



High Performance **Butterfly Valves**

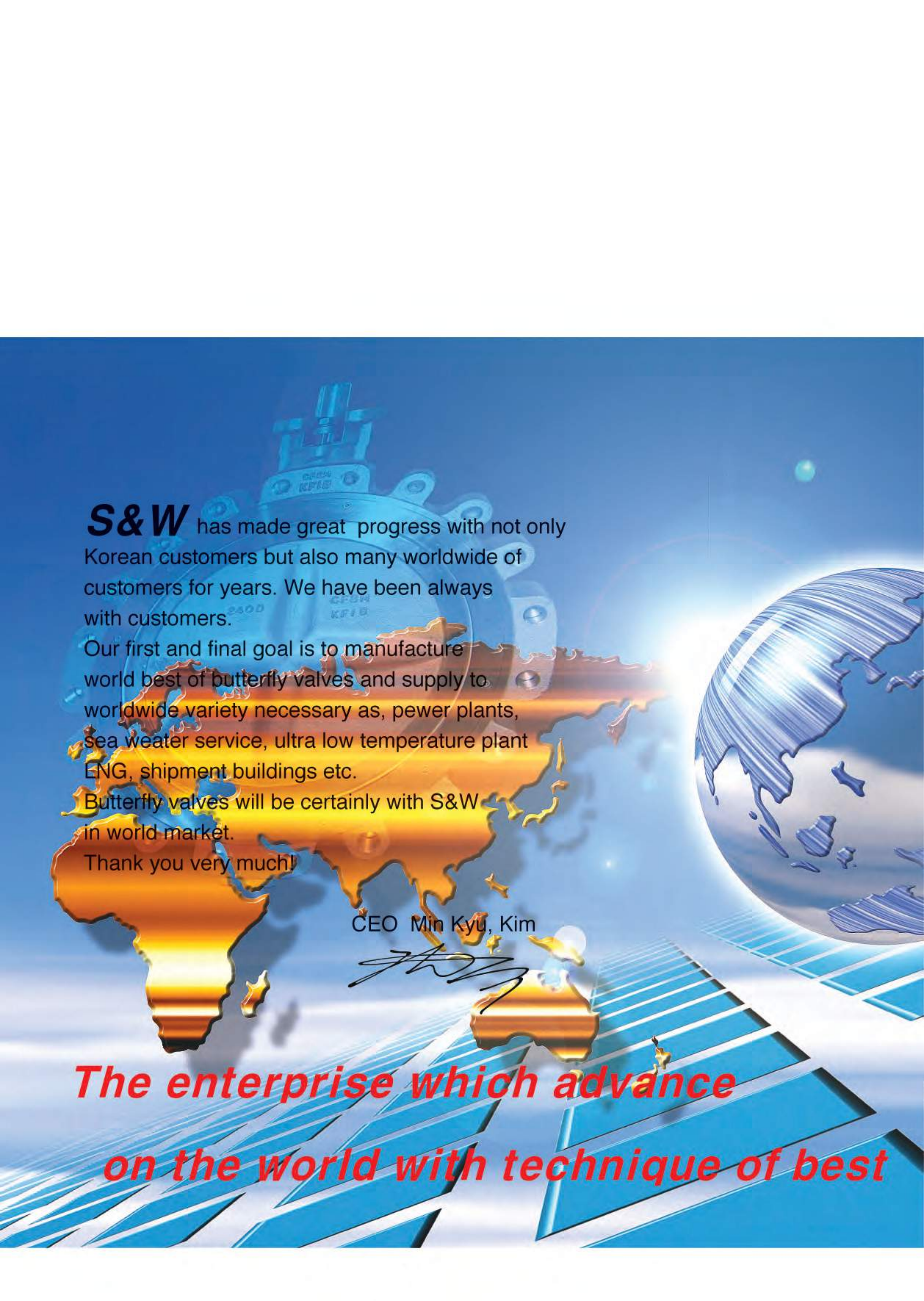
Triple Offset Butterfly Valve

Double Offset Butterfly Valve

Resilient Seated Butterfly Valve

*The enterprise which advance
on the world with technique of best*





S&W has made great progress with not only Korean customers but also many worldwide of customers for years. We have been always with customers.

Our first and final goal is to manufacture world best of butterfly valves and supply to worldwide variety necessary as, power plants, sea weater service, ultra low temperature plant LNG, shipment buildings etc.

Butterfly valves will be certainly with S&W in world market.

Thank you very much!

CEO Min Kyu, Kim



***The enterprise which advance
on the world with technique of best***

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DOUBLE OFFSET

RESILIENT SEATED

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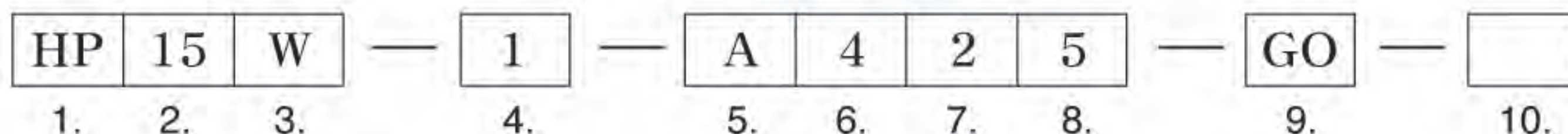
NOTE

The material in this Catalogue is only for general information. For specific performance data and proper material selection, consult factory and your S&W's representative. Although every attempt has been made to ensure that the information contained in this catalogue is correct S&W. reserves the right to change design, material and specification without notice.



ORDERING GUIDE

Example : 8" Figure #HP15W-1-A425-GO



8"High Performance Butterfly 150# Class. Wafer Type. Firesafe, WCB Body, CF8M SS Disc,
316SS Stem, PTFE Seat, Gear Operator

1. MODEL

TO - Triple Offset
HP - High Performance(Double offset)
RS - Resilient Seated(Concentric)

2. RATING

12 - ASME Class 125
15 - ASME Class 150
30 - ASME Class 300
60 - ASME Class 600
10 - PN10
16 - PN16
25 - PN25
40 - PN40

3. END CONNECTION

W - Wafer
L - Lug
DF - Double Flange

4. TYPE

1 - Fire-safety
2 - Standard

6. DISC

1 - A216 WCB + ENP
2 - A217 WC9 + ENP
3 - A351 CF8
4 - A351 CF8M
5 - A536
6 - B148
7 - CA15 410SS
x - Special

5. BODY

FIG	Material	Specification(ASM)
A	Carbon steel	A216, WCB
B	Low Temp carbon	A352, LCB
C	Low Temp carbon	A352, LCC
D	5% Cr Steel	A217, C5
E	9% Cr Steel	A217, C12
G	Low Temp 13Cr 4n	A352, CA6NM
H	410 Stainless steel	A217, CA15
I	304 Stainless steel	A351, CF8
J	316 Stainless steel	A351, CF8M
K	316L Stainless steel	A351, CF3M
L	317 Stainless steel	A352, CG8M
M	Alloy 20	A351, CN7M
AA	Gray Iron	A126, Class B
AB	Ductile Iron	A395, 65-45-12

7. STEM

1 - 304SS
2 - 316SS
3 - 410SS
4 - 416SS
5 - 630SS
6 - 17-4 PHSS
X - Special

8. SEAT

1 - BUNA-N
2 - EPDM
3 - VITON
4 - Neoprene
5 - PTFE
6 - RTFE
7 - 316SS
8 - Stellite
9 - Integral
x - Special

9. OPERATOR

(blank) -Lever
GO- Gear Operator
B - Bare Stem

10. SPECIAL REQUIREMENTS

S - Supply complete information

FIG	Material	Specification(ASM)
N	Alloy 825	UNS N00825
O	Alloy 625	A494, CW6MC
P	Hastelloy C276	A494, CW12MW
Q	Monel 400	A494, M351
R	Nickel Al-Bz	B148, C95800
S	Inconel 625	A494, CW6MC
T	Douplex SS Gr 1	A351, CD4MCu
U	Douplex SS Gr 2	A890, CE8MN
V	Douplex SS Gr 3	A890, CD6MN
W	Douplex SS Gr 4	A890, CD3MN
X	Douplex SS Gr 5	A890, CE3MN
Y	254 SMO	A351, CK3MCuN
Z	904L SS	A351, CN2MCuN
T1	Titanium Gr 2	B381, F2

STANDARD ACTUATOR TYPE**MANUAL GEAR OPERATION**

SW valves adopt a worm gear operation served as a standard of SW Valve International. This type of valve has advantages of large output and easy operation due to high gear ratio, so that it is used extensively for quarter turn valves. The gear constructed by self-locking mechanism is suitable for triple offset valves which require torque seating. Clockwise turning of the handwheel makes the valve closed and counter clockwise turning makes the valve opened.

**ELECTRIC MOTOR ACTUATOR OPERATION**

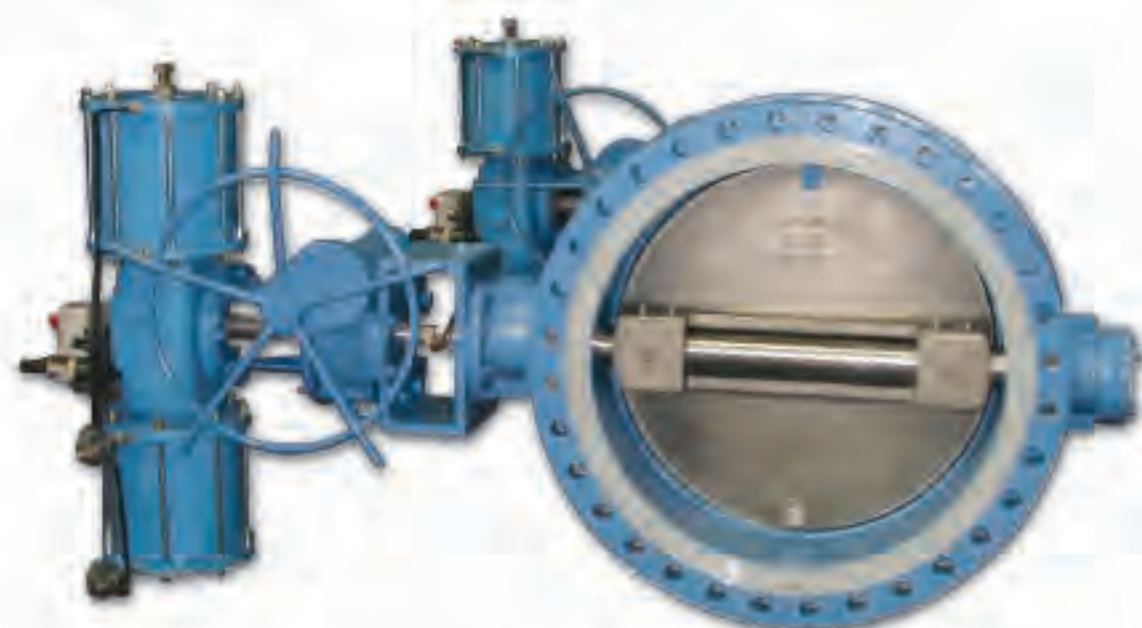
This valve is operated by an electric signal coming from the electric motor to open, close, or stop the valve in the process of operation. The position limit switch or torque switch signals stop at full open or close. The electric motor actuator is applied mainly to large size or high pressure valves because of greater torque over pneumatic actuator.

This type has advantages of simple wiring and good response. In addition, a remote control is available, and therefore the valve can be applied to a dangerous or limited space where it is difficult to access.

PNEUMATIC ACTUATOR OPERATION

This type of valve is operated by a signal of air pressure, which is normally 2~9kgf/cm² in control parts. There are two operating methods: single acting and double acting.

The single acting actuator is divided into full close and full open according to spring acting orientation. It is useful for control valve by virtue of its characteristics of safety and easy handling. Furthermore, the construction is more responsive than electric motor or hydraulic actuator. The double acting actuator is served as SW standard with air regulator, solenoid valve, and position indicator types. However, SW is able to make whatever the customer need.





SPECIFICATIONS – TRIPLE OFFSET METAL SEAT

DESIGN FEATURE

- Designed in accordance with ASME B16.34 or other customer requirements.
- Fire safe design.

STANDARD

OPTION

FACE TO FACE DIMENSIONS

WAFER AND LUG TYPE

API 609 Table 2./MSS-SP-68 Table 1
Class 150 & 300:3" ~ 24"
Class 600:3" ~ 12"

ISO 5752 Table 5
Class 150 & 300:28" ~ 48"
Class 600:14" ~ 24"

DOUBLE FLANGE

ISO 5752 Table 4, BS 5155 Table 6 (short)
Class 150 & 300:3" ~ 24"
ISO 5752 Table 4, BS 5155 Table 6 (long)
Class 600:3" ~ 12"

ISO 5752 Table 4, BS 5155 Table 6 (short)
Class 150 & 300:28" ~ 80"
ISO 5752 Table 4, BS 5155 Table 6 (long)
Class 150 & 300:3" ~ 80"
Class 600:14" ~ 24"
ASME B16.10
Class 150 & 300:3" ~ 24"
Class 600 :3" ~ 24"

BUTT WELDING

ISO 5752 Table 4, BS 5155 Table 6 (long)
Class 150 & 300: 3" ~ 80"
Class 600:3" ~ 24"

END FLANGE

ASME B16.5 : Class 150, 300, 600
JIS B2210: 10K,16K,20K,30K,40K
DIN,ISO PN10, PN16,PN20,PN25,PN40

ASME B16.47 series A: Class 150, 300
MSS-SP-44: Class 150, 300, 600
BS 3293: Class 150, 300

