
		300	350	991	471	597	775	584.2	63.5	2	685.8	24	35	1-1/4"
24	600	150	267	508	470	622	813	692.2	47.8	2	749.3	20	35	1-1/4"
		300	390	1143	553	695	914	692.2	69.9	2	812.8	24	42	1-1/2"

※ Dimensions and weight are subject to change without prior notice.

Class 150/300



Cross-sectional (Short)

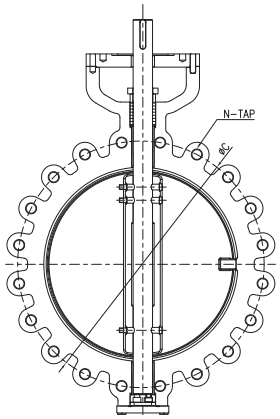


Cross-sectional (Long)

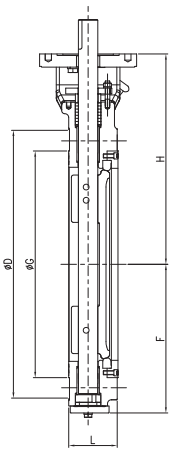
Size		CLASS	L (SHORT)	L1 (LONG)	F	H	ΦD	ΦG	T	F	ΦC	N	Φd	Bolt Diameter
Inch	mm													
26	650	150	292	559	490	635	870	749.0	68.7	2	806.5	24	35	1-1/4"
		300	410	1245			970	749.0	84.6	2	876.3	28	45	1-5/8"
28	700	150	292	610	555	686	925	800.0	71.9	2	863.6	28	35	1-1/4"
		300	430	1346			1035	800.0	90.9	2	939.8	28	45	1-5/8"
30	750	150	318	610	580	711	985	857.0	75.1	2	914.4	28	35	1-1/4"
		300	450	1397			1090	857.0	95.7	2	997.0	28	48	1-3/4"
32	800	150	318	660	620	760	1060	914.0	81.4	2	977.9	28	42	1-1/2"
		300	470	1524			1150	914.0	100.5	2	1054.1	28	51	1-7/8"
34	850	150	318		660	800	1110	965.0	83.0	2	1028.7	32	42	1-1/2"
		300					1205	965.0	105.2	2	1104.9	28	51	1-7/8"
36	900	150	330	711	676	845	1170	1022.0	90.9	2	1085.9	32	42	1-1/2"
		300	510	1727			1270	1022.0	111.6	2	1168.4	32	54	2"
38	950	150	410		712	870	1240	1073.0	87.8	2	1149.4	32	42	1-1/2"
		300	530				1170	1029.0	108.4	2	1092.2	32	42	1-1/2"
40	1000	150	410		757	915	1290	1124.0	90.9	2	1200.2	36	42	1-1/2"
		300	550				1240	1086.0	114.8	2	1155.7	32	45	1-5/8"
42	1050	150	410		784	920	1345	1194.0	97.3	2	1257.3	36	42	1-1/2"
		300	570				1290	1137.0	119.5	2	1206.5	32	45	1-5/8"
44	1100	150	470		824	975	1405	1245.0	102.1	2	1314.5	40	42	1-1/2"
		300					1355	1194.0	124.3	2	1263.7	32	48	1-3/4"
48	1200	150	470		862	1052	1510	1359.0	108.4	2	1422.4	44	42	1-1/2"
		300	630				1465	1302.0	133.8	2	1371.6	32	51	1-7/8"

※ Dimensions and weight are subject to change without prior notice.

Lug Type Class 150/300



Elevation



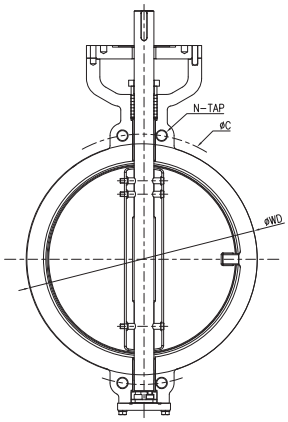
Cross-sectional

Size		CLASS	L	F	H	ΦD	ΦG	F	ΦC	N	Φd	Bolt Diameter
Inch	mm											
3	80	150	48	130	190	190	127.0	2	152.4	4	19	5/8"
		300	48			210	127.0	2	168.3	8	23	3/4"
4	100	150	54	149	209	230	157.2	2	190.5	8	19	5/8"
		300	54	160	230	255	157.2	2	200.0	8	23	3/4"
6	150	150	57	175	260	280	215.9	2	241.3	8	23	3/4"
		300	59	203	288	320	215.9	2	269.9	12	23	3/4"
8	200	150	64	213	298	345	269.7	2	298.5	8	23	3/4"
		300	73	240	330	380	269.7	2	330.2	12	26	7/8"
10	250	150	71	247	342	405	323.9	2	362.0	12	26	7/8"
		300	83	275	375	445	323.9	2	387.4	16	29	1"
12	300	150	81	289	394	483	381.0	2	431.8	12	26	7/8"
		300	92	313		521	381.0	2	450.8	16	32	1-1/8"
14	350	150	92	321	426	533	412.8	2	476.3	12	29	1"
		300	117	349		584	412.8	2	514.4	20	32	1-1/8"
16	400	150	102	357	462	597	469.9	2	539.8	16	29	1"
		300	133	390	510	648	469.9	2	571.5	20	35	1-1/4"
18	450	150	114	383	498	635	533.4	2	577.9	16	32	1-1/8"
		300	149	427		711	533.4	2	628.6	24	35	1-1/4"
20	500	150	127	418	533	699	584.2	2	635.0	20	32	1-1/8"
		300	159	457	592	775	584.2	2	685.8	24	35	1-1/4"
24	600	150	154	481	596	813	692.2	2	749.3	20	35	1-1/4"
		300	181	535	680	914	692.2	2	812.8	24	42	1-1/2"

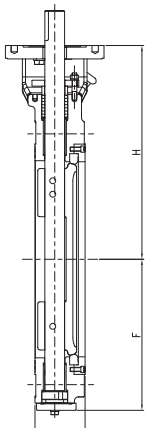
Size		CLASS	L	F	H	ΦD	ΦG	F	ΦC	N	Φd	Bolt Diameter
Inch	mm											
26	650	150	165	490	635	870	749.0	2	806.5	24	35	1-1/4"
		300	209	640	800	970	749.0	2	876.3	28	45	1-5/8"
28	700	150	165	555	686	925	800.0	2	863.6	28	35	1-1/4"
		300	209	660	810	1035	800.0	2	939.8	28	45	1-5/8"
30	750	150	165	580	711	985	857.0	2	914.4	28	35	1-1/4"
		300	241	690	825	1090	857.0	2	997.0	28	48	1-3/4"
32	800	150	190	620	760	1060	914.0	2	977.9	28	42	1-1/2"
		300	241	690	825	1150	914.0	2	1054.1	28	51	1-7/8"
34	850	150	190	660	800	1110	965.0	2	1028.7	32	42	1-1/2"
		300	241	740	920	1205	965.0	2	1104.9	28	51	1-7/8"
36	900	150	200	676	845	1170	1022.0	2	1085.9	32	42	1-1/2"
		300	300	750	930	1270	1022.0	2	1168.4	32	54	2
38	950	150	200	712	870	1240	1073.0	2	1149.4	32	42	1-1/2"
		300				1170	1029.0	2	1092.2	32	42	1-1/2"
40	1000	150	216	757	915	1290	1124.0	2	1200.2	36	42	1-1/2"
		300				1240	1086.0	2	1155.7	32	45	1-5/8"
42	1050	150	251	784	920	1345	1194.0	2	1257.3	36	42	1-1/2"
		300				1290	1137.0	2	1206.5	32	45	1-5/8"
44	1100	150	251	824	975	1405	1245.0	2	1314.5	40	42	1-1/2"
		300				1355	1194.0	2	1263.7	32	48	1-3/4"
48	1200	150	276	862	1052	1510	1359.0	2	1422.4	44	42	1-1/2"
		300				1465	1302.0	2	1371.6	32	51	1-7/8"

※ Dimensions and weight are subject to change without prior notice.

Wafer Type Class 150/300



Elevation



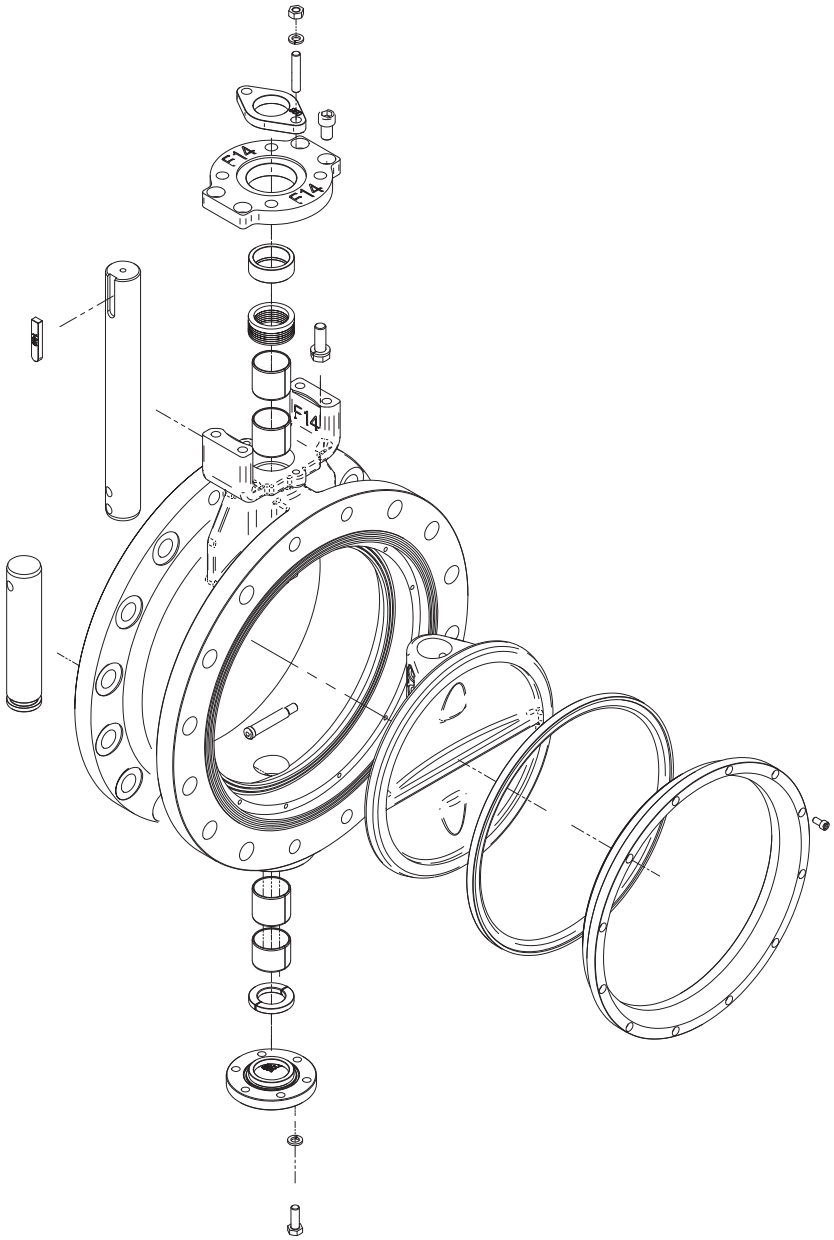
Cross-sectional

Size		CLASS	L	F	H	ΦC	N	Φd	Bolt Diameter
Inch	mm								
3	80	150	48	130	190	152.4	4	19	5/8"
		300	48			168.3	8	23	3/4"
4	100	150	54	149	209	190.5	8	19	5/8"
		300	54	160	230	200.0	8	23	3/4"
6	150	150	57	175	260	241.3	8	23	3/4"
		300	59	203	288	269.9	12	23	3/4"
8	200	150	64	213	298	298.5	8	23	3/4"
		300	73	240	330	330.2	12	26	7/8"
10	250	150	71	247	342	362.0	12	26	7/8"
		300	83	275	375	387.4	16	29	1"
12	300	150	81	289	394	431.8	12	26	7/8"
		300	92	313		450.8	16	32	1-1/8"
14	350	150	92	321	426	476.3	12	29	1"
		300	117	349		514.4	20	32	1-1/8"
16	400	150	102	357	462	539.8	16	29	1"
		300	133	390	510	571.5	20	35	1-1/4"
18	450	150	114	383	498	577.9	16	32	1-1/8"
		300	149	427		628.6	24	35	1-1/4"
20	500	150	127	418	533	635.0	20	32	1-1/8"
		300	159	457	592	685.8	24	35	1-1/4"
24	600	150	154	481	596	749.3	20	35	1-1/4"
		300	181	535	680	812.8	24	42	1-1/2"

Size		CLASS	L	F	H	ΦC	N	Φd	Bolt Diameter
Inch	mm								
26	650	150	165	490	635	806.5	24	35	1-1/4"
		300	209	640	800	876.3	28	45	1-5/8"
28	700	150	165	555	686	863.6	28	35	1-1/4"
		300	209	660	810	939.8	28	45	1-5/8"
30	750	150	165	580	711	914.4	28	35	1-1/4"
		300	241	690	825	997.0	28	48	1-3/4"
32	800	150	190	620	760	977.9	28	42	1-1/2"
		300	241	690	825	1054.1	28	51	1-7/8"
34	850	150	190	660	800	1028.7	32	42	1-1/2"
		300	241	740	920	1104.9	28	51	1-7/8"
36	900	150	200	676	845	1085.9	32	42	1-1/2"
		300	300	750	930	1168.4	32	54	2"
38	950	150	200	712	870	1149.4	32	42	1-1/2"
		300				1092.2	32	42	1-1/2"
40	1000	150	216	757	915	1200.2	36	42	1-1/2"
		300				1155.7	32	45	1-5/8"
42	1050	150	251	784	920	1257.3	36	42	1-1/2"
		300				1206.5	32	45	1-5/8"
44	1100	150	251	824	975	1314.5	40	42	1-1/2"
		300				1263.7	32	48	1-3/4"
48	1200	150	276	862	1052	1422.4	44	42	1-1/2"
		300				1371.6	32	51	1-7/8"

※ Dimensions and weight are subject to change without prior notice.