OPERATING

MANUAL WORM GEAR

ELECTRIC, PNEUMATIC & HYDRAULIC
ACTUATOR LOCK LEVER

MOUNTING FLANGE

ISO 5211

TESTING

API 598

MSS-SP-61, ANSI B16.104

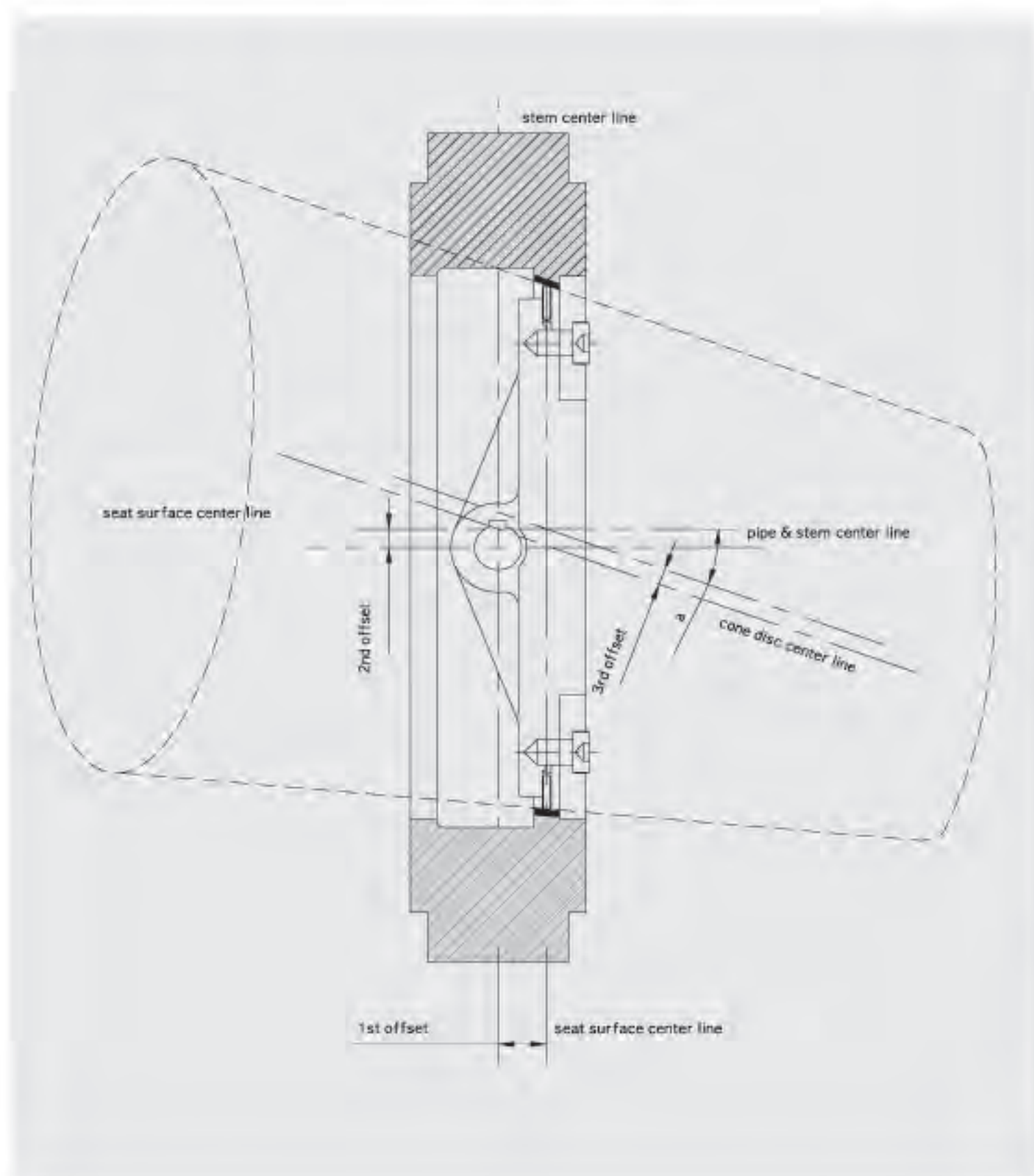
DESIGN PRINCIPLES – TRIPLE OFFSET METAL SEAT

TRIPLE OFFSET DESIGN PRINCIPLES

S&W triple offset metal seat butterfly valves provide a bi-directional and bubble-tight shutoff which is attributed to the geometry of triple offset seat.

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 requires excellent sealing and seat part durability by slight wedging effect. In addition, the angle of contact between body and seal ring has a good sealing performance by low torque because the angle travels the initial torque from actuator to seat parts without any loss by jamming. This valve is characteristic of concentric, offset and double offset construction with remarkable sealing performance and seat part durability, and moreover it hardly ever needs repair.



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.



COMPONENT CHARACTERISTICS

BODY

- The valve body shall be one piece cast or fabrication.
- The body can be supplied with different types of materials in wafer, lug, or flanged and butt welding end connections to satisfy all installation requirements.

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.

DISC

- The valve disc shall be the same material as the valve body. It is supported by a laminated seal ring, which is kept in place by a seat retainer ring bolted to the disc and can be replaced easily.
- The spiral wound gasket shall be provided between laminated seal ring and disc.

SEAL RING (LAMINATED)

- The seal ring shall be resilient stainless steel lamella alternated by graphite, aramid fiber and ceramic 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 too tightly to be replaced easily.

STEM

- The stem shall be stainless steel and one piece and two piece construction.
- The stem shall be fixed to the disc by pin or in combination of pin and key. It can be protected by internal thrust bush and bush bearing.
- The thrust bush and bush bearing shall be provided to locate the valve disc in a proper position.
- The retainer ring shall be installed to avoid blowing out the stem.

PACKING

- The packing shall consist of two braided rings in the top and bottom of valve and three die formed graphite rings in the middle.
- The lantern ring may be provided as required by customer.

ACTUATORS

- All valves shall be self-locking manual gear operation type which is served as standard.
- Electric, pneumatic or hydraulic actuator may be provided as required by customer.

STANDARD MATERIAL LIST – TRIPLE OFFSET METAL SEAT

STANDARD MATERIAL LIST

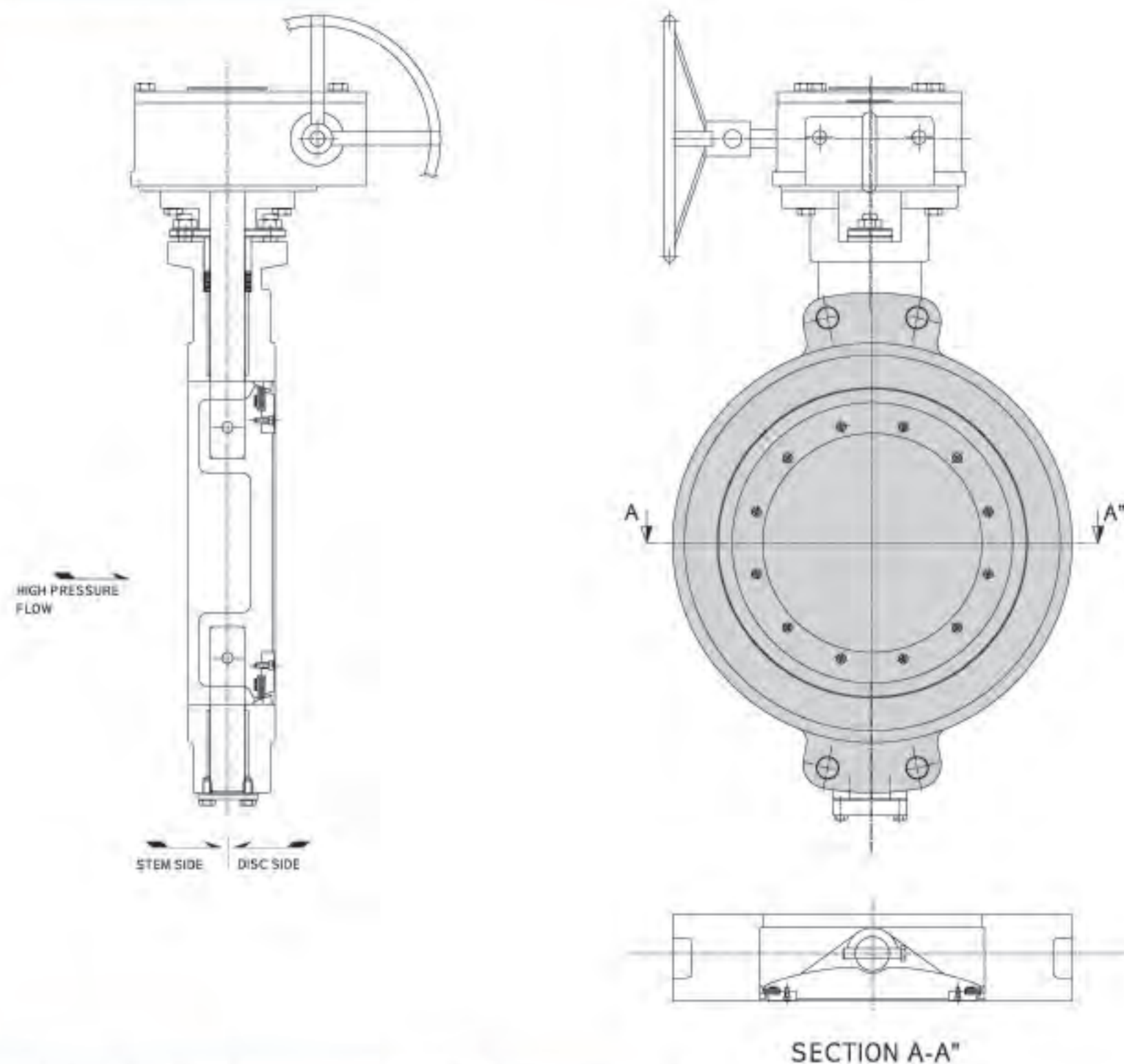
	MATERIAL ACCORDING TO ASTM						
	NO	PART NAME	MATERIAL			QTY	REMARK
S T A N D A R D	1	BODY	A216-WCB	A217-WC9	A351-CF8M		
	2	SEAT SURFACE	316 SS Faced	STELLITE NO.6 Faced	Intergral	1	NOTE 2
	3	DISC	A216-WCB + ENP	A217-WC9 + ENP	A351-CF8M	1	NOTE 1
	4	STEM	A479-410	A479-410A	A564-630	1	
	5	RETAINER RING	A479-410	A479-410A	A479-316	1	
	6	PACKING	Graphite	Graphite	Graphite	1	Set
	7	PAKING BLAND	A576-1020+Cr	A479-410A	A479-316	1	
	8	GLAND FLANGE	A105 or A576-1020 (S20C)	A105 or A576-1020(S20C)	A351-CF8	2/4	
	9	GLAND BOLT	A193-B7	A193-B7	A193-B8	2/4	
	10	NUT	A194-2H	A194-2H	A194-8	1	
	11	BUSH BEARING	A479-304 + Nitr.	A479-316 + Nitr.	A479-316+HCr.Plating	1	Note 1
	12	KEY	A479-410	A479-410	A564-630	1	
	13	SEAL RING	316SS + Graphite	316SS + Graphite	316ss + Graphite	1	Laminated
	14	TAPER PIN	410SS	410SS	A564-630	1	
	15	YOKE	A576-1020(S20C)	A576-1020 (S20C)	A576-1020+Zn.Plating		
	16	YOKE BOLT	A193-B7	A193-B7	A193-B8		
	17	YOKE NUT	A194-2H	A194-2H	A194-8		
	18	MOUNTING BOLT	A194-B7 or EQ.	A193-B7 or EQ	A193-B7 or EQ		
	19	SPRING WASHER	Steel	Steel	304SS		
	20	KEY	A576-1045	A576-1045	A576-1045		
	21	GEAR BOX	Ductile	Ductile	Ductile	1	
	22	CAP	A576-1020(S20C)	A240-304	A240-316	1	
	23	GASKET(CAP)	304SS +Graphite	304SS + Graphite	304SS+Graphite	1	Spiral wound
	24	THRUST BUSH	A479-410	A479-410	A479-316		
	25	SEAT RETAINER	A576-1020 + ENP	A240-304	A240-316		
	26	RETAINER BOLT	A193-B8	A193-B8	A193-B8M		
	27	BUSH BEARING	A479-304 + Nitr.	A479-304 +Nitr.	A479-316+HCr.Plating	1	Note 1
	28	CASKET	304SS + Graphite	304SS +Graphite	304SS +Graphite	1	Spiral wound
	29	HANDWHEEL	A53	A53	A53	1	
	30	CAP BOLT	A193-B7	A193-B16	A193-B8	4/8	
	31	CAP NUT	A194-2H	A194-4	A194-8	4/8	
	32	SEAL RING PIN	A479-304	A479-304	A479-316	1	
	33	SPACER	A479-304	A479-304	A479-316	1	
O P T I O N	2	SEAT SURFACE	Stellite No. 6 Faced	Stellite No. 6 Faced	Stellite No. 6 Faced	1	
	13	SEAL RING	Duplex SS + GRAPHITE	Duplex SS + GRAPHITE	Duplex SS + GRAPHITE	1	Laminated
			316SS + ARAMID	316SS + ARAMID	316SS + ARAMID		
			316SS + CERMIC	316SS + CERMIC	316SS + CERMIC		
	34	LANTRN RING	410SS	410SS	316SS	1	Solid Metal Ring
35	PLUG GREASE FITTING	A105	410SS	316SS	1		
		Carbon Steel + Cr.Plating	316SS	316SS	1		
36	DRAIN PLUG	A105	410SS	316SS	1		

NOTE

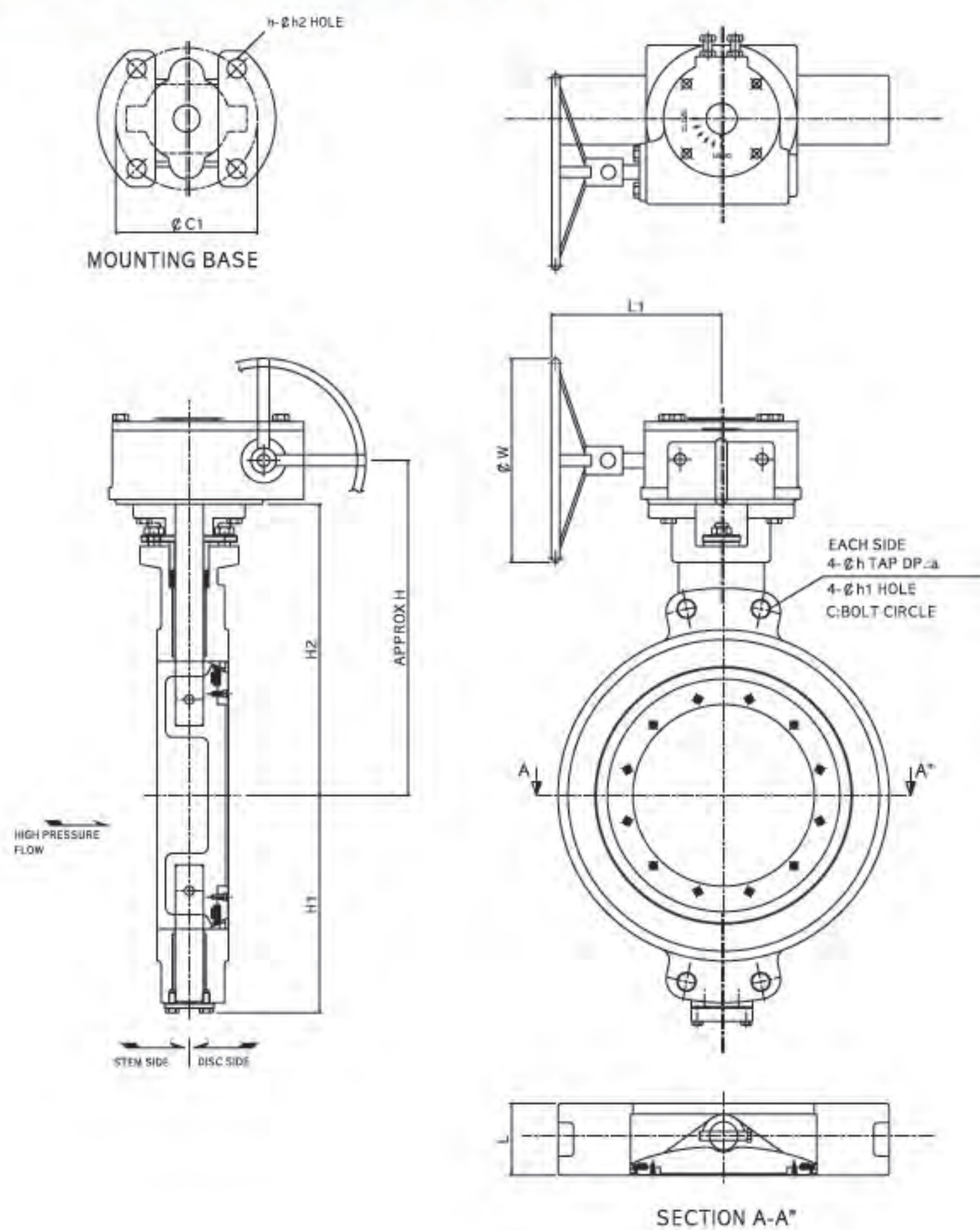
1. Nitr : Hardened by Nitriding : Hcr : Hard Cr Plating: ENP : Electroless Nickel Plating
2. Class 150 & 300 : 316SS Faced and Integral
Class 600 & over : Stellite No. 6 Faced
3. Recommended Spare Parts: Part No. 6, 13, 23, 28

SECTIONAL DRAWING – TRIPLE OFFSET METAL SEAT

SECTIONAL DRAWING



TOB VALVE : WAFER TYPE – OUTDRAWING



TOB VALVE : WAFER TYPE

TOB VALVE : WAFER TYPE – DIMENSIONS

TOB VALVE : WAFER TYPE – DIMENSIONS																UNIT: mm
CLASS 150																
SIZE			FLANGE DIMENSION									MOUNTING BASE				Weight
Inch	mm	L	C	h	a	h1	H	H1	H2	W	L1	TYPE	C1	n	h2	(kgf)
3	80	48	152.4	-	-	19.1	282	142	258	200	165	F07	70	4	9	21
4	100	54	190.5	-	-	19.1	294	162	270	200	165	F07	70	4	9	27
5	125	57	215.9	-	-	22.2	319	170	295	200	165	F07	70	4	9	32
6	150	57	241.3	-	-	22.2	340	179	316	200	165	F07	70	4	9	35
8	200	64	298.4	-	-	22.2	384	208	344	300	270	F10	102	4	11	53
10	250	71	361.9	-	-	25.4	434	241	394	300	270	F10	102	4	11	74
12	300	81	431.8	-	-	25.4	520	267	470	400	335	F14	140	4	18	95
14	350	92	476.3	-	-	28.6	544	316	494	400	335	F14	140	4	18	131
16	400	102	539.7	-	-	28.6	643	349	578	500	375	F16	165	4	22	165
18	450	114	577.8	-	-	31.8	660	381	595	500	375	F16	165	4	22	230
20	500	127	635.0	1-1/8-8	28.6	-	695	412	630	500	375	F16	165	4	22	280
24	600	154	749.3	1-1/4-8	31.8	-	813	473	743	600	485	F25	254	8	18	450
CLASS 300																
SIZE			FLANGE DIMENSION									MOUNTING BASE				Weight
Inch	mm	L	C	h	a	h1	H	H1	H2	W	L1	TYPE	C1	n	h2	(kgf)
3	80	48	168.2	-	-	22.2	282	142	258	200	165	F07	70	4	9	21
4	100	54	200.0	-	-	22.2	294	162	270	200	165	F07	70	4	9	27
5	125	59	234.9	-	-	22.2	319	170	295	300	270	F10	102	4	11	38
6	150	59	269.8	-	-	22.2	375	199	336	300	270	F10	102	4	11	45
8	200	73	330.2	-	-	25.4	450	227	400	400	335	F14	140	4	18	72
10	250	83	387.3	1-8	25.4		499	265	449	400	335	F14	140	4	18	135
12	300	92	450.8	1-1/8-8	28.6		562	302	497	500	375	F16	165	4	22	148
14	350	117	514.3	1-1/8-8	28.6		616	328	551	500	375	F16	165	4	22	208
16	400	133	571.5	1-1/4-8	31.8		676	367	606	600	485	F25	254	8	18	298
18	450	149	628.6	1-1/4-8	31.8		711	402	641	600	485	F25	254	8	18	382
20	500	159	685.8	1-1/4-8	31.8		798	432	721	700	520	F30	298	8	22	450
24	600	181	812.8	1-1/2-8	38.1		914	530	837	700	515	F30	298	8	22	680
CLASS 600																
SIZE			FLANGE DIMENSION									MOUNTING BASE				Weight
Inch	mm	L	C	h	a	h1	H	H1	H2	W	L1	TYPE	C1	n	h2	(kgf)
3	80	54	168.2	-	-	22.2	289	148	265	200	165	F07	70	4	9	29
4	100	64	215.9	-	-	25.4	370	180	330	300	270	F10	102	4	11	38
5	125	78	266.7	-	-	28.6	405	195	355	400	335	F14	140	4	18	55
6	150	78	292.1	1-8	25.4		420	225	370	400	335	F14	140	4	18	75
8	200	102	349.2	1-1/8-8	28.6		490	255	425	500	375	F16	165	4	22	136
10	250	117	431.8	1-1/4-8	31.8		545	310	480	500	375	F16	165	4	22	200
12	300	140	488.9	1-1/4-8	31.8		630	330	560	600	485	F25	254	8	18	295