Standard Specifications



- **DESIGN**
  AWWA C 504
  BS 5155
  JIS B 2064

- **FACE-TO FACE**
  BS 5155 Short Type
  AWWA C 504 Short Type
  Others on request

- **FLANGE STANDARD**
  ASME B 16.5/16.47
  BS 4504/EN 1092-1
  AWWA C 207
  JIS B2220
  Others on request

- **PRESSURE RATING**
  AWWA C 504
  Class 25/75/150

- **NOMINAL DIAMETER**
  8" to 120"
  DN 200 to 3000

- **INSTALLATION OPTIONS**
  HORIZONTAL
  VERTICAL

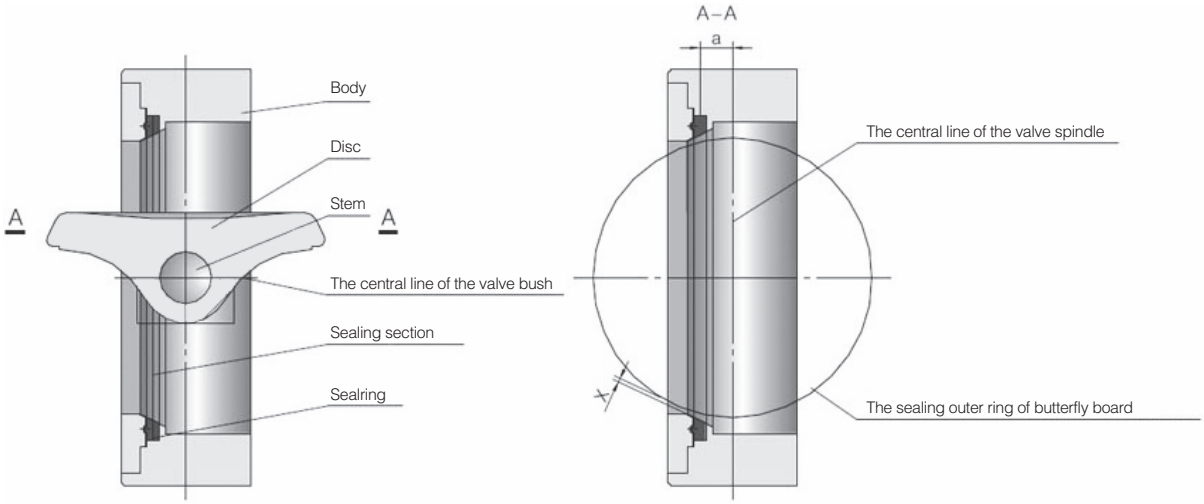
- **LINING OPTIONS**
  FULL RUBBER LINED
  RUBBER LINED BODY ONLY

- **TESTING**
  AWWA C 504

Applicable Materials

Body	A126 CL.B / A536 / A216 WCB
Disc	A536 / A216 WCB / A351 CF8 / B148
Body Seat	A276 304 / B148 / NBR
Disc Seat	A276 304 / B148 / NBR
Lining	Natural Rubber / NBR / EPDM

Single-Eccentric Geometry

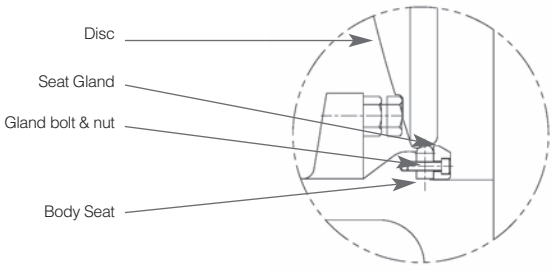


This offset disc design provides an uninterrupted 360° sealing surface. The sealing surface is not interrupted by the valve shaft and does not have any continuous contact points between the body sealing surface and the disc sealing surface. This results in a longer seat life.

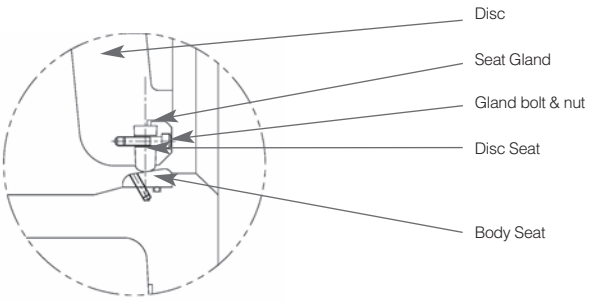
Features and Benefits

- Valve bodies shall be cast iron A126 CL.B, ductile iron A536 or cast steel A216 WCB, short body design. And, body thickness shall be in strict accordance with AWWA C504 where applicable.
- Discs shall not have any hollow chambers that can entrap water. All surfaces shall be visually inspected to assure all structural members are at full disc strength. Disc and shaft connection shall be made with stainless steel pins and/or bolts.
- Shafts shall be turned, grounded, polished and constructed of stainless steel Type 304 or 316. Shafts shall be two-piece, stub type and keyed for actuator connection. Diameter of shafts shall meet minimum requirements established by AWWA C504 where applicable.
- Seats shall be constructed of synthetic rubber compound such as NBR or EPDM and be a full 360° without interruption. Seats shall be field adjustable around the full 360° circumference and replaceable without dismantling the actuator, disc of shaft and without removing the valve from the pipeline.

Variety of Seat Design

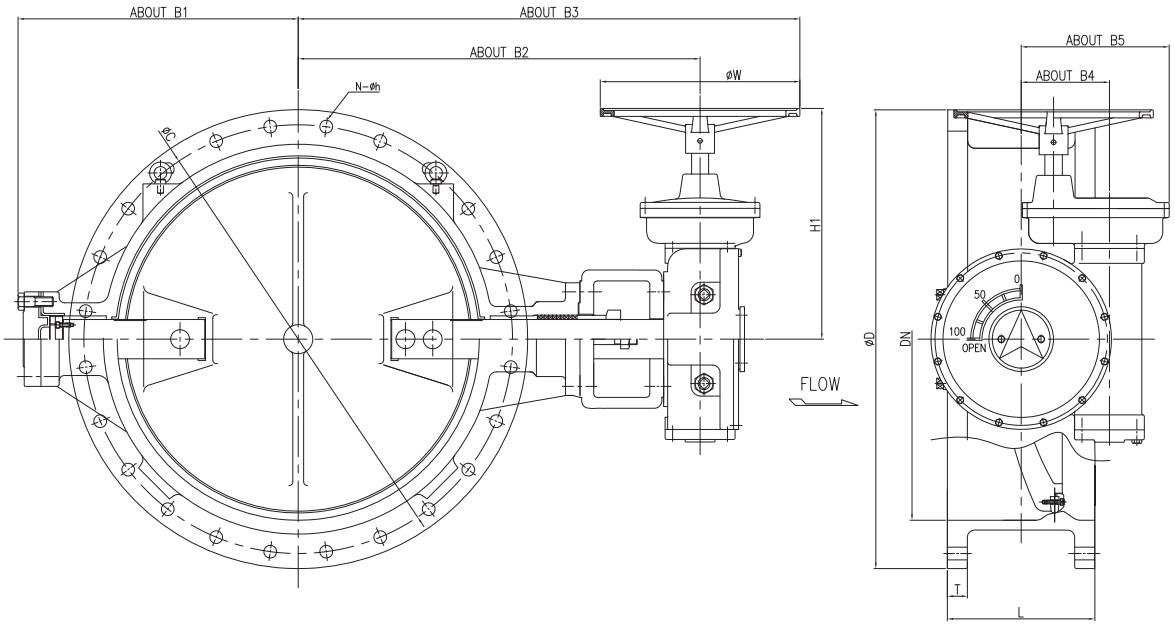


Seat on Body Type



Seat on Disc Type

DN 200 - 1000



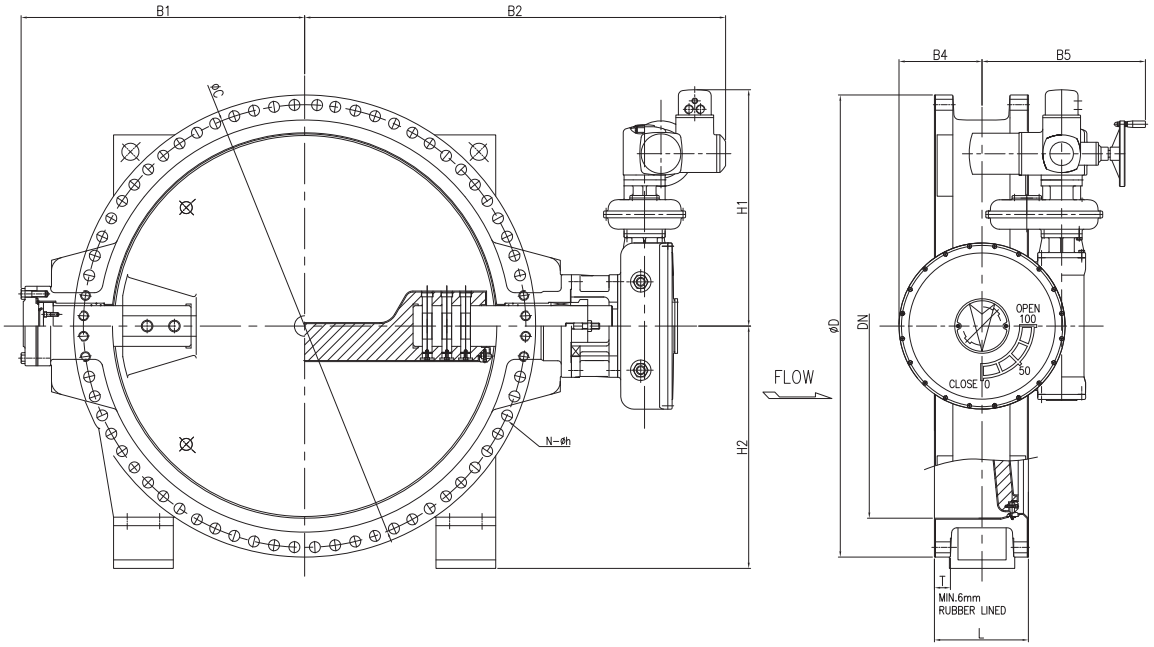
Elevation

Cross-sectional

Size		BS 5155	AWWA C 504	Flange				B1	B2	B3	B4	B5	ØW	H1	Approx. Weight (Kg)
		Short Type	Short Type	Bolt Hole											
Inch	mm	L	L	ØD	ØC	n-Øh	T x f								
8	200	152	152	340	295	8 - 23	27 x 3	213	425	582	83	240	315	220	96
10	250	165	203	395	350	12 - 23	29 x 3	244	465	622	83	240	315	220	120
12	300	178	203	445	400	12 - 23	31 x 4	276	495	652	121	278	315	283	145
14	350	190	203	505	460	16 - 23	32 x 4	310	538	695	121	278	315	283	195
16	400	216	203	565	515	16 - 28	34 x 4	343	578	735	121	278	315	283	256
18	450	222	203	615	565	20 - 28	35 x 4	367	606	806	177	377	400	377	288
20	500	229	203	670	620	20 - 28	36 x 4	400	638	838	177	377	400	377	353
24	600	267	203	780	725	20 - 31	40 x 4	453	680	880	177	377	400	377	454
28	700	292	305	895	840	24 - 31	46 x 4	525	815	1095	236	443	560	560	582
32	800	318	305	1015	950	24 - 34	49 x 5	596	842	1122	236	443	560	560	686
36	900	330	305	1115	1050	28 - 34	51 x 5	653	964	1244	236	443	560	560	1052
40	1000	410	305	1230	1160	28 - 37	55 x 5	730	1035	1365	333	540	700	560	1280

※ Dimensions and weight are subject to change without prior notice.

DN 1100 - 3000



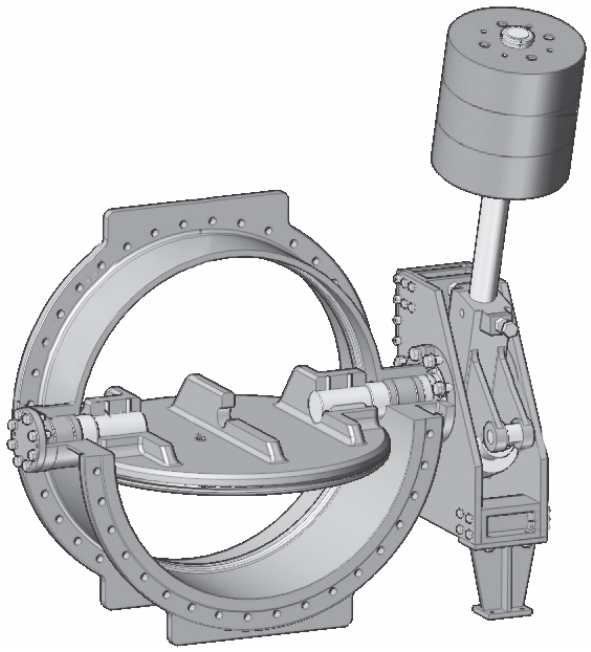
Elevation

Cross-sectional

Size		BS 5155	AWWA C 504	Flange				B1	B2	B3	B4	B5	ØW	H1	Approx. Weight (Kg)
		Short Type	Short Type	Bolt Hole											
Inch	mm	L	L	ØD	ØC	n-Øh	T x f								
44	1100	152	152	340	295	8 - 23	27 x 3	213	425	582	83	240	315	220	96
48	1200	165	203	395	350	12 - 23	29 x 3	244	465	622	83	240	315	220	120
54	1350	178	203	445	400	12 - 23	31 x 4	276	495	652	121	278	315	283	145
60	1500	190	203	505	460	16 - 23	32 x 4	310	538	695	121	278	315	283	195
66	1650	216	203	565	515	16 - 28	34 x 4	343	578	735	121	278	315	283	256
72	1800	222	203	615	565	20 - 28	35 x 4	367	606	806	177	377	400	377	288
80	2000	229	203	670	620	20 - 28	36 x 4	400	638	838	177	377	400	377	353
88	2200	267	203	780	725	20 - 31	40 x 4	453	680	880	177	377	400	377	454
96	2400	292	305	895	840	24 - 31	46 x 4	525	815	1095	236	443	560	560	582
100	2500	318	305	1015	950	24 - 34	49 x 5	596	842	1122	236	443	560	560	686
104	2600	330	305	1115	1050	28 - 34	51 x 5	653	964	1244	236	443	560	560	1052
112	2800	410	305	1230	1160	28 - 37	55 x 5	730	1035	1365	333	540	700	560	1280
120	3000	600	600	3405	3290	68 - 62	75 x 6	2150	2470	3220	600	1350	900	1770	11800

※ Dimensions and weight are subject to change without prior notice.