* NOT SPECIFIED CLASS AND SIZE, PLEASE CONTACT SALES DEPARTMENT

NOTE

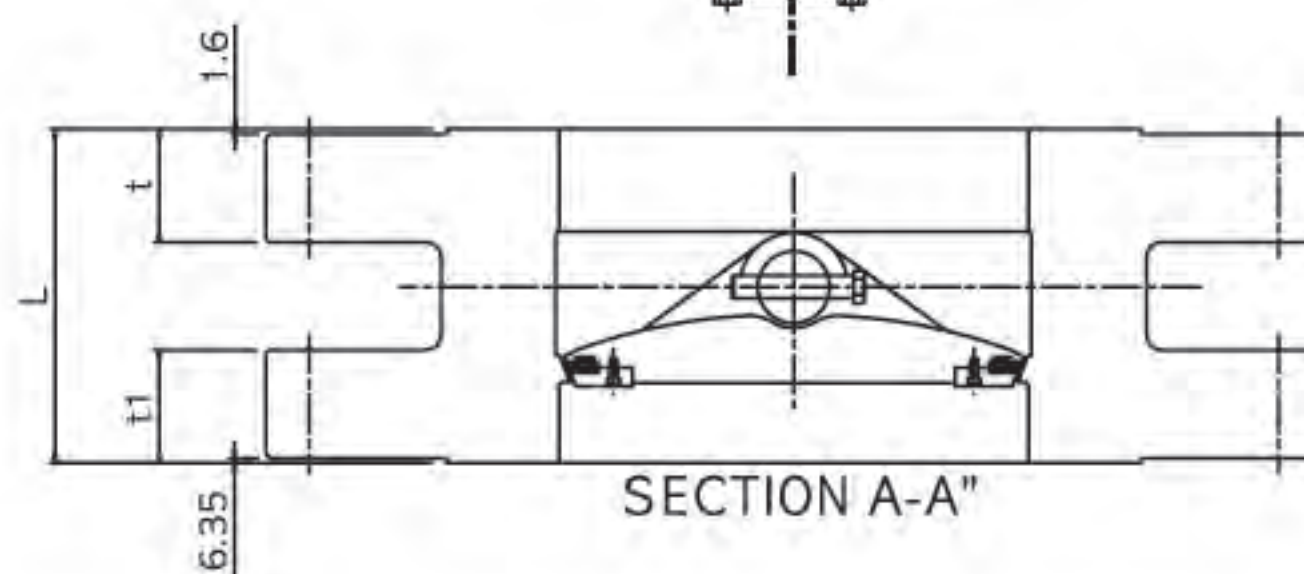
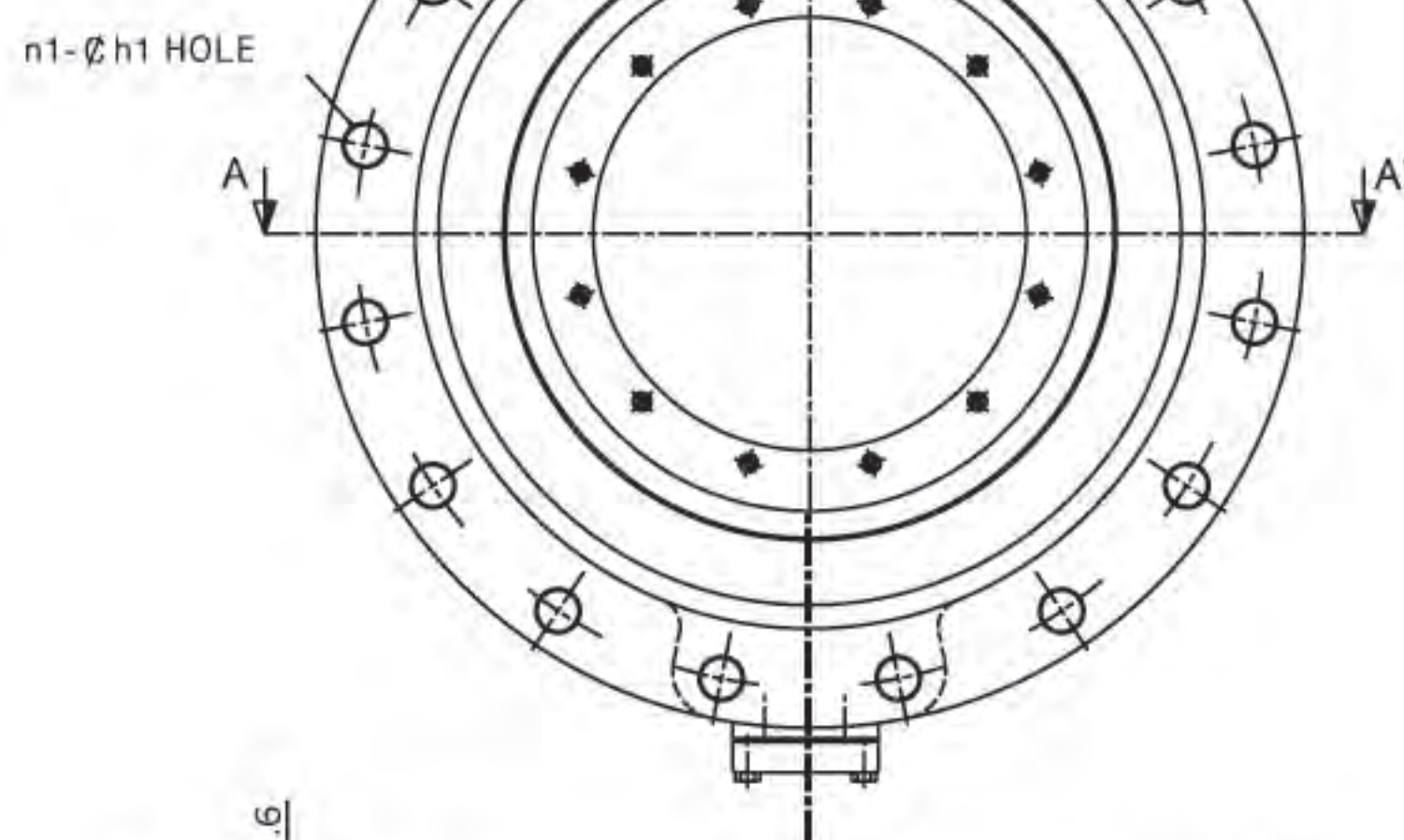
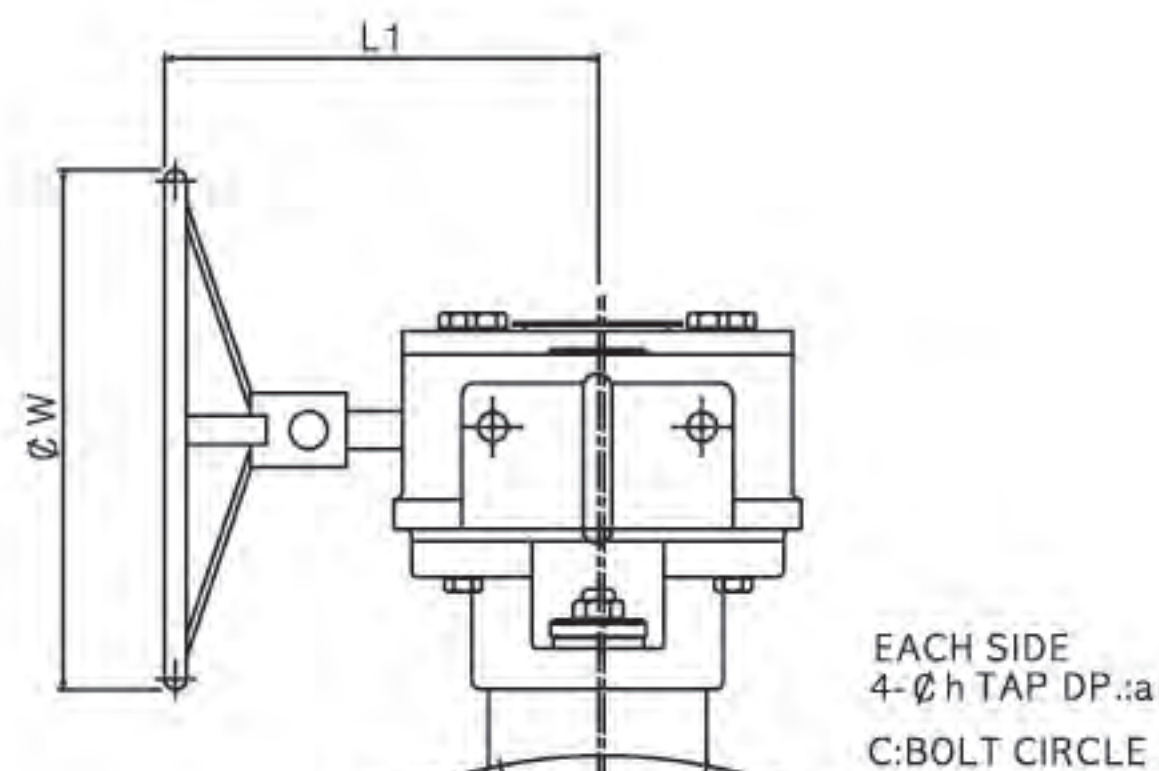
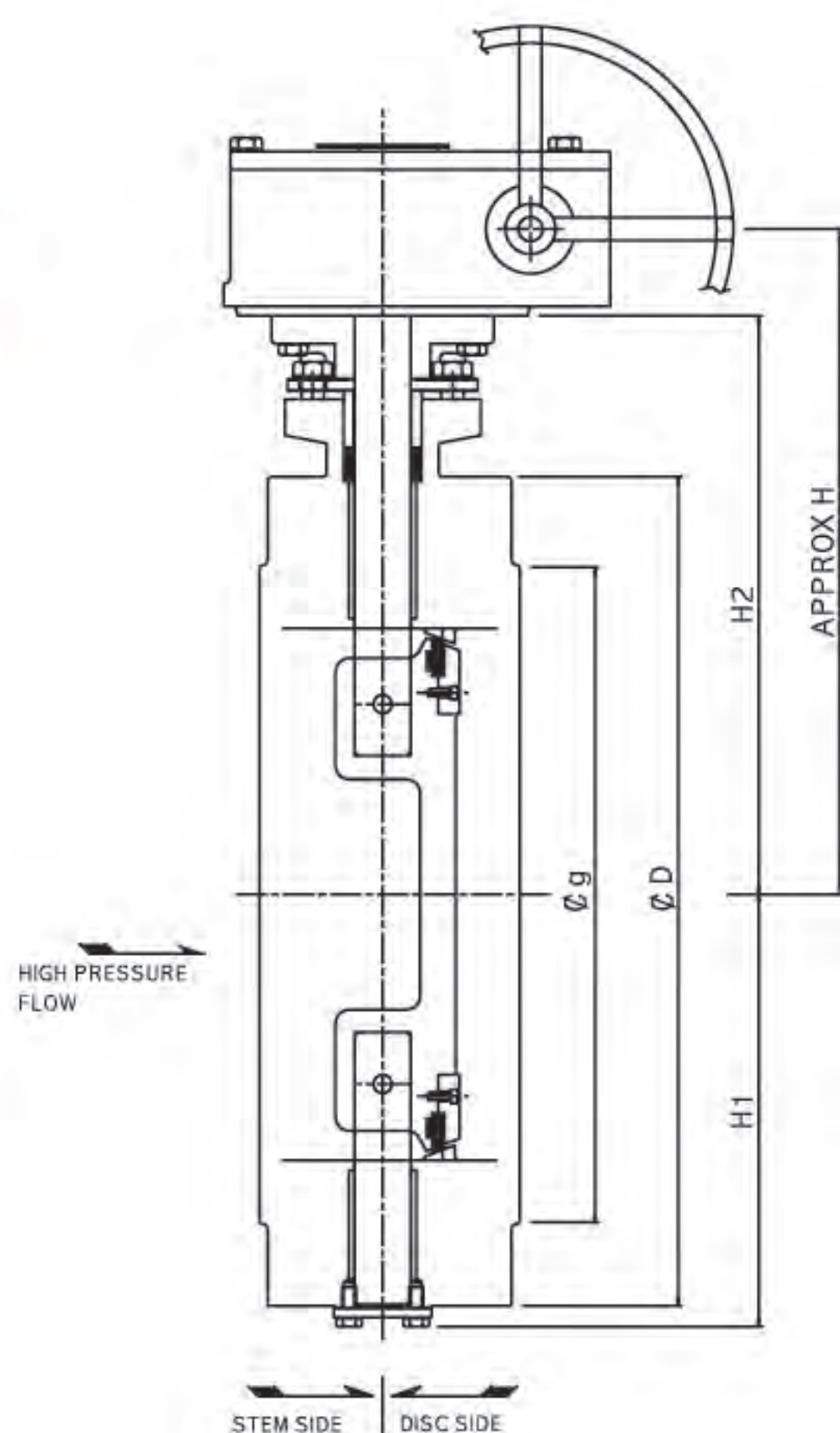
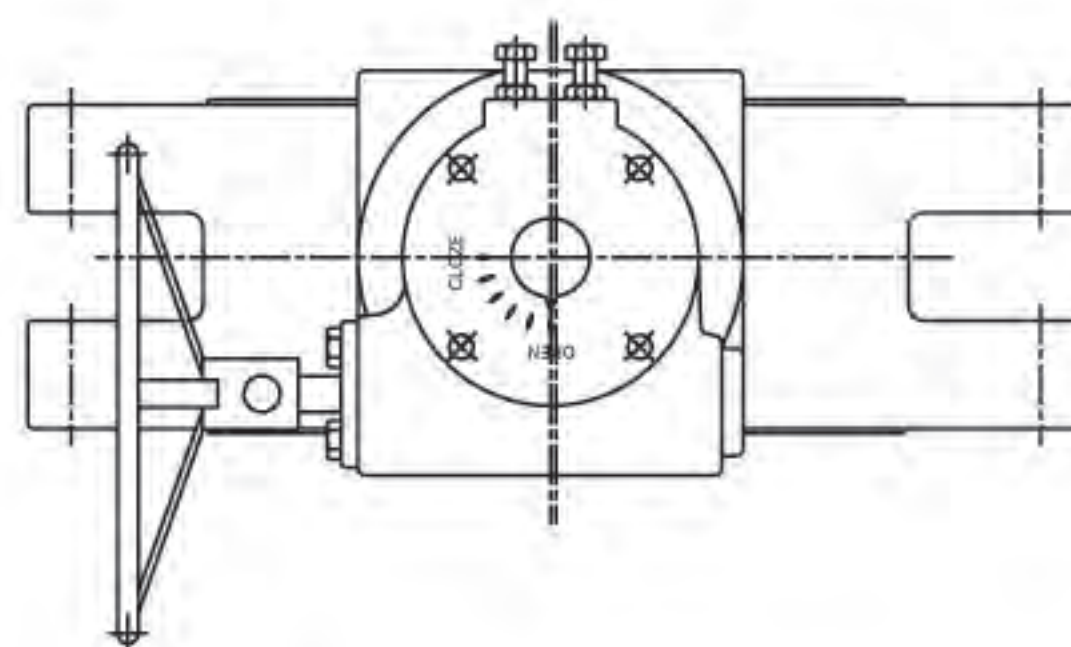
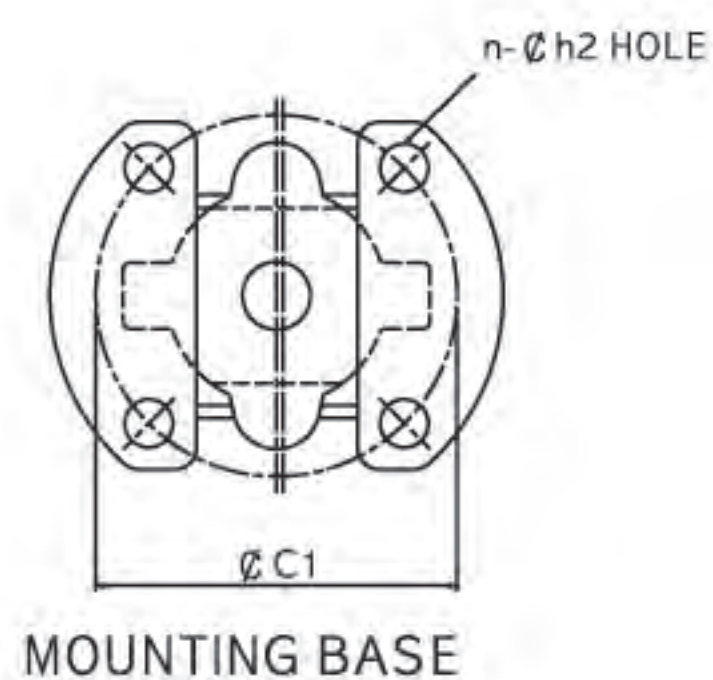
1. Valve Design : ASME B16.34
2. Face to Face Dimension : API 609 (Wafer Type)
3. End Flange Dimension: ASME B16.5

BUTTERFLY VALVES



TOB VALVE : DOUBLE FLANGE (SHORT) TYPE

TOB VALVE : DOUBLE FLANGE (SHORT) TYPE – OUTDRAWING



TOB VALVE : DOUBLE FLANGE (SHORT) TYPE

TOB VALVE : DOUBLE FLANGE (SHORT) TYPE – DIMENSIONS

TOB VALVE : WAFER TYPE – DIMENSIONS																	UNIT: mm			
CLASS 150																				
SIZE			FLANGE DIMENSION													MOUNTING BASE				Weight
Inch	mm	L	D	g	c	t	h	a	n1	h1	H	H1	H2	W	L1	TYPE	C1	n	h2	(kgf)
3	80	114	191	127.0	152.4	19.1	5/8-11	15.8	4	19.1	282	142	258	200	165	F07	70	4	9	27
4	100	127	229	157.2	190.5	24.0	5/8-11	15.8	8	19.1	294	162	270	200	165	F07	70	4	9	35
5	125	140	254	185.7	215.9	24.0	3/4-10	19.1	8	22.2	319	170	295	200	165	F07	70	4	9	41
6	150	140	279	215.9	241.3	25.4	3/4-10	19.1	8	22.2	340	179	316	200	165	F07	70	4	9	45
8	200	152	343	269.7	298.4	28.5	3/4-10	19.1	8	22.2	384	208	344	300	270	F10	102	4	11	68
10	250	165	406	323.9	361.9	30.3	7/8-9	22.2	12	25.4	434	241	394	300	270	F10	102	4	11	97
12	300	178	483	381.0	431.8	31.8	7/8-9	22.2	12	25.4	520	267	470	400	335	F14	140	4	18	133
14	350	190	533	412.8	476.3	35.1	1-8	25.4	12	28.6	544	316	494	400	335	F14	140	4	18	188
16	400	216	597	469.9	539.7	36.6	1-8	25.4	16	28.6	643	349	578	500	375	F16	165	4	22	238
18	450	222	635	533.4	577.8	39.7	1-1/8-8	28.6	16	31.8	660	381	595	500	375	F16	165	4	22	302
20	500	229	699	584.2	635.0	43.0	1-1/8-8	28.6	20	31.8	695	412	630	500	375	F16	165	4	22	380
24	600	267	813	692.2	749.3	47.8	1-1/4-8	31.8	20	35.1	813	473	743	600	485	F25	254	8	18	599
CLASS 300																				
SIZE			FLANGE DIMENSION													MOUNTING BASE				Weight
Inch	mm	L	D	g	c	t	h	a	n1	h1	H	H1	H2	W	L1	TYPE	C1	n	h2	(kgf)
3	80	114	210	127.0	168.2	28.5	3/4-10	19.1	8	22.2	282	142	258	200	165	F07	70	4	9	29
4	100	127	254	157.2	200.0	31.8	3/4-10	19.1	8	22.2	294	162	270	200	165	F07	70	4	9	39
5	125	140	279	185.7	234.9	35.0	3/4-10	19.1	8	22.2	319	170	295	300	270	F10	102	4	11	52
6	150	140	318	215.9	269.8	36.6	3/4-10	19.1	12	22.2	375	199	336	300	270	F10	102	4	11	63
8	200	152	381	269.7	330.2	41.2	7/8-9	22.2	12	25.4	450	227	400	400	335	F14	140	4	18	101
10	250	165	445	323.9	387.3	47.8	1-8	25.4	16	28.6	499	265	449	400	335	F14	140	4	18	176
12	300	178	521	381.0	450.8	50.8	1-1/8-8	28.6	16	31.8	562	302	497	500	375	F16	165	4	22	210
14	350	190	584	412.8	514.3	53.9	1-1/8-8	28.6	20	31.8	616	328	551	500	375	F16	165	4	22	315
16	400	216	648	469.9	571.5	57.2	1-1/4-8	31.8	20	35.1	676	367	606	600	485	F25	254	8	18	440
18	450	222	711	533.4	628.6	60.5	1-1/4-8	31.8	24	35.1	711	402	641	600	485	F25	254	8	18	558
20	500	229	775	584.2	685.8	63.5	1-1/4-8	31.8	24	35.1	798	432	721	700	520	F30	298	8	22	670
24	600	267	814	692.2	812.8	69.9	1-1/2-8	38.1	24	41.2	914	530	837	700	515	F30	298	8	22	1025
CLASS 600																				
SIZE			FLANGE DIMENSION													MOUNTING BASE				Weight
Inch	mm	L	D	g	c	t	h	a	n1	h1	H	H1	H2	W	L1	TYPE	C1	n	h2	(kgf)
3	80	180	210	127.0	168.2	31.8	3/4-10	19.1	8	22.2	289	148	265	200	165	F07	70	4	9	37
4	100	190	273	157.2	215.9	38.1	7/8-9	22.2	8	25.4	370	180	330	300	270	F10	102	4	11	55
5	125	200	330	185.7	266.7	44.5	1-8	25.4	12	28.6	405	195	335	400	335	F14	140	4	18	86
6	150	210	356	215.9	292.1	47.8	1-8	25.4	12	28.6	420	225	370	400	335	F14	140	4	18	109
8	200	230	419	269.7	349.2	55.7	1-1/8-8	28.6	12	31.8	490	255	425	500	375	F16	165	4	22	192
10	250	250	508	323.9	431.8	63.5	1-1/4-8	31.8	16	35.1	545	310	480	500	375	F16	165	4	22	296
12	300	270	559	381.0	488.9	66.6	1-1/4-8	31.8	20	35.1	630	330	560	600	485	F25	254	8	18	390

* NOT SPECIFIED CLASS AND SIZE, PLEASE CONTACT SALES DEPARTMENT

NOTE

1. Valve Design : ASME B16.34
2. Face to Face Dimension: ISO 5752 (Short Type)
3. End Flange Dimension: ASME B16.5



TOB VALVE : TECHNICAL DATA

PRESSURE/TEMPERATURE RATING (REF. ASME B16.34)

TEMPERATURE (°C)	MAXIMUM WORKING PRESSURE, kgf/cm ² A								
	CLASS 150			CLASS 300			CLASS 600		
	WCB	CF8M	WC9	WCB	CF8M	WC9	WCB	CF8M	WC9
-29 to 38	20.0	19.3	20.4	52.0	50.6	52.7	104.1	101.2	105.5
93	18.3	16.9	18.3	47.5	43.6	50.3	94.9	87.2	100.5
149	16.2	15.1	16.2	46.1	39.4	47.5	92.5	78.8	95.3
204	14.1	13.7	14.1	44.7	36.2	45.7	89.3	72.4	91.1
260	12.0	12.0	12.0	42.2	33.8	45.0	84.4	67.1	90.0
316	9.8	9.8	9.8	38.7	31.6	42.5	75.6	62.6	82.6
343	8.8	8.8	8.8	37.6	31.3	41.5	77.0	63.6	82.6
371	7.7	7.7	7.7	37.6	32.3	40.1	74.9	60.8	79.8
399	6.7	6.7	6.7	35.5	29.9	35.9	71.0	59.4	74.9
427	5.6	5.6	5.6	28.8	29.2	35.9	58.0	58.4	71.4
454	4.6	4.6	4.6	19.0	28.5	34.1	37.6	57.0	68.6
482	3.5	3.5	3.5	12.0	27.8	31.6	24.3	55.5	63.3
510	2.5	2.5	2.5	7.4	27.1	26.7	14.4	54.5	53.1
538	1.4	1.4	1.4	3.5	25.7	19.1	7.4	51.0	37.6
566		1.4(1)	1.4(1)		25.3	14.1		50.6	28.1
593		1.4(1)	1.4(1)		22.9	8.1		45.4	15.8
624		1.4(1)	1.4(1)		19.3	7.4		38.7	14.4
649		1.4(1)	1.4(1)		14.4	3.9		28.8	110.0

NOTE

(1) For weld valve only, the temperature rating of flanged end terminates at 538°...

FLOW DATA

Valve flow coefficient C_v is defined as the flow of water at 60°F in gallons per minute (GPM) at a pressure of one pound per square inch (1 psi) across the valve.

$$Q = C_v \sqrt{(\Delta P (62.4/\rho))}$$

WHERE

Q = Flow rate (GPM)

C_v = Flow coefficient

ΔP = Pressure drop (psi)

ρ = Density of fluid ($\rho = 62.4$, water at 60°F)

THEREFORE

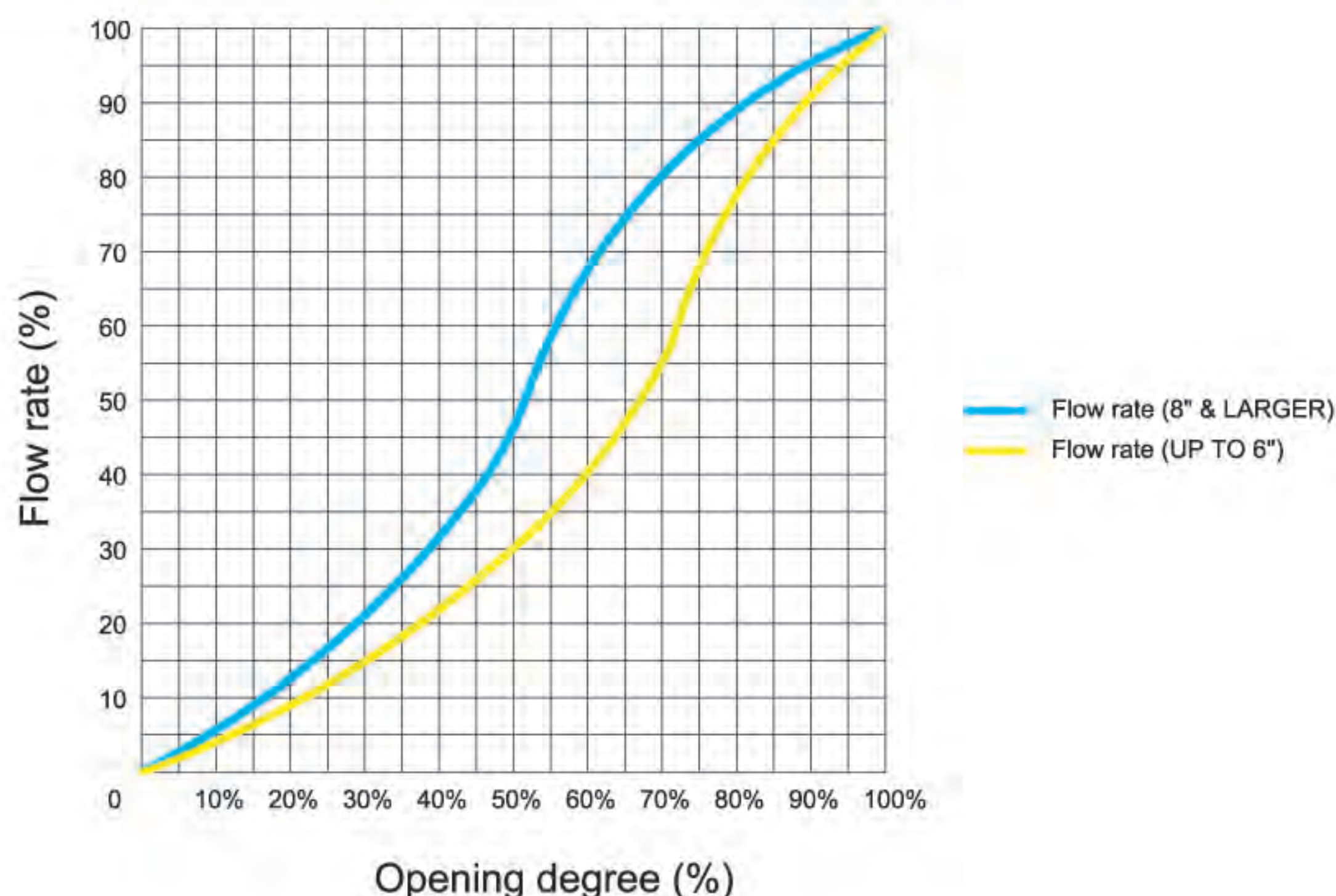
$$Q = C_v \sqrt{\Delta P}$$

FLOW COEFFICIENT VALUE(C_v)

Class	3"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	24"
150#	195	345	500	827	1523	2698	4032	5674	7880	10594	13292	19604
300#	195	345	500	786	1447	2563	3830	5390	7486	10064	12627	18624
600#	195	345	475	746	1374	2435	3640					

TOB VALVE : TECHNICAL DATA

FLOW CHARACTERISTIC CURVE



TORQUE DATA

Max ΔP (kdf/cm ²)	3"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	24"
10.5 (150PSIG)	2.8	4.9	6.8	11.0	19.3	29.8	51.2	61.7	86.5	143.7	181.8	272.5
20.0 (285PSIG)	5.4	9.3	13.0	20.8	36.5	56.4	96.8	116.5	163.1	271.0	342.1	510.7
28.1 (400PSIG)	7.6	13.0	18.2	29.1	52.3	81.5	134.2	169.3	236.8	386.0	495.1	735.1
42.2 (600PSIG)	11.3	19.3	27.3	43.7	78.4	122.1	201.0	253.6	354.5	578.0	741.0	1098.9
52.0 (740PSIG)	14.0	24.1	33.6	53.9	96.7	150.5	247.8	312.6	436.8	712.3	913.1	1353.5
104.1 (1480PSIG)	36.4	66.2	90.1	14.9	286.6	449.4	642.5					

APPLICATION

- Nuclear Power Plants and Power Plants
- Oil Refineries and Chemical Plants
- Pulp and Paper, Steel Mills
- Offshore Plants
- Ship Building

INSTALLATION CAUTIONS

- The valve is bi-directional and can be mounted in any position. However, it is recommended that the valve is horizontal to the stem and the inclined cone edge of disc faces toward the downstream (refer to directional arrows and stem side).
- If you want to use at a temperature below -48°... or above 426°..., the extension design shall be applied. In such cases, please contact the Sales Department.



SPECIFICATIONS – HIGH PERFORMANCE (Double Offset)

DESIGN FEATURE

- Designed in accordance with ASME B16.34 or other customer requirements.
- Fire afe design.

DOUBLE ECCENTRIC TYPE

(HIGH PERFORMANCE)

FACE TO FACE DIMENSIONS

WAFER AND LUG TYPE

API 609 / MSS-SP-68 / ISO 5752

Class 150 : 2" ~ 48"

Class 300 : 2" ~ 48"

Class 600 : 3" ~ 24"

API 609 / MSS-SP-68 / ISO 5752

Class 150 : 2" ~ 48"

DOUBLE FLANGE

ISO 5752, BS 5155

Class 150 : 2" ~ 48"

Class 300 : 2" ~ 48"

Class 600 : 3" ~ 24"

ISO 5752, BS 5155

Class 150 : 2" ~ 48"

END FLANGE

ASME B16.5 : Class 150,300,600

JIS B2210 : 10K,16,20K

DIN, ISO PN10, PN16, PN25, PN40

ASME B16.47 A/B: Class 150,300,600

API 605, MSS-SP-44 : Class 150,300,600

BS 3293 : Class 150,300

OPERATING

MANUAL WORM GEAR
LEVER HANDLE

ELECTRIC, PNEUMATIC & HYDRAULIC
ACTUATOR

MOUNTING FLANGE

ISO 5211

MSS-SP-102

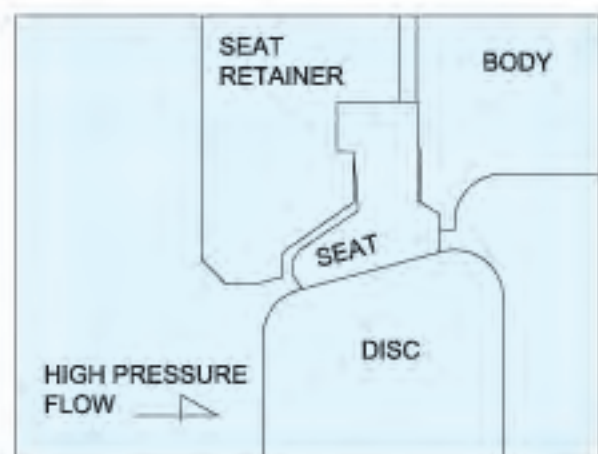
TESTING

API 598

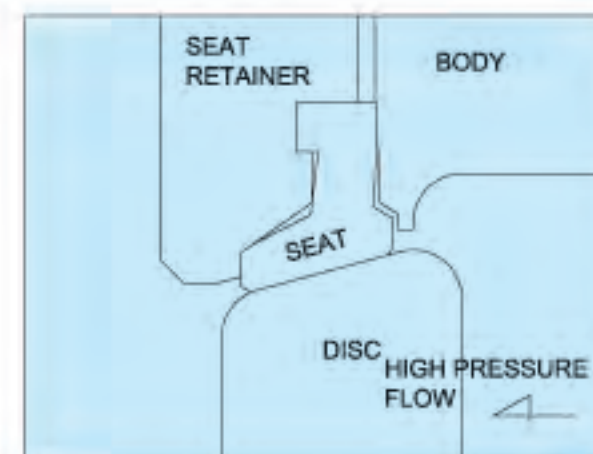
MSS-SP-61, ANSI B16.104

SEAT DESIGN PRINCIPLES – HIGH PERFORMANCE (Double Offset)

STANDARD DESIGN



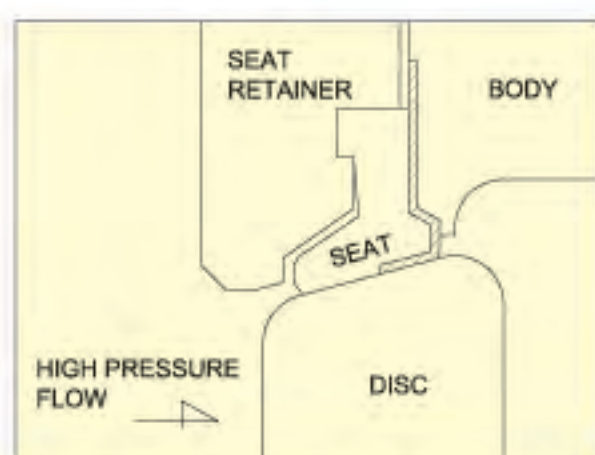
FORWARD FLOW



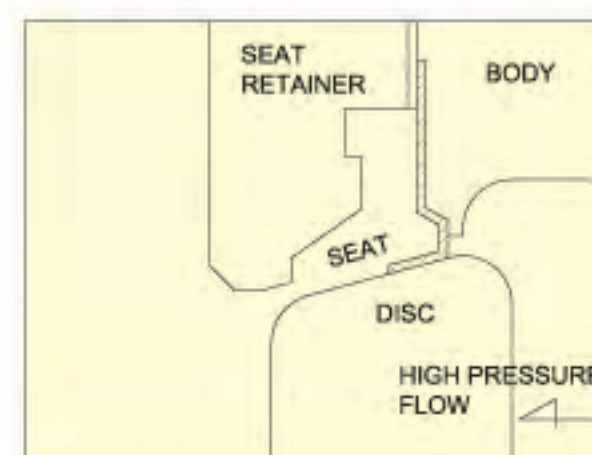
REVERSE FLOW

- Bi-directional flow and shut-off are easily accommodated.
- As pressure increases, seal becomes tighter.