General overview



A butterfly check valve with counterweight and hydraulic cylinder is very reliable as it can regulate the closing time of the valve itself. This valve is applied in pipelines as a non-return device, with flow allowed in one direction only. The butterfly check valve with counterweight is double-eccentric type with a tilting disc, the counterweight lever will facilitate the anti-hammer device and the oil cylinder will slow down the closure movement, to reduce any slam with noise. With the damping system, the water hammer effect can be prevented effectively by reducing the damping time. The flow opens the valve in the desired direction, while back flow forces the valve to close. Full tightness is ensured by an elastomer-to-metal seat design and it can be easily replaced without dismantling the valve from the pipeline.

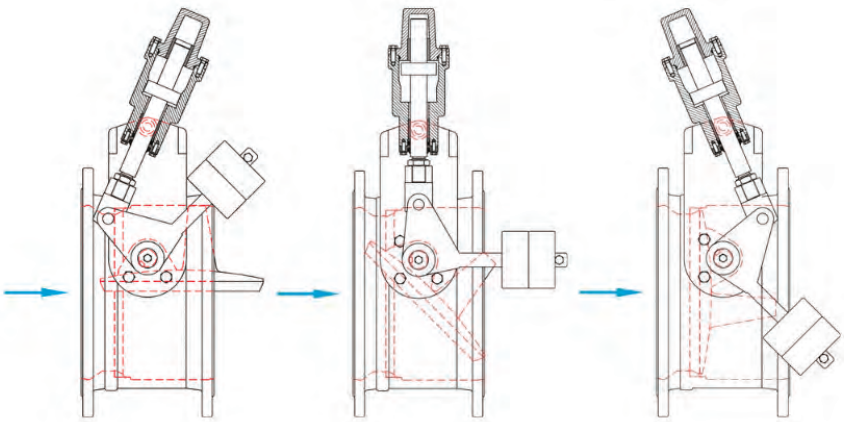
Main application

- Water
- Energy
- Industry

Application fluid

- Sea water
- Drinking water
- Brackish water
- Grey water
- Solids-laden fluids
- Corrosive fluids
- Gas

Mechanism and operation



Non-Return valve in damped open position

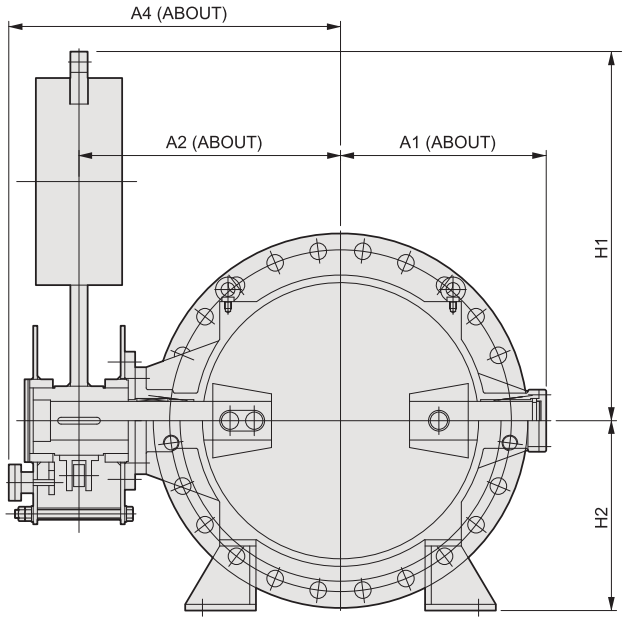
Non-Return valve in 50% open position

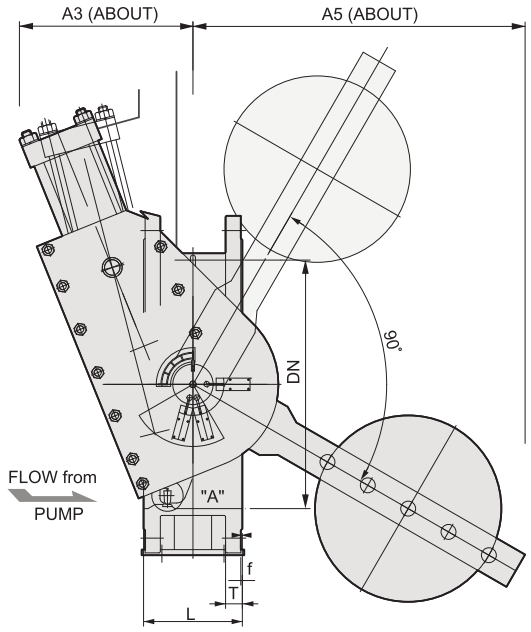
Non-Return valve in damped closed position

Features

- Double-offset free-swinging disc
- Low weight due to short face-to-face dimension
- Absolutely reliable, gravity-powered closing system
- Two-speed closing action prevents surge pressure
- Manual open by an emergency hand pump

DN 600 - 2000

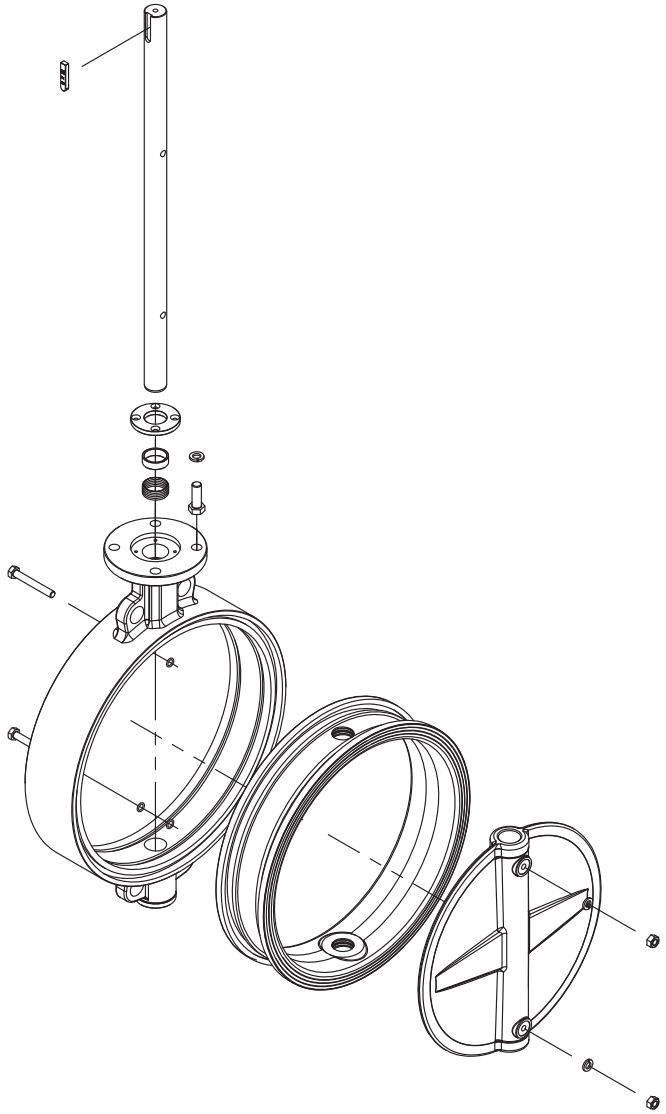




Size		BS 5155	AWWA C 504	Flange				A1	A2	A3	A4	A5	H1 (REF.)	H2 (REF.)
		Short Type	Short Type	Bolt Hole										
Inch	mm	L	L	ØD	ØC	n-Øh	T x f							
24	600	267	203	780	725	20 - 31	40 x 4	620	560	820	815	950	700	450
28	700	292	305	895	840	24 - 31	46 x 4	700	645	820	900	1050	750	500
32	800	318	305	1015	950	24 - 34	49 x 5	760	690	820	940	1200	800	550
36	900	330	305	1115	1050	28 - 34	51 x 5	820	750	1200	1000	1300	850	600
40	1000	410	305	1230	1160	28 - 37	55 x 5	900	920	1200	1240	1500	900	650
44	1100	450	343	1366	1270	32 - 37	61 x 5	970	1000	1200	1320	1600	1000	700
48	1200	470	381	1470	1387	32 - 37	63 x 5	1050	1100	1200	1480	1700	1200	825
54	1350	530	381	1642	1552	36 - 38	68 x 6	1170	1200	1200	1580	1800	1350	900
60	1500	530	381	1800	1710	36 - 38	74 x 6	1270	1300	1300	1700	2000	1500	1000
66	1650	530	457	1950	1680	40 - 48	48 x 5	1350	1400	1300	1800	2200	1650	1150
72	1800	550	457	2115	2020	44 - 48	50 x 5	1450	1450	1300	1850	2400	1850	1250
80	2000	550	550	2325	2230	48 - 48	54 x 5	1550	1550	1500	1950	2600	2000	1350

※ Dimensions and weight are subject to change without prior notice.

Standard Specifications



- **DESIGN**
  API 609 / BS 5155
  ISO 5752 / MSS SP 67

- **FACE-TO FACE**
  API 609 Cat. A
  Wafer and Lugged
  Double flange
  ISO 5752 Sr.13/20

- **FLANGE STANDARD**
  ASME B 16.5/16.47
  BS 4504/EN 1092-1
  JIS B2220
  BS 10 Table D & E
  Others on request

- **PRESSURE RATING**
  ANSI B 16.34 Class 150
  JIS 5K/10K/16K/20K
  PN 6/10/16

- **NOMINAL DIAMETER**
  1.5 ″ to 160 ″
  DN 40 to 4000

- **TESTING**
  API 598
  MSS SP 67

Applicable Materials

Body	A126 CL.B, A395, A536, A216 WCB, A351 CF8/CF8M
Disc	A351 CF8/CF8M, B62 C83600, B148 C95800
Seat	EPDM, NBR, FKM, Silicon, Neoprene, PTFE
Stem	A276 410/304/316, A564 630, B150 C63000, Monel®

Other materials on request

Features and Benefits

- Compact construction results in low weight, less space in installation
- Central shaft position, 100% bi-directional bubble tight shut off makes installation acceptable at any direction
- No cavities in the flow passage, easy to clean and disinfect for potable water system, etc.
- Liner creates seal with mating flanges so no media is in contact with the valve body
- Integral ISO 5211 top flange for easy fitting of actuators
- Low operating torques results in easy operation and economical actuator sizing
- One-piece resilient seat with integral O-ring seal eliminates the need for additional flange gasket
- Extended neck design in consideration of construction method and operability

Seat Material

- **EPDM** (Working Temp. 0 ~ 80°C)
  EPDM is the abbreviated name for Ethylene Propylene Diene Monomer. In general industry, called EPT, Nordel, ECD, or EPR. Typically these are the same material as EPDM.
  It is the most universal and economical of seat materials.

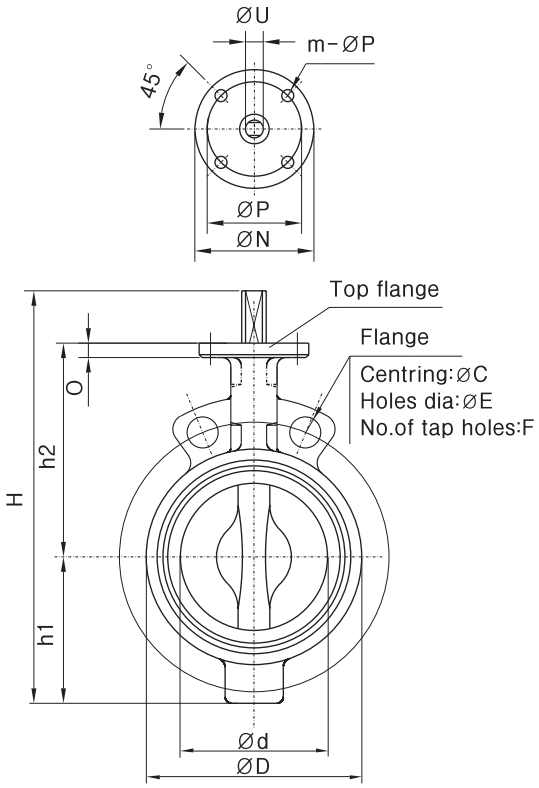
- **BUNA-N** (Working Temp. 0 ~ 70°C)
  BUNA-N is the commonly used name for Nitrile rubber.
  Nitrile is a copolymer of acrylonitrile and butadiene. BUNA-N is Sometimes referred to as NBR, Nitrile or Hycar.
  BUNA-N is an excellent general purpose seat material which is particularly suitable for hydrocarbon service.

- **FKM** (Working Temp. -20 ~ 150°C)
  FKM is the ASTM D1418 designation for Fluorinated Hydrocarbon Elastomers such as Viton®. FKM has some outstanding characteristics such as improved acid, oil and temperature resistance over standard seat materials.

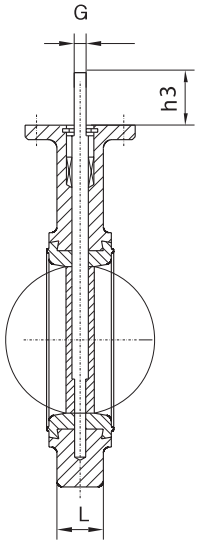
- **Silicone** (Working Temp. -20 ~ 120°C)
  Silicone seats are primarily used for their ability to resist abrasive wear. Silicone can be used on a reasonable broad range of services.
  Silicone will withstand severe impact, recover its original shape after distortion and resist abrasion better than other elastomers such as EPDM and BUNA-N.

- **Neoprene** (Working Temp. -10 ~ 70°C)
  Neoprene complies with FDA guidelines and is principally recommended for food and beverage service. It is resistant to vegetable oils, brine and oxygen. Same as Polychloroprene and CPE.

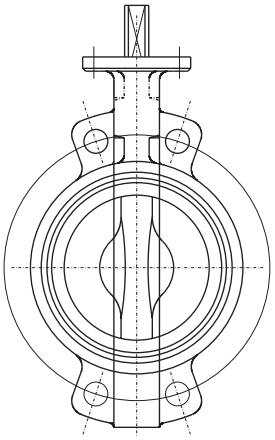
Wafer Type



Elevation



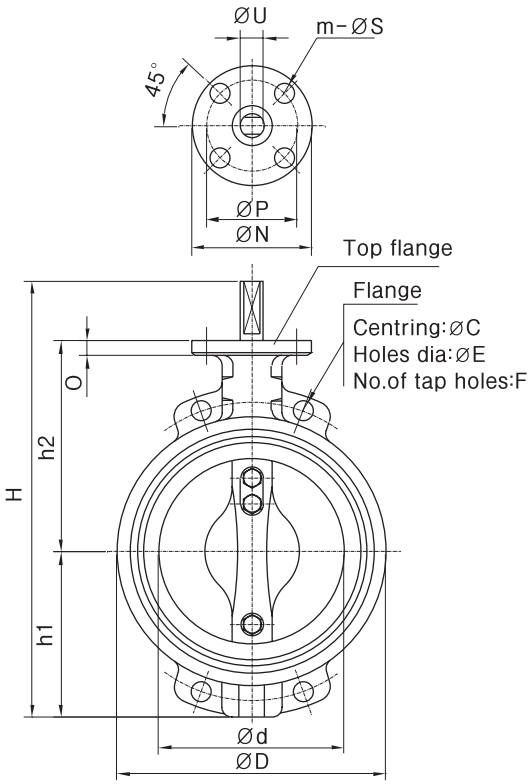
Cross-sectional



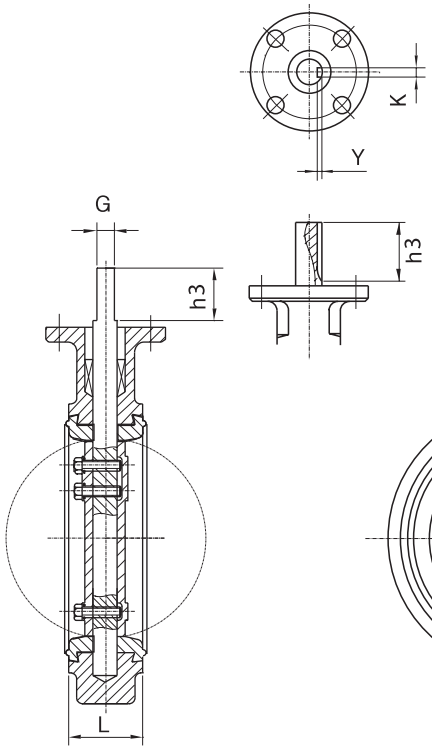
Size 8″ ~ 12″

Size		ØD	Ød	L	h1	h2	h3	Top flange to ISO 5211					O
Inch	mm							Type	ØN	ØP	m	ØS	
1.5	40	86	40	40	54	122	35	F7	90	70	4	9	10
2	50	105	52	43	57	129	35	F7	90	70	4	9	11
2.5	65	114	65	46	67	139	35	F7	90	70	4	9	11
3	80	129	80	46	78	156	35	F7	90	70	4	9	11
4	100	155	100	52	103	164	35	F7	90	70	4	9	11
5	125	180	125	56	107	187	35	F7	90	70	4	9	12
6	150	207	150	56	122	200	35	F7	90	70	4	9	12
8	200	260	198	60	165	238	35	F7	90	70	4	9	13
10	250	331	248	68	215	286	45	F10	125	102	4	12	15
12	300	377	298	78	245	316	45	F10	125	102	4	12	15
14	350	416	327	78	272	345	45	F10	125	102	4	12	20
16	400	475	387	102	304	382	70	F14	175	140	4	18	23
18	450	535	438	114	333	400	70	F14	175	140	4	18	23
20	500	590	477	127	370	438	80	F16	210	165	4	20	34
22	550	680	518	140	413	475	80	F16	210	165	4	20	34
24	600	695	560	154	430	510	80	F16	210	165	4	20	34
26	650	735	585	165	455	530	80	F16	210	165	4	20	34
28	700	800	690	165	490	580	90	F16	210	165	4	20	35
30	750	857	729	180	535	585	90	F25	300	254	4	22	35
32	800	920	785	190	580	630	90	F25	300	254	6	22	35
34	850	945	820	200	590	660	90	F25	300	254	6	22	35
36	900	1000	870	203	650	700	100	F25	300	254	6	22	38
40	1000	1095	960	216	700	750	100	F25	300	254	6	22	40
42	1050				725	820	100	F25	300	254	6	22	40

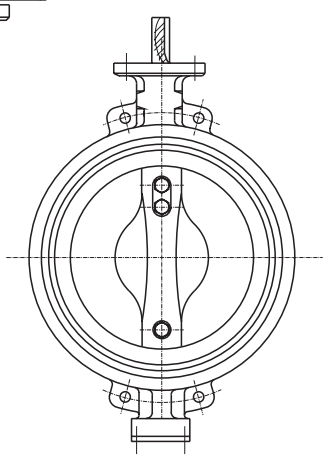
※ Dimensions and weight are subject to change without prior notice.



Elevation



Cross-sectional

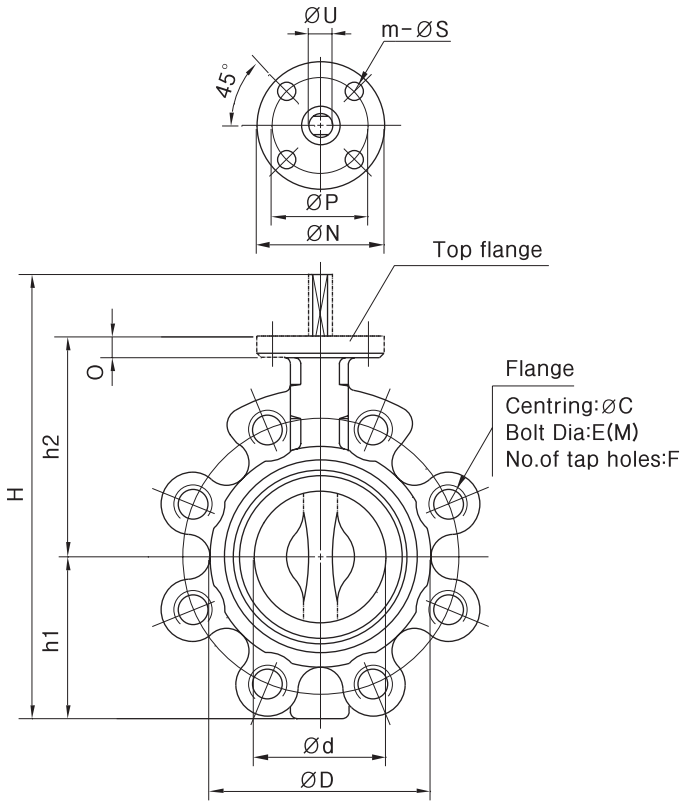


Size 16" ~ 40"

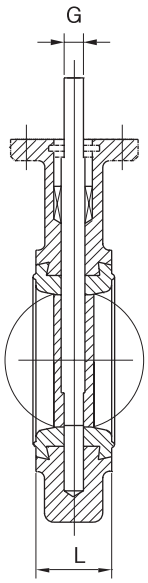
Size		JIS 5K			KS, JIS 10K			JIS 16K(20K)			BS4504 PN10			BS4504 PN16			ANSI 150 LB		
Inch	mm	ØC	F	ØE	ØC	F	ØE	ØC	F	ØE	ØC	F	ØE	ØC	F	ØE	ØC	F	ØE
1.5	40	95	4	15	105	4	19	105	4	19	110	4	18	110	4	18	98.5	4	16
2	50	105	4	15	120	4	19	120	8	19	125	4	18	125	4	18	121	4	19
2.5	65	130	4	15	140	4	19	140	8	19	145	4	18	145	4	18	140	4	19
3	80	145	4	19	150	8	19	160	8	23	160	8	18	160	8	18	153	4	19
4	100	165	8	19	175	8	19	185	8	23	180	8	18	180	8	18	191	8	19
5	125	200	8	19	210	8	23	225	8	25	210	8	18	210	8	18	216	8	22
6	150	230	8	19	240	8	23	260	12	25	240	8	18	240	8	23	542	8	22
8	200	280	8	23	290	12	23	305	12	25	295	8	23	295	12	23	299	8	22
10	250	345	12	23	355	12	25	380	12	27	350	12	23	355	12	27	362	12	25
12	300	390	12	23	400	16	25	430	16	27	400	12	23	410	12	27	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	540	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
22	550																		
24	600	715	20	27	730	24	33	770	24	39	725	20	30	770	20	36	750	20	35
26	650																		
28	700	820	24	27	840	24	33	875	24	42	840	24	30	840	24	36	864	28	35
30	750	880	24	33	900	24	33	935	24	42			30				914	28	35
32	800	930	24	33	950	28	33	990	24	48	950	24	33	950	24	39	978	28	41
34	850																		
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
42	1050																		

※ Dimensions and weight are subject to change without prior notice.

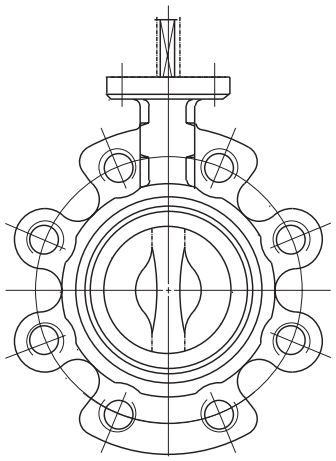
Lug Type



Elevation



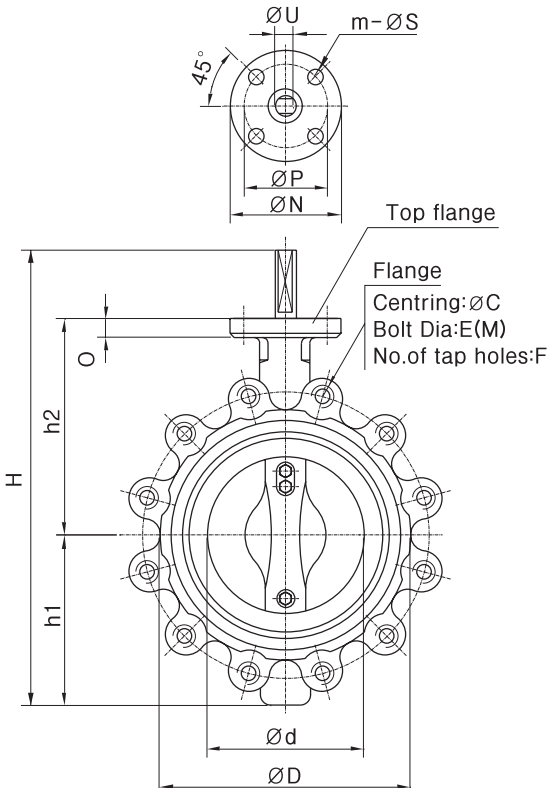
Cross-sectional



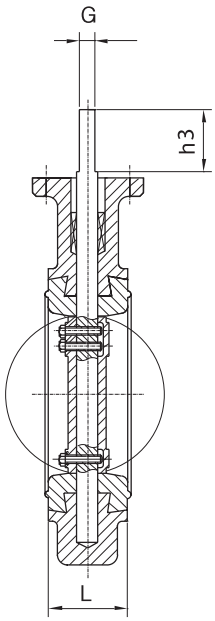
Size 10″ ~ 12″

Size		ØD	Ød	L	h1	h2	h3	Top flange to ISO 5211					O
Inch	mm							Type	ØN	ØP	m	ØS	
1.5	40	86	40	40	54	122	35	F7	90	70	4	9	10
2	50	105	52	43	57	129	35	F7	90	70	4	9	11
2.5	65	114	65	46	67	139	35	F7	90	70	4	9	11
3	80	129	80	46	78	156	35	F7	90	70	4	9	11
4	100	155	100	52	103	164	35	F7	90	70	4	9	11
5	125	180	125	56	107	187	35	F7	90	70	4	9	12
6	150	207	150	56	122	200	35	F7	90	70	4	9	12
8	200	260	198	60	165	238	35	F7	90	70	4	9	13
10	250	331	248	68	215	286	45	F10	125	102	4	12	15
12	300	377	298	78	245	316	45	F10	125	102	4	12	15
14	350	416	327	78	272	345	45	F10	125	102	4	12	20
16	400	475	387	102	304	382	70	F14	175	140	4	18	23
18	450	535	438	114	333	400	70	F14	175	140	4	18	23
20	500	590	477	127	370	438	80	F16	210	165	4	20	34
22	550	680	518	140	413	475	80	F16	210	165	4	20	34
24	600	695	560	154	430	510	80	F16	210	165	4	20	34
26	650	735	585	165	455	530	80	F16	210	165	4	20	34
28	700	800	690	165	490	580	90	F16	210	165	4	20	35
30	750	857	729	180	535	585	90	F25	300	254	4	22	35
32	800	920	785	190	580	630	90	F25	300	254	6	22	35
34	850	945	820	200	590	660	90	F25	300	254	6	22	35
36	900	1000	870	203	650	700	100	F25	300	254	6	22	38
40	1000	1095	960	216	700	750	100	F25	300	254	6	22	40
42	1050				725	820	100	F25	300	254	6	22	40

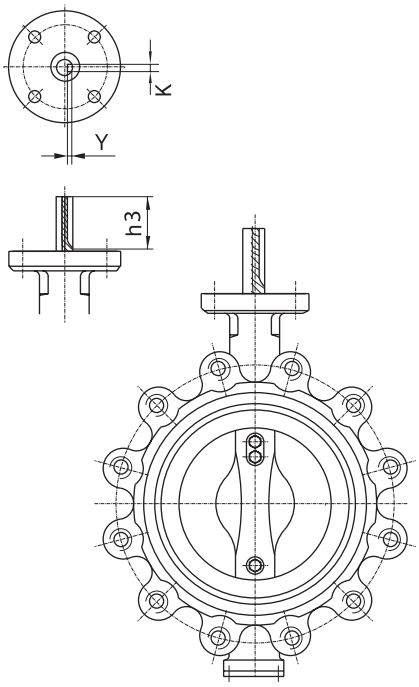
※ Dimensions and weight are subject to change without prior notice.