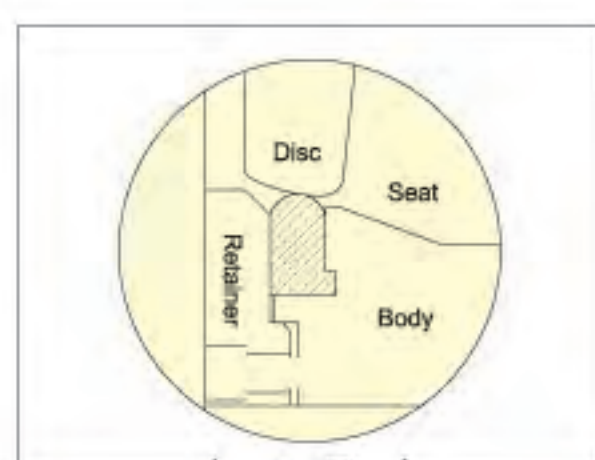
FIRE SAFETY DESIGN



BEFORE FIRE TEST

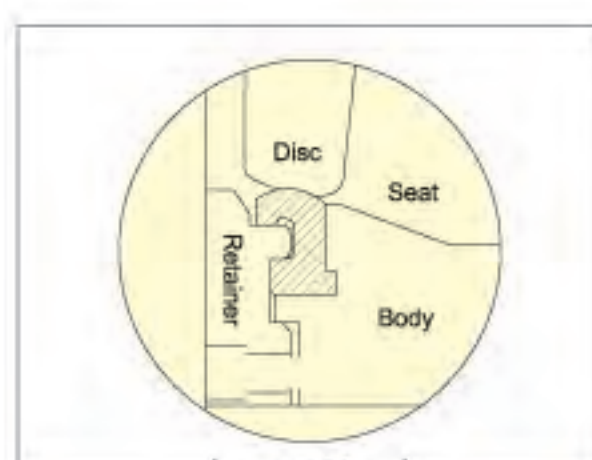


AFTER FIRE TEST



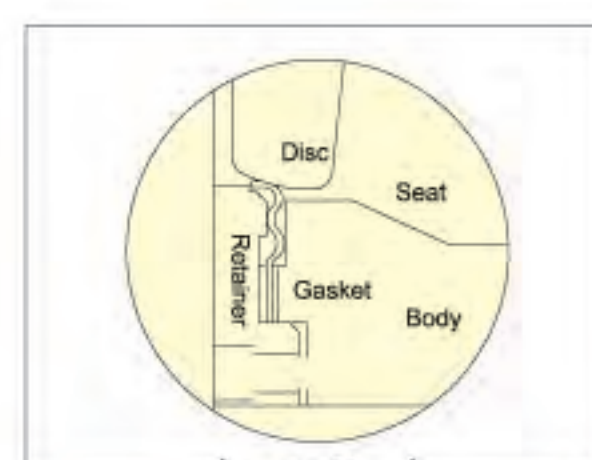
HFR

EPDM / NBR / VITON
Rubber Seat



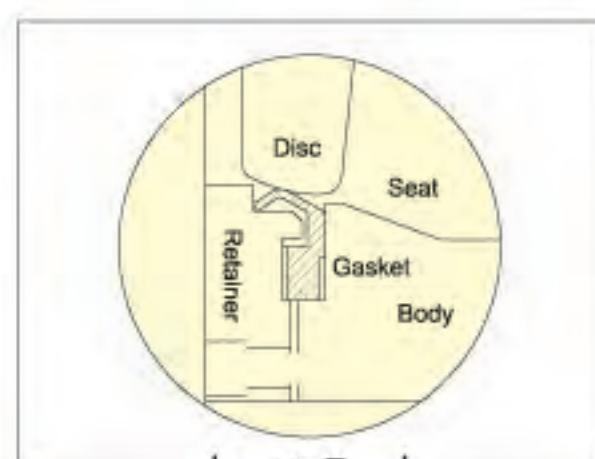
HFR

PTFE / RTFE
Teflon Seat



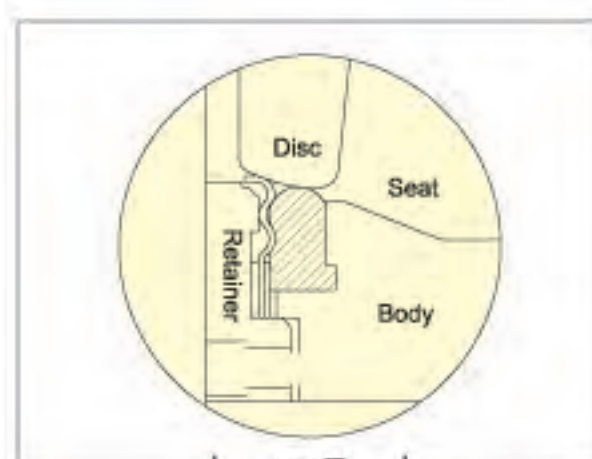
HFR

INCONEL 625 / St. steel 316
Flat Metal Seat



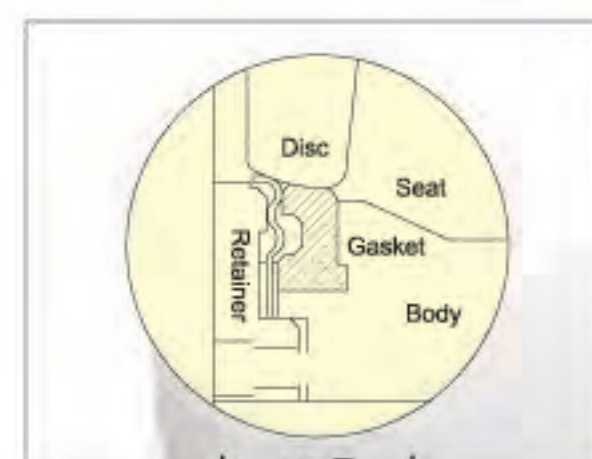
HFR

SF.St. steel 316 / MONEL
Solid Metal Seat



HFR

Rubber / St. steel 316
Fire Safe-Rubber+Metal



HFR

Teflon / St. steel 316
Fire Safe-Teflon+Metal

SEAT MATERIAL AND WORKING TEMPERATURE

STANDARD MATERIAL	MAX. WORKING TEMPERATURE °C(°F)
PTFE	200 (392)
PTFE	250 (482)

SEAT LEAKAGE

- Leakage soft seated version (PTFE, RTFE) is zero.



STANDARD LIST – HIGH PERFORMANCE (Double Offset)

STANDARD LIST

S
T
A
N
D
A
R
D

MATERIAL ACCORDING TO ASTM						
NO	PART NAME	MATERIAL			QTY	REMARK
1	BODY	A216 WCB	A351 CF8	A351 CF8M	1	
2	DISC	CF8	A351 CF8	A351 CF8M	1	
3	SEAT	VITON , EPDM , Buna-N , PTFE , RTFE , METAL			1	
4	SEAT RETAINER	A216 WCB	A351 CF8	A351 CF8M	1	
5	BOLT	A193 B7	A193 B8	A193 B8M	8	
6	SHAFT	A276 T304	A276 T304	A276 T316	1	
7	LOCK PIN	A276 T304	A276 T304	A276 T316	1	
8	BUSH	OILLESS B/R			1	
9	BUSH	OILLESS B/R			1	
10	GASKET	TEFLON			1	
11	END COVER	A216 WCB	A351 CF8	A351 CF8M	1	
12	BOLT	A193 B7	A193 B8	A193 B8M	1	
13	PACKING	TEFLON			4	
14	BOLT	A193 B7	A193 B8	A193 B8M	1SET	
15	PAC. B/N	A193 B7	A193 B8	A193 B8M	2	
16	PAC. GLAND	A216 WCB	A351 CF8	A351 CF8M	2	
17	GLAND RING	A276 T304	A276 T304	A276 T316	1	

NOTE :

1. RTFE : Reinforced PTFE

FEATURES :

- Bubble tight shut-off
- Light weight, compact size and easy installation
- General application valve
- Easy replaceable seat
- Application : - Chemical processing
 - Power plant
 - Hydrocarbon processing

Standard Specifications

Model Designation		HF-R	HF-T	HF-FM	HF-SM	HF-RF	HF-TF
Seat Ring		Rubber	Teflon	Flat Metal	Solid Metal	Rubber+Metal	Teflon+Metal
Size Range		DN50 to DN1200		DN50 to DN1200		DN50 to DN1200	
Press, Rating		ANSI CLASS 150 &300		ANSI CLASS 150 &300		ANSI CLASS 150 &300	
Body Conection		WAFER / LUG / FLANGED / BUTT WELD END					
Applicable Flange		ANSI CLASS 150 & 300 /JIS 10K, 16K, 20K / ISO / BS / DIN PN10, PN16, PN25, PN40					
Geometry		Double Offset Giving Low Unsetting and Seating Torque.					
Safety Feature		Anti Blow Out Device To API 609					
Face to Face		LUG and WAFER type : API std. 609 category B / ISO 5752(25 Series)					
Design Base		API std.609 / BS 5155 / ANSI B 16.34 / ASME SEC VIII					
Seat Leak(Water)		None	None	Tight shut V	Tight shut V	None	None
Working Temp.		-10 to + 120℃	-50 to + 200℃	-80 to + 300℃	-80 to + 450℃	-10 to + 120℃	-10 to + 200℃
STD. Material	Body / Disc	STD ; ASTM A216 WCB / ASTM A351 CF8M / ASTM B148 / DUPLEX St.steel					
	Stem	ASTM A479 Ty.304 / 316. ASTM A564 Ty.630. AISI 420J2 / 403 DUPLEX St.steel					
	Seat Ring	EPDM, VITON	PTFE, RTFE	316 St.steel/Inconel	316 St.steel	EPDM/VITON+316St	EPDM/VITON+Teflon
	Packing	PTFE / GRAPHITE / GRAFOIL / NON-ASBESTOS PACKING					
	Bearing	RTFE+316 St.steel / RTFE+Fiberglass composite / Bronze / 316 St.steel / Steel					
Pressure tests		API std.598	API std.598	API std.598 / ANSI B16.104		API std.607 / BS 6755 Part2	
Seat lea test		MAX.2.2523kg/cm2G) as per API 598. Low Pressure test is available upon request					
Marking		API std.609 / MSS SP-25					
Top Flange		ISO 5211					
Actuator		Lever / Gear / Pneumatic Cylinder / Hydraulic Cylinder / Electric Motor					



SECTIONAL DRAWING – HIGH PERFORMANCE (Double Offset)

SECTIONAL DRAWING



HIGH PERFORMANCE – OUTDRAWING



BUTTERFLY VALVES



DIMENSIONS – HIGH PERFORMANCE (Double Offset)

HIGH PERFORMANCE – DIMENSIONS

HIGH PERFORMANCE BUTTERFLY VALVE – DIMENSIONS																		UNIT: mm		
ANSI CLASS 150																				
SIZE											FLANGE DIMENSION				MOUNTING BASE				Weight	
Inch	mm	H	H1	H2	H3	ϕd	L	A	B	ϕW	C	n1	h	h1	TYPE	n	h2	c1	WAFER	LUG
2"	50	330	80	148	102	55	43	267	150	145	120.7	4	5/8"	19.1	F07	4	10	70	6.3	6.5
3"	80	344	85	157	102	84	48	267	150	145	152.4	4	5/8"	19.3	F07	4	10	70	12	16
4"	100	402	134	166	102	104	54	267	150	145	190.5	8	5/8"	19.5	F07	4	10	70	20	22
6"	150	458	158	195	102	155	57	267	150	145	241.3	8	3/4"	22.4	F07	4	10	70	26	29
8"	200	580	198	250	132	205	64	267	255	200	298.5	8	3/4"	22.4	F10	4	12	102	32	36
10"	250	731	223	281	227	255	71	-	255	200	362.0	12	7/8"	25.4	F14	4	18	140	51	58
12"	300	813	266	320	227	305	81	-	210	350	431.8	12	7/8"	25.4	F14	4	18	140	72	87
14"	350	899	292	380	227	340	92	-	210	350	476.3	12	1"	28.4	F14	4	18	140	85	98
16"	400	986	333	418	235	380	102	-	230	350	539.8	16	1"	28.4	F16	4	22	165	116	143
18"	450	1012	347	430	235	430	114	-	230	350	577.9	16	1-1/8"	31.8	F16	4	22	165	160	210
20"	500	1091	383	468	240	480	127	-	240	350	635.0	20	1-1/8"	31.8	F16	4	22	165	207	260
24"	600	1192	427	525	240	590	154	-	240	350	749.3	20	1-1/4"	35.1	F16	4	22	165	320	400
26"	650	1375	545	570	260	607	165	-	350	400	806.5	24	1-1/4"	35.1	F25	8	19	254	350	430
28"	700	1440	580	600	260	654	165	-	350	400	863.6	28	1-1/4"	35.1	F25	8	19	254	370	460
30"	750	1590	600	625	365	698	190	-	390	605	914.4	28	1-1/4"	35.1	F25	8	19	254	465	520
32"	800	1625	615	645	365	755	190	-	390	605	977.9	28	1-1/2"	41.1	F25	8	19	254	490	580
36"	900	1780	695	720	365	825	203	-	390	605	1085.9	32	1-1/2"	41.1	F25	8	19	254	750	805
40"	1000	1940	775	800	365	950	216	-	390	605	1200.2	36	1-1/2"	41.1	F25	8	19	254	920	1105
44"	1100	2100	855	880	365	1040	241	-	440	605	1314.5	40	1-1/2"	41.1	F30	8	23	298	1105	1230
48"	1200	2180	890	925	365	1162	254	-	440	605	1422.4	44	1-1/2"	41.1	F30	8	23	298	1250	1320