Elevation



Cross-sectional

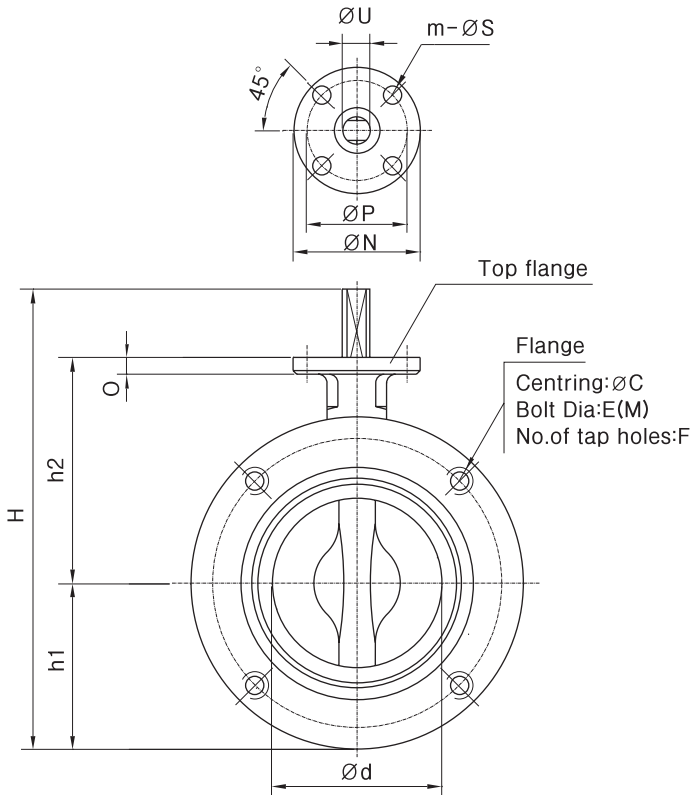


Size 16″~ 40″

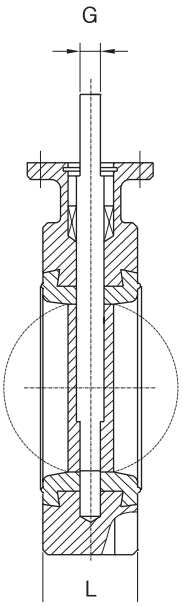
Size		JIS 5K			KS, JIS 10K			JIS 16K(20K)			BS4504 PN10			BS4504 PN16			ANSI 150 LB		
Inch	mm	ØC	F	ØE	ØC	F	ØE	ØC	F	ØE	ØC	F	ØE	ØC	F	ØE	ØC	F	ØE
1.5	40	95	4	15	105	4	19	105	4	19	110	4	18	110	4	18	98.5	4	16
2	50	105	4	15	120	4	19	120	8	19	125	4	18	125	4	18	121	4	19
2.5	65	130	4	15	140	4	19	140	8	19	145	4	18	145	4	18	140	4	19
3	80	145	4	19	150	8	19	160	8	23	160	8	18	160	8	18	153	4	19
4	100	165	8	19	175	8	19	185	8	23	180	8	18	180	8	18	191	8	19
5	125	200	8	19	210	8	23	225	8	25	210	8	18	210	8	18	216	8	22
6	150	230	8	19	240	8	23	260	12	25	240	8	18	240	8	23	542	8	22
8	200	280	8	23	290	12	23	305	12	25	295	8	23	295	12	23	299	8	22
10	250	345	12	23	355	12	25	380	12	27	350	12	23	355	12	27	362	12	25
12	300	390	12	23	400	16	25	430	16	27	400	12	23	410	12	27	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	540	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
22	550																		
24	600	715	20	27	730	24	33	770	24	39	725	20	30	770	20	36	750	20	35
26	650																		
28	700	820	24	27	840	24	33	875	24	42	840	24	30	840	24	36	864	28	35
30	750	880	24	33	900	24	33	935	24	42			30				914	28	35
32	800	930	24	33	950	28	33	990	24	48	950	24	33	950	24	39	978	28	41
34	850																		
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
42	1050																		

※ Dimensions and weight are subject to change without prior notice.

Flange Type



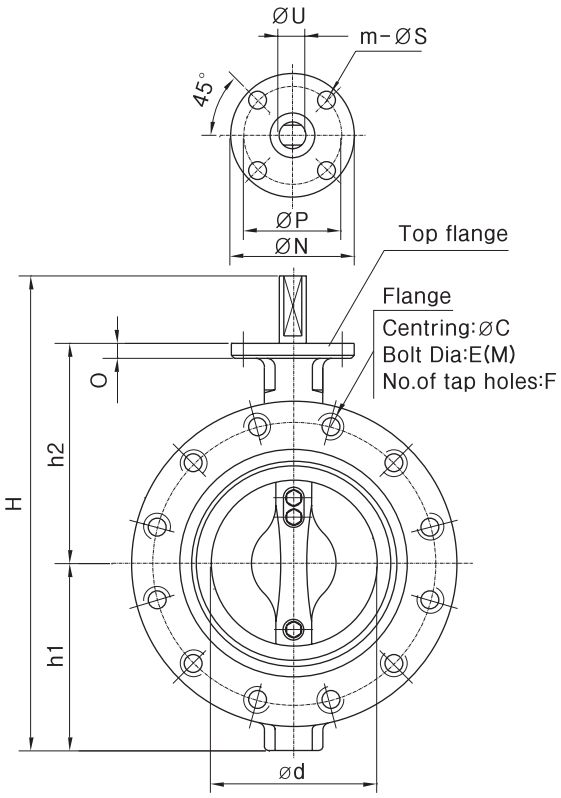
Elevation



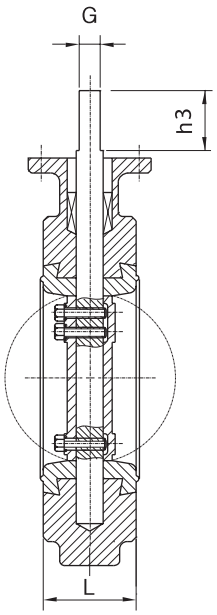
Cross-sectional

Size		ØD	Ød	L	h1	h2	h3	Top flange to ISO 5211					O
Inch	mm							Type	ØN	ØP	m	ØS	
1.5	40	86	40	40	54	122	35	F7	90	70	4	9	10
2	50	105	52	43	57	129	35	F7	90	70	4	9	11
2.5	65	114	65	46	67	139	35	F7	90	70	4	9	11
3	80	129	80	46	78	156	35	F7	90	70	4	9	11
4	100	155	100	52	103	164	35	F7	90	70	4	9	11
5	125	180	125	56	107	187	35	F7	90	70	4	9	12
6	150	207	150	56	122	200	35	F7	90	70	4	9	12
8	200	260	198	60	165	238	35	F7	90	70	4	9	13
10	250	331	248	68	215	286	45	F10	125	102	4	12	15
12	300	377	298	78	245	316	45	F10	125	102	4	12	15
14	350	416	327	78	272	345	45	F10	125	102	4	12	20
16	400	475	387	102	304	382	70	F14	175	140	4	18	23
18	450	535	438	114	333	400	70	F14	175	140	4	18	23
20	500	590	477	127	370	438	80	F16	210	165	4	20	34
22	550	680	518	140	413	475	80	F16	210	165	4	20	34
24	600	695	560	154	430	510	80	F16	210	165	4	20	34
26	650	735	585	165	455	530	80	F16	210	165	4	20	34
28	700	800	690	165	490	580	90	F16	210	165	4	20	35
30	750	857	729	180	535	585	90	F25	300	254	4	22	35
32	800	920	785	190	580	630	90	F25	300	254	6	22	35
34	850	945	820	200	590	660	90	F25	300	254	6	22	35
36	900	1000	870	203	650	700	100	F25	300	254	6	22	38
40	1000	1095	960	216	700	750	100	F25	300	254	6	22	40
42	1050				725	820	100	F25	300	254	6	22	40

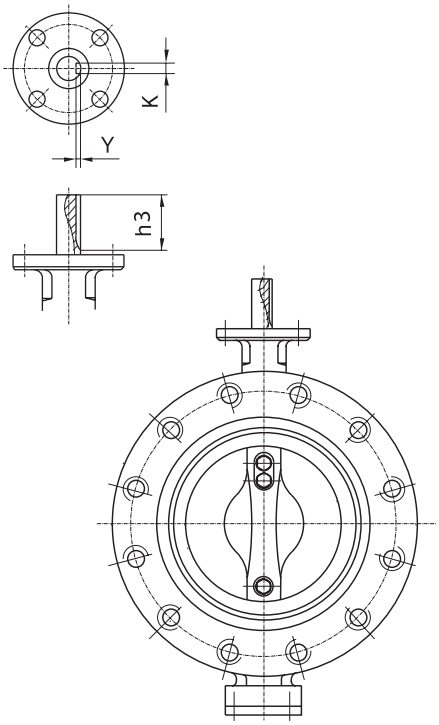
※ Dimensions and weight are subject to change without prior notice.



Elevation



Cross-sectional



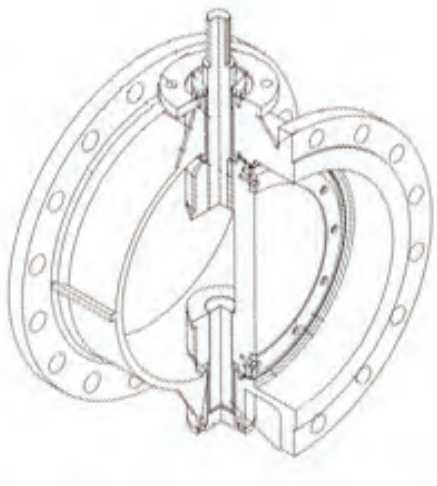
Size 16″ ~ 40″

Size		JIS 5K			KS, JIS 10K			JIS 16K(20K)			BS4504 PN10			BS4504 PN16			ANSI 150 LB		
Inch	mm	ØC	F	ØE	ØC	F	ØE	ØC	F	ØE	ØC	F	ØE	ØC	F	ØE	ØC	F	ØE
1.5	40	95	4	15	105	4	19	105	4	19	110	4	18	110	4	18	98.5	4	16
2	50	105	4	15	120	4	19	120	8	19	125	4	18	125	4	18	121	4	19
2.5	65	130	4	15	140	4	19	140	8	19	145	4	18	145	4	18	140	4	19
3	80	145	4	19	150	8	19	160	8	23	160	8	18	160	8	18	153	4	19
4	100	165	8	19	175	8	19	185	8	23	180	8	18	180	8	18	191	8	19
5	125	200	8	19	210	8	23	225	8	25	210	8	18	210	8	18	216	8	22
6	150	230	8	19	240	8	23	260	12	25	240	8	18	240	8	23	542	8	22
8	200	280	8	23	290	12	23	305	12	25	295	8	23	295	12	23	299	8	22
10	250	345	12	23	355	12	25	380	12	27	350	12	23	355	12	27	362	12	25
12	300	390	12	23	400	16	25	430	16	27	400	12	23	410	12	27	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	540	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
22	550																		
24	600	715	20	27	730	24	33	770	24	39	725	20	30	770	20	36	750	20	35
26	650																		
28	700	820	24	27	840	24	33	875	24	42	840	24	30	840	24	36	864	28	35
30	750	880	24	33	900	24	33	935	24	42			30				914	28	35
32	800	930	24	33	950	28	33	990	24	48	950	24	33	950	24	39	978	28	41
34	850																		
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
42	1050																		

※ Dimensions and weight are subject to change without prior notice.

Standard Specifications

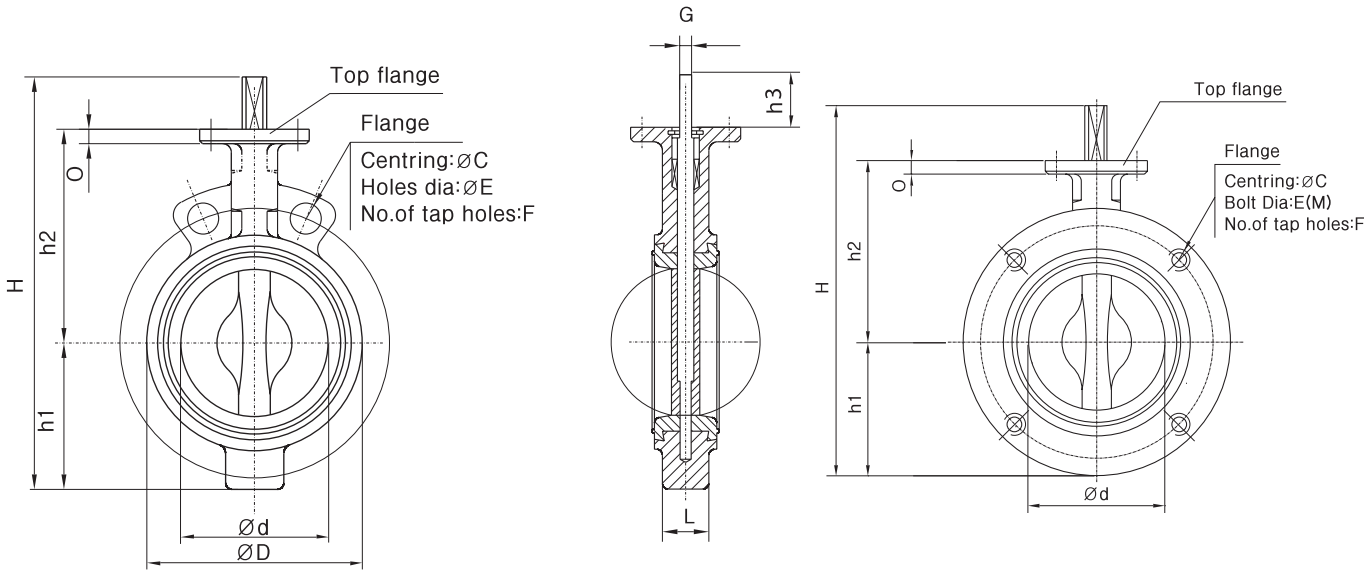
- **DESIGN**
  JIS F7480
- **FACE-TO FACE**
  JIS F7480
- **FLANGE STANDARD**
  JIS B2210 – 5K / 10K
- **PRESSURE RATING**
  JIS 5K 10K
- **NOMINAL DIAMETER**
  DN 50 to DN 1200
- **TESTING**
  JIF 7400



Applicable Materials

Body	FC200, FCD400/450, SC480
Disc	SCS13/14, BC6, AL BC3
Seat	EPDM, NBR, FKM
Stem	SUS 410/304/316

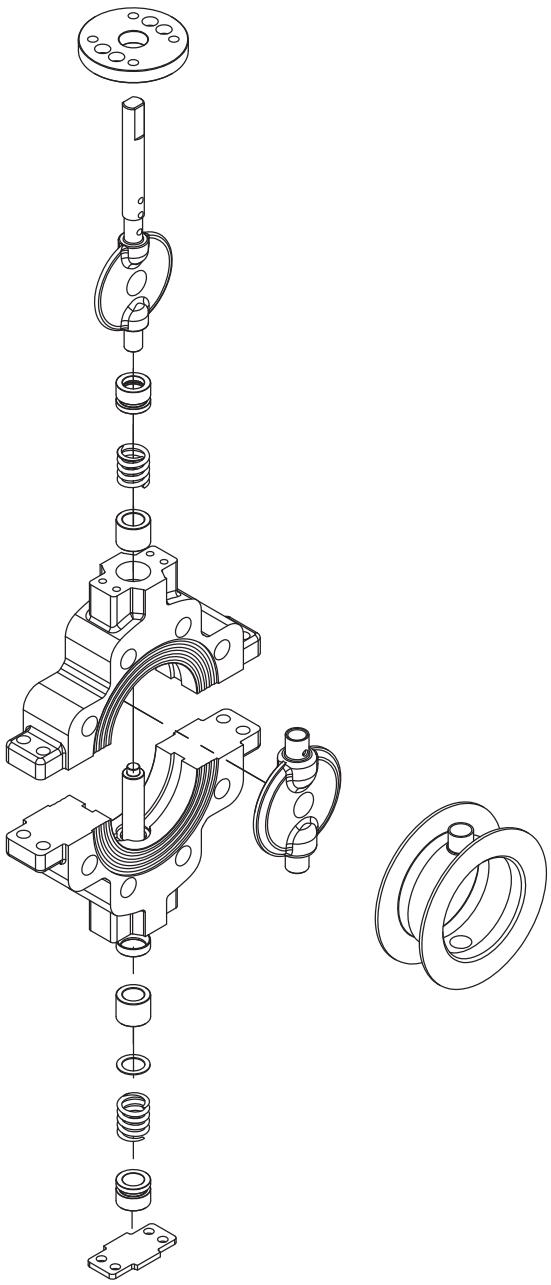
Wafer / Flange Type



Size		ØD	Ød	Wafer	Flange	h1	h2	h3	Top flange to ISO 5211				O
Inch	mm			L	L				ØN	ØP	m	ØS	
2	50	105	52	43	40	57	129	3	90	70	4	9	11
2.5	65	114	65	46	40	67	139	35	90	70	4	9	11
3	80	129	80	46	60	78	156	35	90	70	4	9	11
4	100	155	100	52	60	103	164	35	90	70	4	9	11
5	125	180	125	56	100	107	187	35	90	70	4	9	12
6	150	207	150	56	100	122	200	35	90	70	4	9	12
8	200	260	198	60	100	165	238	35	90	70	4	9	13
10	250	331	248	68	110	215	286	45	125	102	4	12	15
12	300	377	298	78	110	245	316		125	102	4	12	15
14	350	416	327	78	120	272	345	45	125	102	4	12	20
16	400	475	387	102	130	304	382	70	175	140	4	18	23
18	450	535	438	114	150	333	400	70	175	140	4	18	23
20	500	590	477	127	160	370	438	80	230	165	4	20	34
22	550	680	518	154	170	413	475	80	230	165	4	20	34
24	600	695	560	154	170	430	510	80	230	165	4	20	34
26	650	735	585	165	170	455	530	80	230	165	4	20	34
28	700	800	690	165	180	490	580	90	230	165	4	20	35
30	750	857	729	190	190	535	585	90	300	250	4	22	35
32	800	920	785	190	200	580	630	90	300	250	6	22	35
34	850	945	820	203	210	590	660	90	300	250	6	22	35
36	900	1000	870	203	230	650	700	100	300	250	6	22	38
40	1000	1095	960	216	250	700	750	100	300	250	6	22	40

※ Dimensions and weight are subject to change without prior notice.

Standard Specifications



- **DESIGN**
  API 609 Cat. A
  ISO 5752 Sr. 20
  MSS SP 67
- **FACE TO FACE**
  API 609 Cat. A
  Wafer and Lugged
- **FLANGE STANDARD**
  ASME B 16.5
  BS 4504/EN 1092-1
  JIS B2220
  Others on request
- **PRESSURE RATING**
  ASME B 16.34
  Class 150
- **NOMINAL DIAMETER**
  2" to 24"
  DN 50 to 600
- **TESTING**
  API 598
  High voltage pin hole test

Applicable Materials

Cast Iron	A126 CL. B
Ductile Iron	A395 Gr.60-40-18, A536 Gr.65-45-12
Austenitic Stainless Steel	A351 CF8/CF8M/CF3/CF3M
Duplex Stainless Steel	A890 4A/5A/6A, A995 4A/5A/6A
Special Alloy	Inconel® 625(UNS N06625), 254SMO®(UNS S31254) Monel® K400/500(UNS N04400/N05500)

Lining materials

PFA

PFA exhibits thermal characteristics like PTFE, being able to withstand super low to high temperature. It is also transparent and mechanically strong under high temperature. It is easily workable besides applicable with extrusion molding to the same degree as general thermoset plastics. It is used where purity is important, such a semiconductor wafer baskets, piping couplings and non-corrosive linings. PFA has better mechanical strength at high temperature than FEP, and excellent moldability for easy processing by extrusion, compression, blow, transfer and injection molding methods. Due to high bonding strength of carbon, fluorine and oxygen atoms, PFA demonstrates nearly the same outstanding capabilities as PTFE.

FEP

FEP is a copolymer of tetra-fluoro-ethylene and hexa-fluoro-propylene. FEP consists of carbon and fluorine atoms, as PTFE does, and has a molecular structure in which one of fluorine atoms bonded to carbon atoms. FEP has a lower melt viscosity than PTFE and can be processed like other molten thermoplastic resins by extrusion, transfer, injection and compression molding. Because the bonding energy between its carbon and fluorine atoms is so high, and because the carbon chain is completely surrounded by fluorine atoms, FEP fluorocarbon polymer retains excellent thermal, electrical and chemical stability

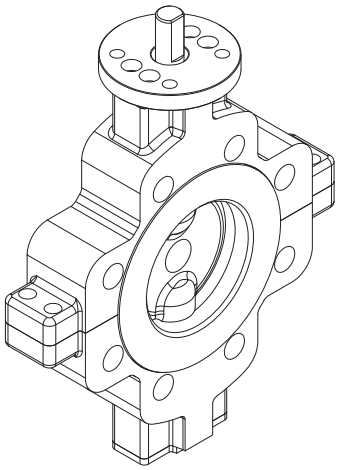
PTFE

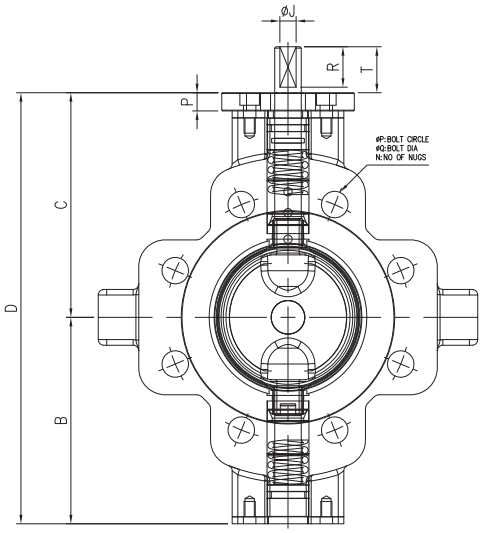
The fluorine atoms completely cover the carbon chain backbone and protect the carbon-carbon bond from attack. The fluorine atoms are also responsible for low surface energy and exceptional friction characteristics of PTFE. Because of very high melt viscosity, PTFE does not flow above its melting point. It requires special polymer processing like past extrusion, compression molding and sintering. Among all the fluoro-plastics products, PTFE offers the highest heat resistances. It is not corroded d has good electrical insulation and dielectric characteristics. Moreover, it has a unique non-stick property and the lowest coefficient of friction among solids. It is the most widely used fluoro-plastic.

Features and Benefits

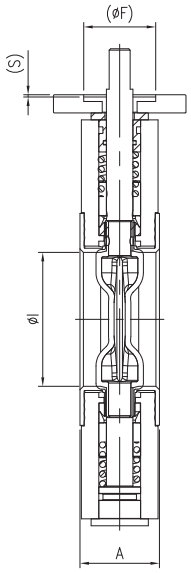
- Superior bubble tightness by completely lined body with PFA/FEP/PTFE
- Excellent corrosion resistance thanks to the neutral characteristic of PFA/FEP/PTFE
- Improved disc design leading to less deflection at high pressure and tight in-line seal
- Fully encapsulated bottom shaft eliminates potential leak path at bottom of valve
- Cavity-free design making simple sterile cleaning possible and choice of body material independent from medium
- Extended body and disc liner above the shaft seals provides optimum protection of shaft seals
- Low operating torque and no frictional electricity
- Easy exchange of wearing parts because of the two-piece body design
- Long service life despite of high switching cycle and varying temperature

Lug Type





Elevation

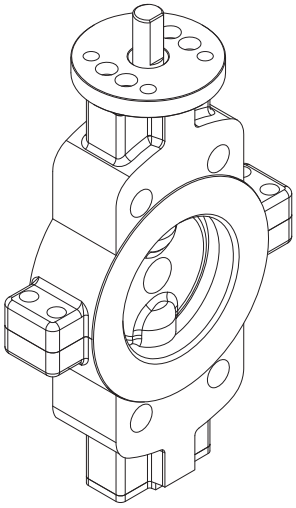


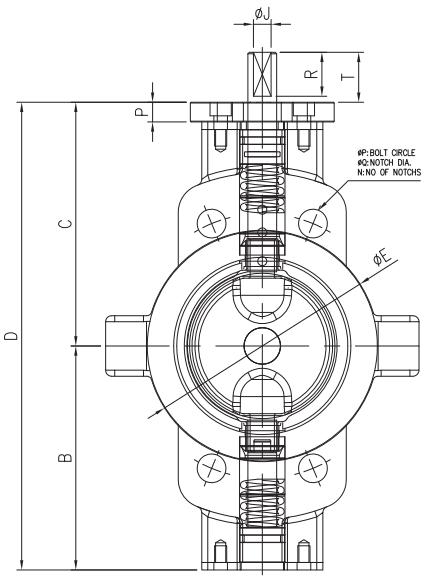
Cross-sectional

Size		ΦI	A	B	C	D	ΦE	P	T	Stem				Top Flange to ISO 5211						
Inch	mm									Key (axb)	b1	a(K)	ΦJ	Type	ΦM	Φ(F)	(S)	Φ(W)	n	ΦZ
1.5	40	40	33	50	100	150	80	10	32	6 x 6	3.5	6 (9.5)	14	F07	90	55	3	70	4	9.5
2	50	50	43	55	120	175	92	10	32	6 x 6	3.5	6 (9.5)	14	F07	90	55	3	70	4	9.5
2.5	65	64	46	65	130	195	106	11	32	6 x 6	3.5	6 (9.5)	14	F07	90	55	3	70	4	9.5
3	80	76	46	75	140	215	122	11	32	6 x 6	3.5	6 (9.5)	16	F07	90	55	3	70	4	9.5
4	100	102	52	95	160	255	150	12	32	6 x 6	3.5	6 (12.5)	16	F07	90	55	3	70	4	9.5
5	125	127	56	115	180	295	178	12	32	6 x 6	3.5	6 (12.5)	19	F07	90	55	3	70	4	9.5
6	150	146	56	130	205	335	206	12	40	8 x 7	3.5	6 (15.0)	19	F07	90	55	3	70	4	9.5
8	200	197	60	160	230	390	258	14	40	8 x 7	4.0	8 (15.0)	22	F10	125	72	3	102	4	12
10	250	246	68	195	270	465	324	14	40	8 x 7	4.0	8 (20.0)	22	F10	125	72	3	102	4	12
12	300	292	78	220	300	520	370	16	40	8 x 7	4.0	8 (20.0)	28	F10	125	72	3	102	4	12
14	350	330	78	250	340	590	410	16	40	8 x 7	4.0	8	32	F10	125	72	3	102	4	12
16	400	380	102	300	370	670	418	20	50	12 x 8	5.0	12	38	F14	175	100	4	140	4	18
18	450	430	114	320	400	720	528	20	64	12 x 8	5.0	12	38	F14	175	130	4	140	4	18
20	500	482	127	360	440	800	578	20	64	14 x 9	5.5	14	45	F16	210	130	5	165	4	22
22	550	528	142	420	460	880	636	22	64	16 x 10	6.0	16	55	F16	210	130	5	165	4	22
24	600	575	154	450	500	950	680	22	100	16 x 10	6.0	16	55	F16	210	130	5	165	4	22

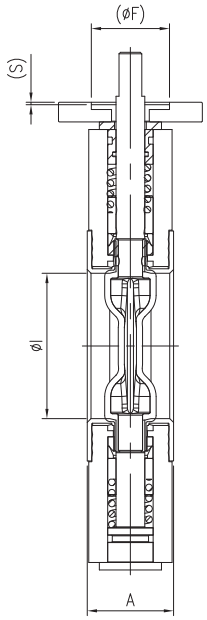
※ Dimensions and weight are subject to change without prior notice.