HIGH PERFORMANCE – DIMENSIONS

HIGH PERFORMANCE BUTTERFLY VALVE – DIMENSIONS																		UNIT: mm		
ANSI CLASS 300																				
SIZE											FLANGE DIMENSION				MOUNTING BASE				Weight	
Inch	mm	H	H1	H2	H3	ϕd	L	A	B	ϕW	C	n1	h	h1	TYPE	n	h2	c1	WAFER	LUG
2"	50	339	87	155	102	55	43	267	150	145	127.0	8	3/4"	19.1	F07	4	10	70	6.3	7
3"	80	364	95	167	102	84	48	267	150	145	168.1	8	3/4"	22.4	F07	4	10	70	12	16
4"	100	426	146	178	102	104	54	267	150	145	200.2	8	3/4"	22.4	F07	4	10	70	20	22
6"	150	495	177	216	102	155	59	267	150	145	269.7	12	3/4"	22.4	F07	4	10	70	27	37
8"	200	618	217	269	132	205	73	267	255	200	330.2	12	7/8"	25.4	F10	4	12	102	45	63
10"	250	711	243	301	227	255	83	-	255	200	387.4	16	1"	28.4	F14	4	18	140	67	103
12"	300	847	280	340	227	305	92	-	210	350	450.9	16	1-1/8"	31.8	F14	4	18	140	85	112
14"	350	949	317	405	227	340	118	-	210	350	514.4	20	1-1/8"	31.8	F14	4	18	140	105	220
16"	400	1009	346	428	235	380	134	-	230	350	571.5	20	1-1/4"	35.1	F16	4	22	165	180	280
18"	450	1076	385	456	235	430	150	-	230	350	628.7	24	1-1/4"	35.1	F16	4	22	165	270	360
20"	500	1167	421	506	240	480	159	-	240	350	685.8	24	1-1/4"	35.1	F16	4	22	165	320	450
24"	600	1300	481	579	240	590	181	-	240	350	812.8	24	1-1/2"	41.1	F16	4	22	165	410	700
26"	650	1505	540	600	365	607	210	-	390	605	876.3	28	1-5/8"	44.5	F25	8	19	254	480	810
28"	700	1565	580	620	365	654	229	-	440	605	939.8	28	1-5/8"	44.5	F25	8	19	254	540	960
30"	750	1695	660	670	365	698	230	-	440	605	997.0	28	1-3/4"	47.8	F25	8	19	254	610	1110
32"	800	1730	675	690	365	755	241	-	440	605	1054.1	28	1-7/8"	50.8	F25	8	19	254	670	1205
36"	900	1925	770	790	365	825	241	-	440	605	1168.4	32	2"	53.8	F30	8	23	298	806	1310
40"	1000	2125	870	890	365	950	300	-	440	605	1155.7	32	1-5/8"	44.5	F30	8	23	298	980	1425



BUTTERFLY VALVES

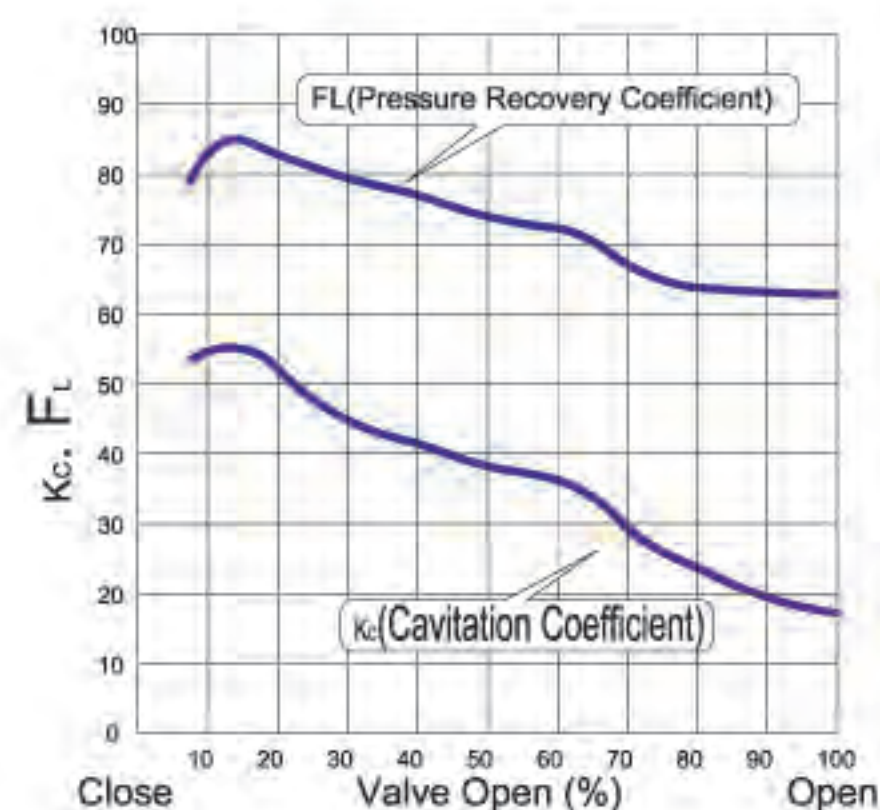
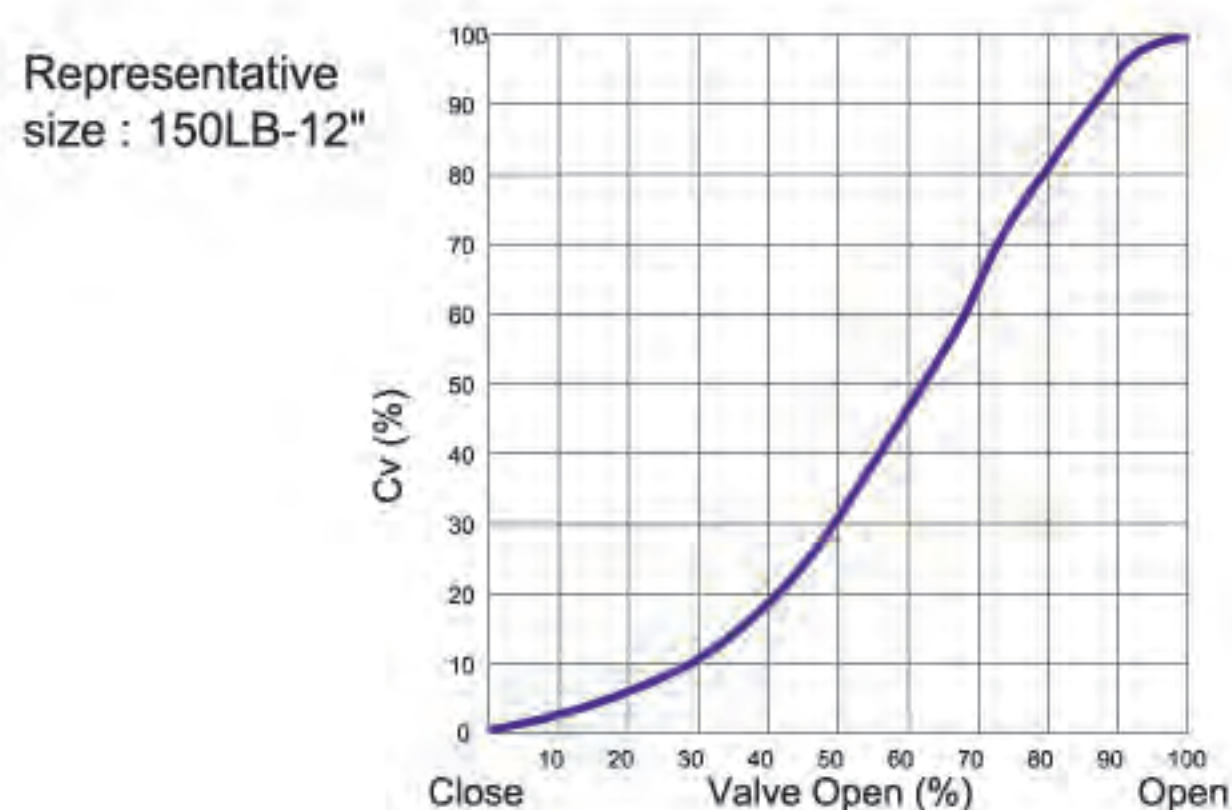
DIMENSIONS – HIGH PERFORMANCE

HIGH PERFORMANCE – TORQUE & Cv

TORQUE VALUE		Cv VALUE								
SIZE Inch mm		MAX. DIFFERENTIAL PRESSURE (kgf/cm ²)						FULL OPEN		
		10.5	20	28.1	42.2	49.2	104.1	CLASS		
		(150PSI)	(285PSI)	(400PSI)	(600PSI)	(700PSI)	(1480PSI)	150	300	600
2"	50	3.1	3.5	4.4	4.6	4.7	-	92	92	-
2-1/2"	65	3.3	3.8	4.5	4.8	4.9	-	150	150	-
3"	80	3.5	4.3	4.8	5.3	5.5	11.8	260	260	155
4"	100	4.6	6.2	7.1	7.9	8.7	21.0	460	460	255
5"	125	6.2	8.8	9.4	11.0	12.2	27.8	760	760	710
6"	150	8.2	10.2	12.2	14.3	14.9	37.0	1150	1100	740
8"	200	14.3	17.3	19.4	22.4	24.5	67.8	2100	1900	1350
10"	250	20.9	29.1	34.7	40.8	45.6	105.0	3200	3000	2050
12"	300	29.9	43.8	53.5	64.2	69.1	160.6	4700	4500	2700
14"	350	44.7	72.2	100.9	126.4	138.7	254.9	5800	5500	3900
16"	400	63.7	106.0	138.7	168.2	185.1	328.3	8000	7600	5100
18"	450	86.2	137.7	185.1	218.7	235.5	408.4	10500	9900	5500
20"	500	130.0	197.3	246.8	291.6	314.1	547.1	14000	13000	7900
22"	550	161.6	242.2	295.7	358.9	381.4	-	-	-	-
24"	600	197.3	296.2	358.9	444.1	475.7	948.3	21000	19500	11100
26"	650	224.3	336.5	413.0	520.5	565.4	-	25000	-	-
28"	700	255.9	394.6	475.7	646.5	708.7	-	29000	-	-
30"	750	304.9	448.7	556.2	735.7	807.6	-	33500	-	-
32"	800	368.1	556.2	-	-	-	-	41000	-	-
34"	850	430.8	646.5	-	-	-	-	-	-	-
36"	900	493.5	744.4	-	-	-	-	55000	-	-
38"	950	565.9	843.3	-	-	-	-	-	-	-
40"	1000	655.7	987.1	-	-	-	-	70000	-	-
42"	1050	717.9	1076.8	-	-	-	-	-	-	-
44"	1100	781.1	1166.5	-	-	-	-	87000	-	-
46"	1150	852.5	1346.0	-	-	-	-	-	-	-
48"	1200	987.1	1480.6	-	-	-	-	104000	-	-

FLOW COEFFICIENTS FOR HF-Series

Cv(Coefficient of Volume) is the number of U.S.gallons per minute of water required to pass through a valve with a pressure drop of 1 psi.





STANDARD MATERIAL LIST – RESILIENT SEATED

STANDARD MATERIAL LIST

S T A N D A R D	MATERIAL ACCORDING TO ASTM								
	NO	PART NAME	MATERIAL					QTY	REMARK
	1	BODY	A126 Cl . B	A395	A216-WCB	A351-CF8	A351-CF8M	1	
	2	DISC	A351-CF8, A351 CF8M, B148					1	
	3	SEAT RING	BUNA-A(NBR), EPDM , VITON, NEOPRENE					1	
	4	STEM	A276-304, A276-316, A276-410, A564-630					1	
	5	DISC BOLT/NUT	A193-B7, A193-B8, A193-B8M					2	
	6	PACKING	TEFLON					2	
	7	O-RING	BUNA-A(NBR), EPDM , VITON, NEOPRENE					3	
	8	O-RING HOLDER	ACETAL					1	
	9	END COVER	A126 Cl . B	A395	A216-WCB	A351-CF8	A351-CF8M	1	
	10	BOLT	A193-B7, A193-B8, A193-B8M					4	
11	O-RING	BUNA-A(NBR), EPDM , VITON, NEOPRENE					1		



SEAT MATERIAL AND WORKING TEMPERATURE

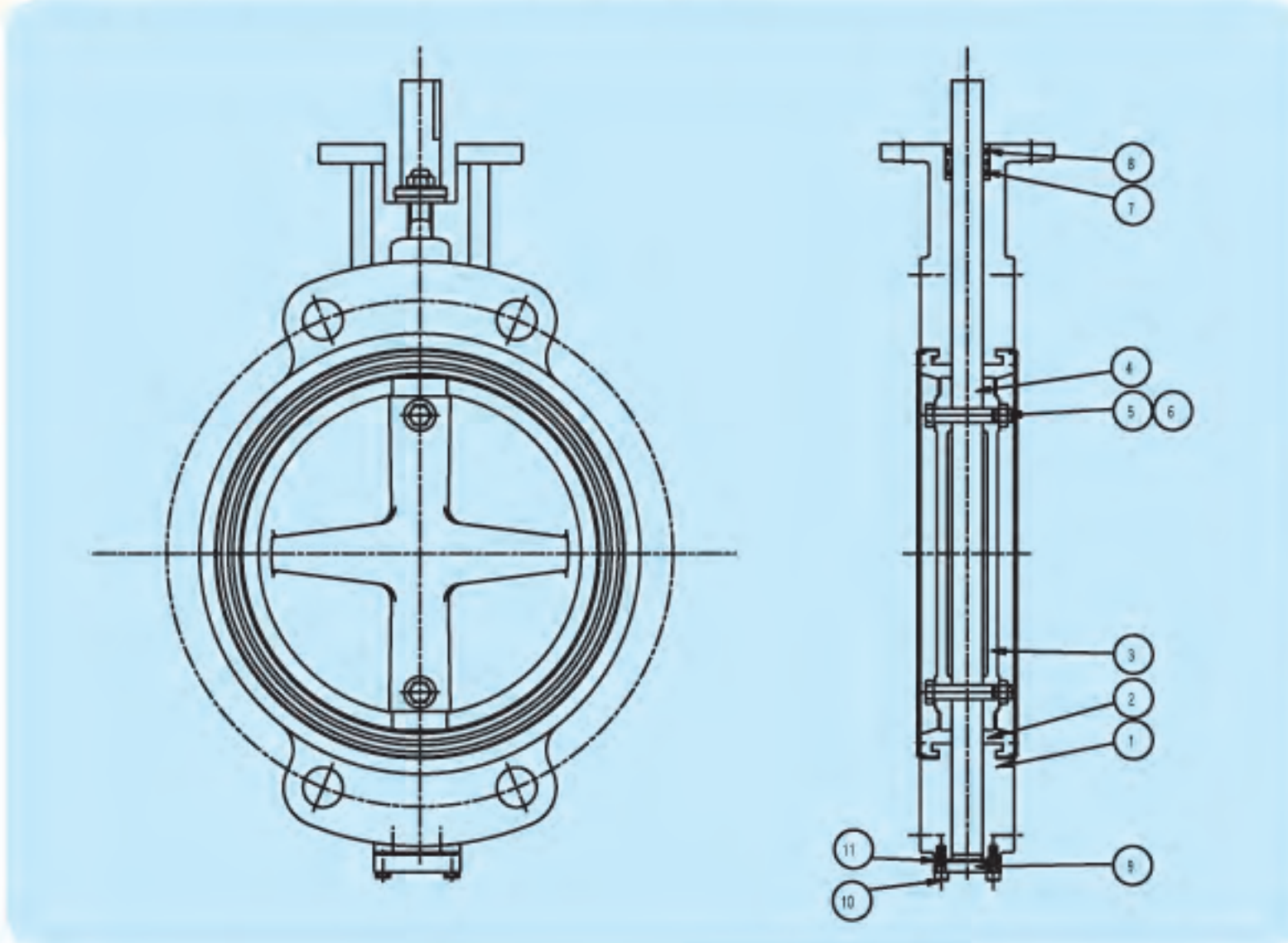
SEAT MATERIAL	MAX. WORKING TEMPERATURE °C	
	CONTINUOUS	INTERMITTENT
BUNA-N (NBR)	-18°C ~ 93°C	-18°C ~ 100°C
EPDM	-40°C ~ 130°C	-40°C ~ 140°C
VITON	-18°C ~ 200°C	-18°C ~ 210°C
NEOPRENE	-16°C ~ 90°C	-16°C ~ 100°C