Wafer Type





Elevation



Cross-sectional

Size		ΦI	A	B	C	D	ΦE	P	T	Stem				Top Flange to ISO 5211						
Inch	mm									Key (axb)	b1	a(K)	ΦJ	Type	ΦM	Φ(F)	(S)	Φ(W)	n	ΦZ
1.5	40	40	33	50	100	150	80	10	32	6 x 6	3.5	6 (9.5)	14	F07	90	55	3	70	4	9.5
2	50	50	43	55	120	175	92	10	32	6 x 6	3.5	6 (9.5)	14	F07	90	55	3	70	4	9.5
2.5	65	64	46	65	130	195	106	11	32	6 x 6	3.5	6 (9.5)	14	F07	90	55	3	70	4	9.5
3	80	76	46	75	140	215	122	11	32	6 x 6	3.5	6 (9.5)	16	F07	90	55	3	70	4	9.5
4	100	102	52	95	160	255	150	12	32	6 x 6	3.5	6 (12.5)	16	F07	90	55	3	70	4	9.5
5	125	127	56	115	180	295	178	12	32	6 x 6	3.5	6 (12.5)	19	F07	90	55	3	70	4	9.5
6	150	146	56	130	205	335	206	12	40	8 x 7	3.5	6 (15.0)	19	F07	90	55	3	70	4	9.5
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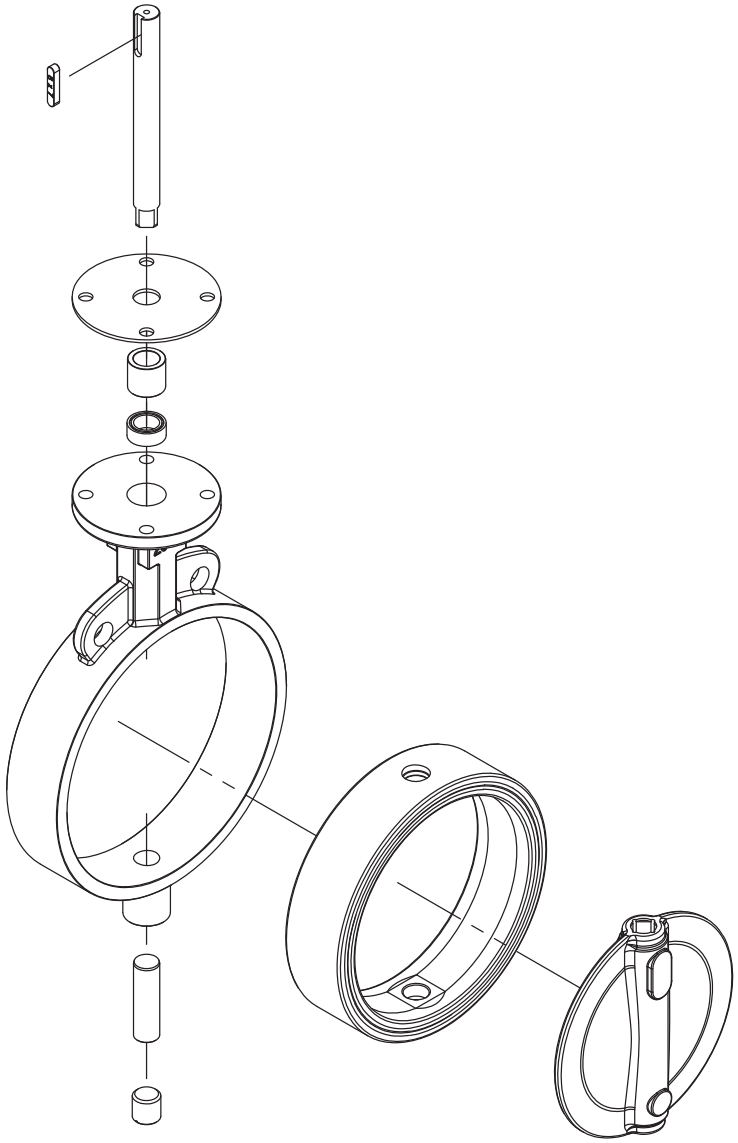
22	550	528	142	420	460	880	636	22	64	16 x 10	6.0	16	55	F16	210	130	5	165	4	22
24	600	575	154	450	500	950	680	22	100	16 x 10	6.0	16	55	F16	210	130	5	165	4	22

※ Dimensions and weight are subject to change without prior notice.

Standard Specifications

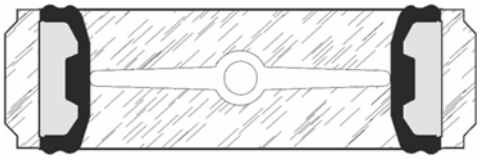


- **DESIGN**
  API 609 Cat. A
  ISO 5752 Sr. 20
  MSS SP 67
- **FACE-TO FACE**
  API 609 Cat. A
  Wafer and Lugged
- **FLANGE STANDARD**
  ASME B 16.5
  BS 4504/EN 1092-1
  JIS B2220
  Others on request
- **PRESSURE RATING**
  20 Bar
  285 PSI
- **NOMINAL DIAMETER**
  2" to 24"
  DN 50 to 600
- **TESTING**
  Shell : 31 Bar or 450 PSI
  Closure : 23 Bar or 325 PSI

Applicable Materials

Cast Iron	A126 CL. B
Ductile Iron	A395 Gr.60-40-18, A536 Gr.65-45-12
Austenitic Stainless Steel	A351 CF8/CF8M/CF3/CF3M
Duplex Stainless Steel	A890 4A/5A/6A, A995 4A/5A/6A
Special Alloy	Inconel® 625(UNS N06625), 254SMO®(UNS S31254)
	Monel® K400/500(UNS N04400/N05500)
Liner	Nitrile Rubber with Phenolic Backing
	EPDM Rubber with Phenolic Backing

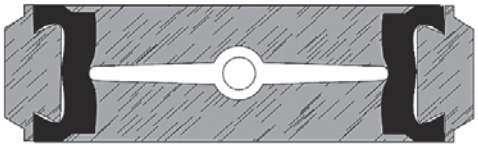
Benefits of Cartridge type seat



Cartridge design seat

Cartridge design seat

- Elastomer is supported by hard phenolic backing which eliminates seat shifting during installation
- Seat to disc seal is independent of flange support and capable of full rated dead end service
- Static seat design allows disc to sweep into seat for lower, and more consistent torque
- Smaller mass of elastomer minimizes seat swell



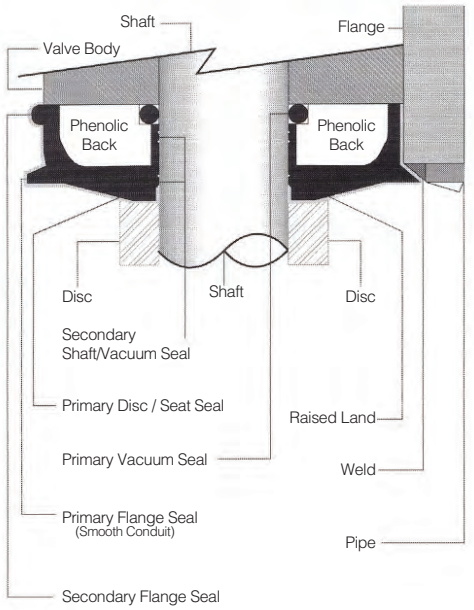
Tongue-and-Groove design seat

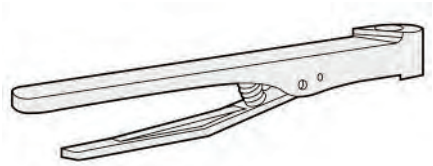
Tongue-and-Groove design seat

- Dynamics of seat based on being installed between two flanges making seat subject to distortion during installation
- Standard seat design is not rated for full pressure on dead end service
- Disc is designed to push into seat causing distortion and inconsistent torque
- Overabundance of elastomer exaggerates any swelling

Features

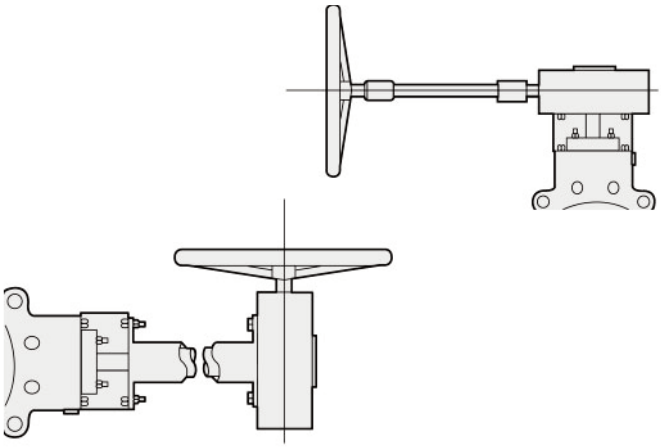
- One piece wafer and lugged body for strength and stability in extreme environments
- Fluid is completely isolated from the body and other external arts
- Heavy duty top plate is drilled and slotted to ISO 5211
- Discs have a stream lined design providing higher Cvand lower pressure drop
- The disc edge is contoured to give a tighter seal with lower torque
- A self lubricated bearing is machined to tolerances to the shaft and body eliminating side loading of the shaft
- Blow-out proof deign is achieved by utilizing the shaft retainers to prevent any vertical movement
- Torque fluctuation is eliminated because of the consistent conformity of the seat provided for by the cartridge design.
- The cartridge design allows full field replacement
- Large flange seal area assures no leakage ; no need for gaskets or O-rings





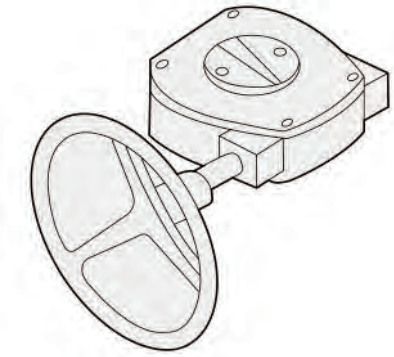
Throttling Hand-lever

Notched detent plate and positive-stop gripper with locking lug insures positive locking in any of 10 positions from full open to full closed allowing the valve to be set in intermediate positions for throttling service.



Extension

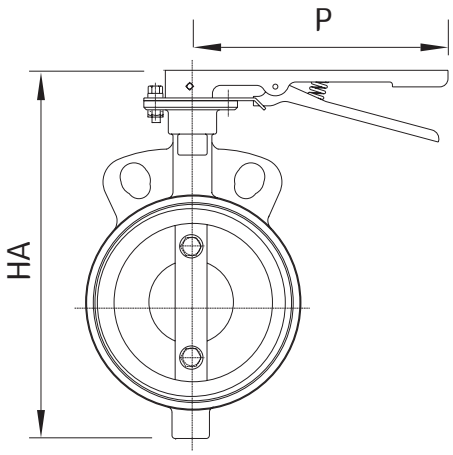
Extends valve operating shaft or input stem, allowing service in applications where the valve is inaccessible. Extension can be totally sealed for submersible or buried service. The mounting flange dimensions are identical to the corresponding valve.



Gear box

Notched detent plate and positive-stop gripper with locking lug insures positive locking in any of 10 positions from full open to full closed allowing the valve to be set in intermediate positions for throttling service.

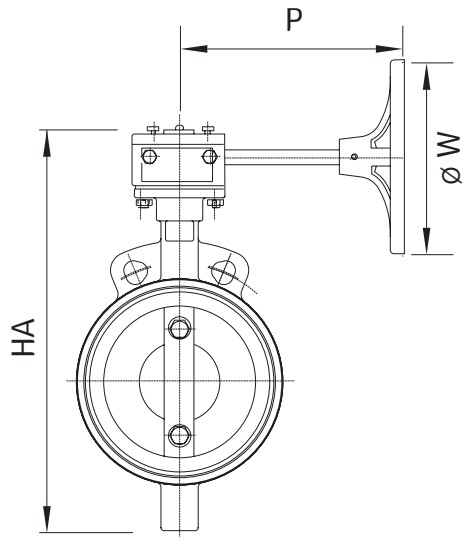
Hand-lever type



Approximated dimensions

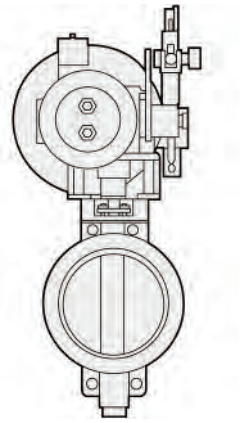
Size		LEVER	
Inch	mm	HA	P
2	50	238.5	227
2.5	65	257.5	227
3	80	272.5	285
4	100	298.0	285
5	125	333.0	285
6	150	365.0	285
8	200	433.0	
10	250		
12	300		

Gear box type



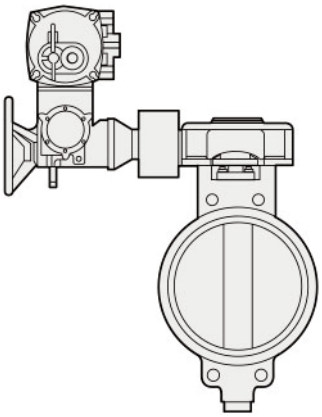
Approximated dimensions

Size		GEAR		
Inch	mm	HA	P	ØW
2	50	262.5	130	150
2.5	65	277.5	130	150
3	80	290.5	130	150
4	100	320.0	130	150
5	125	374.0	160	190
6	150	403.0	210	190
8	200	454.0	220	250
10	250	558.0	270	250
12	300	602.5	270	300
14	350	657.0	330	300
16	400	807.0	330	400
18	450	867.0	330	400
20	500	1013.0	330	400
22	550	1059.0	330	400
24	600	1172.0	330	400
28	700	1310.0	330	700
30	750	1355.0	330	700
32	800	1455.0	330	700
36	900	1510.0	330	800
40	1000	1775.0	330	800



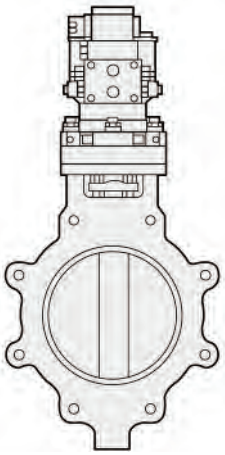
Pneumatic-powered

Pneumatic actuators, of which cylinders are the most common, are the devices providing power and movement to automated systems, machines and processes. A pneumatic cylinder is a simple, low cost, easy to install device that is ideal for producing powerful liner movement over a wide range of velocities, and can be stalled without casing internal damage. Adverse conditions can be easily tolerated such as high humidity, dry and dusty environments and repetitive clean-down with high pressure hoses.



Electric-powered

An electric actuator is a motor that makes use of electric energy for producing mechanical energy. These are used in a number of applications and are favored by many industrial users. One of the greatest benefits of the electric actuators is the accuracy and precision that they offer. By employing high precision screws and antibacklash mechanisms, users can get ultimate precision and accuracy, resulting in exact processes and results. It is also important to note that even though the component costs of electric actuators tend to be on the higher side, still the operational and maintenance costs of these actuators is lower than the pneumatic actuators.



Hydraulic-powered

A hydraulic actuator is rugged and suited for high-force applications. It can produce forces 25 times greater than a pneumatic cylinder of equal size. It also operate in pressures of up to 4000 psi. A hydraulic actuator can hold force and torque constant without the pump supplying more fluid or pressure due to the incompressibility of fluids. And, it can have its pump or motor located a considerable distance away with minimal loss of power. However, a hydraulic actuator requires many companion parts, including a fluid reservoir, motors, pumps, release valves, and heat exchangers, along with noise-reduction equipment.

Pneumatic actuator

Specifications

Service	: On-Off, Throttling
Design	: Rack-and-Pinion, Scotch yoke
Operating	: Double acting, Single acting with spring return
Mounting	: Bottom - ISO 5211, Top/Side – VDI/VDE 3845 Namur
Travel range	: 90 degree, -5° ~ +5° adjustable stopper
Accessory	: Limit switch, Solenoid valve, P-P/E-P/Smart positioner Air regulator filter, Volume booster, Speed controller, Lock-up valve Declutchable override gear box

Electric actuator

Specifications

Service	: On-Off, Throttling
Enclosure	: Weather proof IP 67, NEMA 4 and 4X, or higher grade on request
Power	: 110/220 VAC 1 Ph , 380/440 VAC 3 Ph
Travel range	: 90 degree -10°~ +10° or Multi-turn
Limit SW	: 4 x SPDT (2 for close and 2 for open)
Torque SW	: 2 X SPDT (1 for close and 1 for open)
Other option	: Explosion proof enclosure, Water tight enclosure Potentiometer, Current position transmitter, Proportional control unit Integral control unit, Signal lamp unit

Hydraulic actuator

Specifications

Service	: On-Off,
Design	: Rack-and-Pinion, Scotch yoke, Rotary
Operating	: Double acting
Travel range	: 90 degree, -5° ~ +5° adjustable stopper
Accessory	: Limit switch, Solenoid valve Declutchable override gear box

Applicable Standards

Design

API 609	Butterfly Valves: Double Flanged, Lug- and Wafer-Type
API 607	Fire Test for Soft-Seated Quarter Turn Valves
API 6FA	Specification for Fire Test for Valves
ASME B 16.34	Valves – Flanged, Threaded, and Welding End
MSS SP 67	Butterfly Valves
MSS SP 68	High Pressure Butterfly Valves with Offset Design
BS 5155	Specification for Butterfly Valves
JIS F7480	Shipbuilding – Rubber seat butterfly valves

Face-to-Face Dimensions

ASME B 16.10	Face-to-Face and End-to-End Dimensions of Valve
ISO 5752	Metal Valves for Use in Flanged Pipe Systems – Face-to-Face and Centre-to-Face Dimensions

Flange Dimensions

ASME B 16.1	Cast Iron Pipe Flanges and Flanged Fittings
ASME B 16.5	Pipe Flanges and Flanged Fittings
ASME B 16.24	Cast Copper Alloy Pipe Flanges and Flanged Fittings
ASME B 16.42	Ductile Iron Pipe Flanges and Flanged Fittings, Classes 150 and 300
ASME B 16.47	Large Diameter Steel Flange
API 605	Large Diameter Steel Flanges : NPS 26 through NPS 60
MSS SP 44	Steel Pipeline Flanges
BS 4504	Circular Flanges for Pipes, Valves and Fittings
EN 1092-1	Circular Flanges for Pipes, Valves, Fittings and Accessories

Inspection and Testing

API 598	Valve Inspection and Testing
FCI 70-2	Control Valve Seat Leakage
ISO 5208	Industrial Valves – Pressure Testing of Metallic Valves
MSS SP 61	Pressure Testing of Steel Valves
MSS SP 6	Standard Finishes for Contact Faces of Pipe Flanges and Connecting & End Flanges of Valves and Fittings
MSS SP 25	Standard Marking System for Valves, Fittings, Flanges and Unions
MSS SP 53	Quality Standard for Steel Castings and Forgings for Valves, Flanges and Fittings and Other Piping Components – Magnetic Particle Exam Method
MSS SP 54	Quality Standard for Steel Castings for Valves, Flanges and Fittings and Other Piping Components – Radiographic Examination Method
MSS SP 55	Quality Standard for Steel Castings for Valves, Flanges and Fittings and Other Piping Components – Visual Method for Evaluation of Surface Irregularities
MSS SP 82	Valve Pressure Testing Methods
MSS SP 112	Quality Standard for Evaluation of Cast Surface Finishes – Visual and Tactile Method
MSS SP 137	Quality Standard for Positive Material Identification of Metal Valves, Flanges, Fittings, and Other Piping Components

Face-to-Face Dimension Comparison Table

NPS (mm)	NPS (inch)	API 609										BS 5155				ASME B 16.10 (MSS SP 67/68)									JIS F7480
		LUG- AND WAFER-TYPE (CAT. A)	LUG- AND WAFER-TYPE (CAT. B)			DOUBLE FLANGED (CAT. B)						DOUBLE FLANGED		WAFER		FLANGED		LUG AND WAFER STYLE (CONCENTRIC)			GROOVED	LUG AND WAFER STYLE (OFFSET)			MARINE HULL VALVE
						LONG			SHORT			SHORT	LONG	SHORT	LONG	NARROW	WIDE	NARROW	WIDE	EXTRA WIDE					
		125/150	150	300	600	150	300	600	150	300	600	PN 16	PN 25	PN 16	PN 16	150	150	150	150	150	150	150	300	600	A GROUP (122)
40	1.5											106	140	33				33	37	38	86				
50	2	43										108	150	43				43	44	46	81				40
65	2.5	46										112	170	46				46	49	51	97				40
80	3	46	48	48	54	203	282	356	114	180	180	114	180	46	64	127	127	46	49	51	97	48	48	54	60
100	4	52	54	54	64	229	305	432	127	190	190	127	190	52	64	127	178	52	56	57	116	54	54	64	60
125	5	56										140	200	56	70	127	190	56	64	65	148				100
150	6	56	57	59	78	267	403	559	140	210	210	140	210	56	76	127	203	56	70	71	148	57	59	78	100
200	8	60	64	73	102	292	419	660	152	230	230	152	230	60	89	152	216	60	71	75	133	64	73	102	100
250	10	68	71	83	117	330	457	787	165	250	250	165	250	68	114	203	381	68	76	79	159	71	83	117	110
300	12	78	81	92	140	356	502	838	178	270	270	178	270	78	114	203	381	78	83	86	165	81	92	140	110
350	14	78	92	117	155	381	762	889	190	290	290	190	290	78	127	203	406	78	92	95	178	92	117	155	120
400	16	102	102	133	178	406	838	991	216	310	310	216	310	102	140	203	406	79	102	105	178	102	133	178	130
450	18	114	114	149	200	432	914	1092	222	330	330	222	330	114	152	203	406	102	114	117	203	114	149	200	150
500	20	127	127	159	216	457	991	1194	229	350	350	229	350	127	152	203	457	111	127	130	216	127	159	216	160
550	22																								170
600	24	154	154	181	232	508	1143	1397	267	390	390	267	390	154	178	203	457		154	157	254	154	181	232	170
650	26					559	1245	1448	292	410															170
700	28					610	1346	1549	292	430		292	430		229										180
750	30	165				610	1397	1651	318	450						305	559		165						190
800	32					660	1524	1778	318	470		318	470		241										200
850	34																								210
900	36	200				771	1727	2083	330	510		330	510		241	305	559		200						230
950	38								410	530															
1000	40								410	550		410	550		300										250
1050	42	251							410	570						305	610		251						
1100	44																								280
1200	48	276							470	630		470	630		350	381	660		276						300
1350	54															381	711								
1400	56											530	710		390										
1500	60															381	762								
1600	64											600	790		440										
1650	66															457	864								
1800	72											670	870		490	457	914								
2000	80											760	950		540										

Hydrostatic Test Criteria

API 598

DN ≤ 100 AND CLASS ≤ 1500 DN > 100 AND CLASS ≤600	Required					Required				Optional			
DN ≤ 100 AND CLASS > 1500 DN > 100 AND CLASS > 600	Required					Required				Required			
Valve Type	Shell					Low-pressure closure				High-pressure closure			
	Class	Pressure (Bar)	Pressure (PSI)	Duration		Pressure (Bar)	Pressure (PSI)	Duration		Pressure (Bar)	Pressure (PSI)	Duration	
Ductile iron	150	26	400	≤50	15	4 to 7	60 to 100	≤50	15	110% of max allowable pressure at 38℃	110% of max allowable pressure at 38℃	≤50	15
	300	66	975										
Cast Iron (DN 50 to 300)	125	25	350	65 to 150	60			65 to 150	60			65 to 150	60
Cast Iron (DN 350 to 1200)	125	19	265										
Cast Iron (DN 50 to 300)	250	61	875	200 to 300	120			200 to 300	120			200 to 300	120
Cast Iron (DN 350 to 1200)	250	37	525										
Steel - flange	150 to 2500	ASME B 16.34	ASME B 16.34	≥350	300			≥350	120			≥350	120

Maximum Allowable Leakage Rates for Closure Tests																						
	≤50	65	80	100	125	150	200	250	300	350	400	450	500	600	650	700	750	800	900	1000	1050	1200
All Resilient Seated Valves	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Metal Seated Valves																						
- Liquid Test (drops/min)	0	5	6	8	10	12	16	20	24	28	32	36	40	48	52	56	60	64	72	80	84	96
- Gas Test (bubbles/min)	0	10	12	16	20	24	32	40	48	56	64	72	80	96	104	112	120	128	144	160	168	192

ASME B 16.34

Pressure Testing in accordance with ASME B 16.34										
Shell test				Closure test				Optional Gas Closure test			
Pressure (Bar)	Pressure (PSI)	Duration		Pressure (Bar)	Pressure (PSI)	Duration		Pressure (Bar)	Pressure (PSI)	Requisite	
No less than 1.5 times the 38˚C pressure rating, rounded off to the next higher 1 bar increment.	No less than 1.5 times the 100˚F pressure rating, rounded off to the next higher 25 psi increment.	NPS ≤ 2	15	No less than 1.1 times the 38˚C pressure rating, rounded off to the next higher 1 bar increment.	No less than 1.1 times the 100˚F pressure rating, rounded off to the next higher 25 psi increment.	NPS ≤ 2	15	No less than 5.5 bar	No less than 80 psi	NPS ≤ 4	Pc ≤ 2500
		2½ ≤ NPS ≤ 8	60			2½ ≤ NPS ≤ 8	30				
		10 ≤ NPS	180			10 ≤ NPS ≤ 18	60			NPS ≤ 12	Pc ≤ 300
						20 ≤ NPS	120				

Pressure-Temperature Rating, ASME B 16.1 / 16.24 / 16.34 / 16.42

Standard Class At 38℃ (Bar)

	ASME B 16.34									
	A105			A182 F11	A182 F22	A182 F304	A182 F316	A182 F304L	A182 F51	
	A350 LF2							A182 F316L	A182 F53	
		A216 WCC	A352 LCB	A217 WC6	A217 WC9	A351 CF8	A351 CF8M		A351 CE8MN	A494 N-12MV
		A352 LCC				A351 CF3	A351 CF3M		A351 CD4MCuN	A494 CW-12MW
									A351 CD3MWCuN	
150	19.6	19.8	18.4	19.8	19.8	19.0	19.0	15.9	20.0	15.9
300	51.1	51.7	48.0	51.7	51.7	49.6	49.6	41.4	51.7	41.4
600	102.1	103.4	96.0	103.4	103.4	99.3	99.3	82.7	10.4	82.7
900	153.2	155.1	144.1	155.1	155.1	148.9	148.9	124.1	155.1	124.1
1500	255.3	258.6	240.1	258.6	258.6	248.2	248.2	206.8	258.6	206.8
2500	425.5	430.9	400.1	430.9	430.9	413.7	413.7	344.7	430.9	344.7
4500	765.9	775.7	720.3	775.7	775.7	744.6	744.6	620.5	775.7	620.5

	ASME B 16.1			ASME B 16.42	ASME B 16.24		
	A126 CL.B NPS 1-12	A126 CL.B NPS 14-24	A126 CL.B NPS 30-48	A395	B62 C83600	B61 C92200	B148 C95200
125	13.8	10.3	10.3				
250	34.5	20.7	20.7				
150				17.2	15.5	15.5	13.4
300				44.1	34.5	34.5	35.6
600							71.1
900							106.6
1500							177.6
2500							295.8

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