FEATURES :

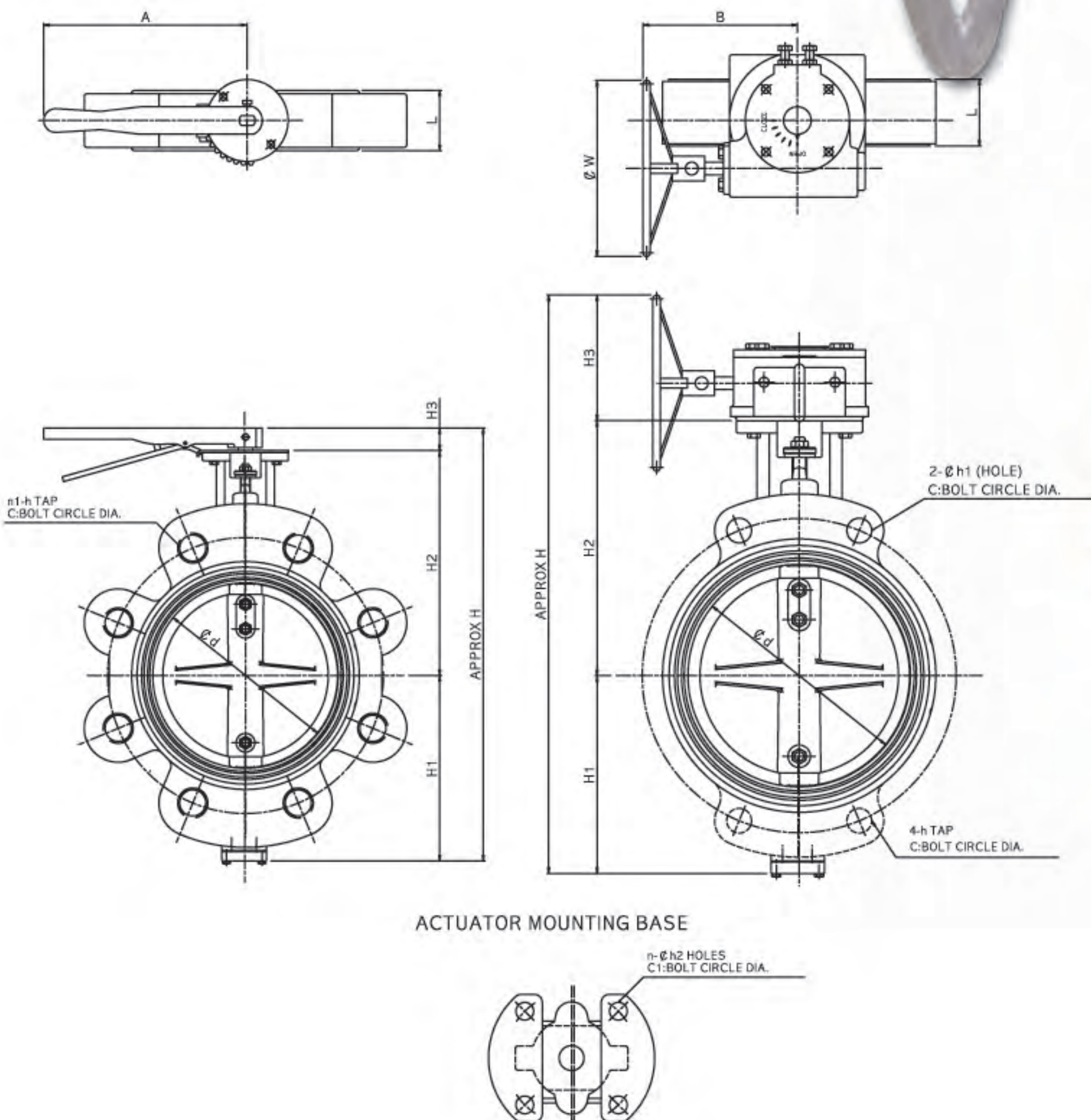
- Bubble tight shut-off
- Light weight, compact size and easy installation
- General application valve
- Bi-directional mounting
- Easy replaceable seat
- Application : - Chemical processing
 - Oil field
 - Power plant
 - Hydrocarbon processing

SECTIONAL DRAWING – RESILIENT SEATED

SECTIONAL DRAWING



HIGH PERFORMANCE – OUTDRAWING





DIMENSIONS – RESILIENT SEATED

RESILIENT SEATED – DIMENSIONS

RESILIENT SEATED – DIMENSIONS																UNIT: mm			
ANSI CLASS 150																			
SIZE											FLANGE DIMENSION				MOUNTING BASE			Weight	
Inch	mm	H	H1	H2	H3	ϕ d	L	A	B	ϕ W	C	n1	h	h1	n	h2	c1	WAFER	LUG
2"	50	330	65	130	105	50	43	260	180	150	127.7	4	5/8"X11unc	19	4	10	83	2.9	3.7
2-1/2"	65	324	74	145	105	64	46	260	180	150	139.7	4	5/8"X11unc	19	4	10	83	4	4.4
3"	80	343	90	148	105	80	46	260	160	150	152.4	4	5/8"X11unc	19	4	10	83	4.8	5.1
4"	100	390	110	175	105	100	52	330	180	150	190.5	8	5/8"X11unc	19	4	10	83	6.8	8.5
5"	125	418	125	188	105	124	56	330	180	150	215.9	8	3/4"X10unc	22.5	4	10	83	8.2	12.1
6"	150	443	138	200	105	150	56	330	180	150	241.3	8	3/4"X10unc	22.5	4	10	83	11.5	13
8"	200	559	165	230	164	200	60	470	260	260	298.5	8	3/4"X10unc	22.5	4	14	125	16	21
10"	250	629	200	265	164	250	68	-	260	260	362.0	12	7/8"X9unc	25.5	4	14	125	22	31
12"	300	704	235	305	164	300	78	-	260	260	431.8	12	3/4"X10unc	22.5	4	14	125	38	46
14"	350	762	268	330	164	334	78	-	260	260	476.3	12	1"X8unc	28.5	4	14	125	50	62
16"	400	926	362	310	254	390	102	-	300	400	539.8	16	1"X8unc	28.5	4	23	165	80	106
18"	450	981	337	390	254	434	108	-	300	400	577.9	16	1-1/8"X8unc	-	4	23	165	100	120
20"	500	1074	380	440	254	486	127	-	300	400	635.0	20	1-1/8"X8unc	-	4	23	165	142	172
22"	550	1130	415	455	260	526	154	-	350	400	692.2	20	1-1/4"X8unc	-	8	19	192	206	252
24"	600	1182	447	475	260	582	154	-	350	400	749.3	20	1-1/4"X8unc	-	8	19	192	234	290
26"	650	1260	475	525	260	622	165	-	350	400	806.5	24	1-1/4"X8unc	-	8	19	192	262	325
28"	700	1325	500	565	260	674	165	-	350	400	863.6	28	1-1/4"X8unc	-	8	19	192	310	385
30"	750	1505	540	600	365	724	165	-	390	605	914.4	28	1-1/4"X8unc	-	8	19	254	395	488
32"	800	1600	615	620	365	774	190	-	390	605	977.9	28	1-1/2"X8unc	-	8	19	254	470	582
34"	850	1680	640	675	365	836	200	-	390	605	1028.7	32	1-1/2"X8unc	-	8	19	254	522	655
36"	900	1740	670	705	365	872	200	-	390	605	1085.9	32	1-1/2"X8unc	-	8	19	254	583	725
40"	1000	1850	750	735	365	964	216	-	390	605	1200.0	36	1-1/2"X8unc	-	8	19	254	660	822

RESILIENT SEATED – TORQUE & Cv

TORQUE VALUE		Cv VALUE	
SIZE		MAX. DIFFERENTIAL PRESSURE (kgf/cm ²)	
Inch	mm	5.3 (75 PSI)	105 (150 PSI)
2"	50	2.0	2.5
2-1/2"	65	2.3	3.1
3"	80	3.4	4.1
4"	100	4.8	6.5
5"	125	7.3	9.0
6"	150	11.2	14.6
8"	200	14.6	19.1
10"	250	29.2	35.9
12"	300	43.8	53.8
14"	350	57.1	91.8
16"	400	78.5	117.3
18"	450	123.4	173.3
20"	500	157.0	246.8
22"	550	208.0	342.6
24"	600	241.7	432.3
26"	650	314.1	550.6
28"	700	403.8	656.7
30"	750	471.1	780.1
32"	800	527.2	874.9
34"	850	605.7	987.1
36"	900	683.2	1099.2
40"	1000	1088.0	1884.4

		FULL OPEN	
2"	50	115	
2-1/2"	65	221	
3"	80	425	
4"	100	792	
5"	125	1290	
6"	150	2175	
8"	200	3984	
10"	250	4900	
12"	300	8710	
14"	350	11460	
16"	400	13702	
18"	450	18302	
20"	500	22903	
22"	550	27479	
24"	600	32096	
26"	650	34944	
28"	700	37791	
30"	750	42988	
32"	800	48185	
34"	850	54543	
36"	900	60901	
40"	1000	60901	

BUTTERFLY VALVES-C SERIES, TORQUE VALVES

S&W C series butterfly valves are manufactured as easy re-assembling, compact and high quality to be applied oil, gas, sea water and many application industry range.

Anticipated Seating & Unseating Torque Values–Nm(Fully Rated)

Shut Pressure kg/cm ² (PSI)									
Valve (mm)	Normal Service				Valve (mm)	Normal Service			
	0	3	6	10		0	3	6	10
	(0)	(50)	(85)	(150)		(0)	(50)	(85)	(150)
40	8	8	12	15	550	1050	1210	1850	3040
50	25	25	25	26	600	1150	1950	2700	3800
65	31	32	32	33	650	1320	2800	3100	4650
80	36	37	38	39	700	1450	3180	3940	5840
100	54	56	58	61	750	1695	3320	4050	6940
125	73	77	81	86	800	2870	3700	5050	7850
150	102	107	112	130	850	3350	4200	5790	8700
200	170	181	191	206	900	3750	4600	6100	9700
250	260	282	303	332	950	4250	5600	8700	9950
300	350	382	413	480	1000	7320	8500	9250	10500
350	486	570	653	820	1050	8600	8800	9950	10830
400	622	751	879	1050	1100	10500	9500	15300	14500
450	780	968	1155	1550	1200	11300	12300	17200	19100
500	961	1225	1490	2220					

For conditions that vary from hose noted, then apply the following Application Factor Multipliers:

Operated less than once per day	X 1.2
Dry service with abrasives, cement	X 1.7
Lubrication oils	X 0.5
Temperature - lower than minus 4.5°C	X 1.2
- higher than 93°C	X 1.2
Chemical attack : Consult factory	

Note:

To apply the as noted Application Factor Multipliers

1. Find the base torque value by selecting the required valve size from the left hand column and read across to the intended line pressure column. Note the torque value. You can interpolate between line pressure values.
2. Fine the zero pressure torque for the same valve on the same row and subtract this zero pressure torque from the value in step 1.
3. Multiply the zero pressure torque value by the expected Application Factors.
4. Add the difference between the zero pressure torque and the line pressure torque (value of step 2 plus value of step 3) to give the new torque value specific to the actual service conditions.

Example:

A 150mm valve is to be used in a clean water application. The line pressure is 10kg/cm²(150 PSI)@100°C
The valve may only twice cycle per month.

1. Using the Normal Service Torque Values table
Base Torque value for 150mm@10kg/cm²(150 PSI) = 119 Nm
2. Find torque value at zero kg/cm² = 102 Nm
Subtract 119 - 102 = 17 Nm
3. Multiply zero pressure torque value by Application Factors
Application Factors
Operated less than once per day = X 1.2
Temperature higher than 93 C = X 1.2
$$\frac{1.2 \times 1.2}{1.4}$$

102 X 1.4 = 143 Nm
4. Add the difference between zero pressure and line pressure, as pre step 2 to the value determined in step 3.
28 + 143 = 171 Nm
The new torque value for this valve, specific to the actual service conditions is 171 Nm.



SELECTION OF BUTTERFLY VALVES (Flow Coefficient Cv)

Cv (pure number) is, in American units, the water flow rate in U.S. gallons per minute which passes through the valve giving a pressure drop of 1 psi at a temperature of 68°F

In metric units the same coefficient is called Kv and correspond to the flow rate in m³/h passing through the valve The approximate corresponding formulas are :

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

Where :

Q = valve flow rate in gpm (U.S.GPM)

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

γ = specific gravity (for water at 68°F = 1)

$$Q = K_J \cdot \sqrt{\frac{\Delta P}{\gamma}}$$

Where :

Q = valve flow rate in m³/h

ΔP = Pressure drop through the valve in bar

γ = specific gravity (for water at 20°C = 1)

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

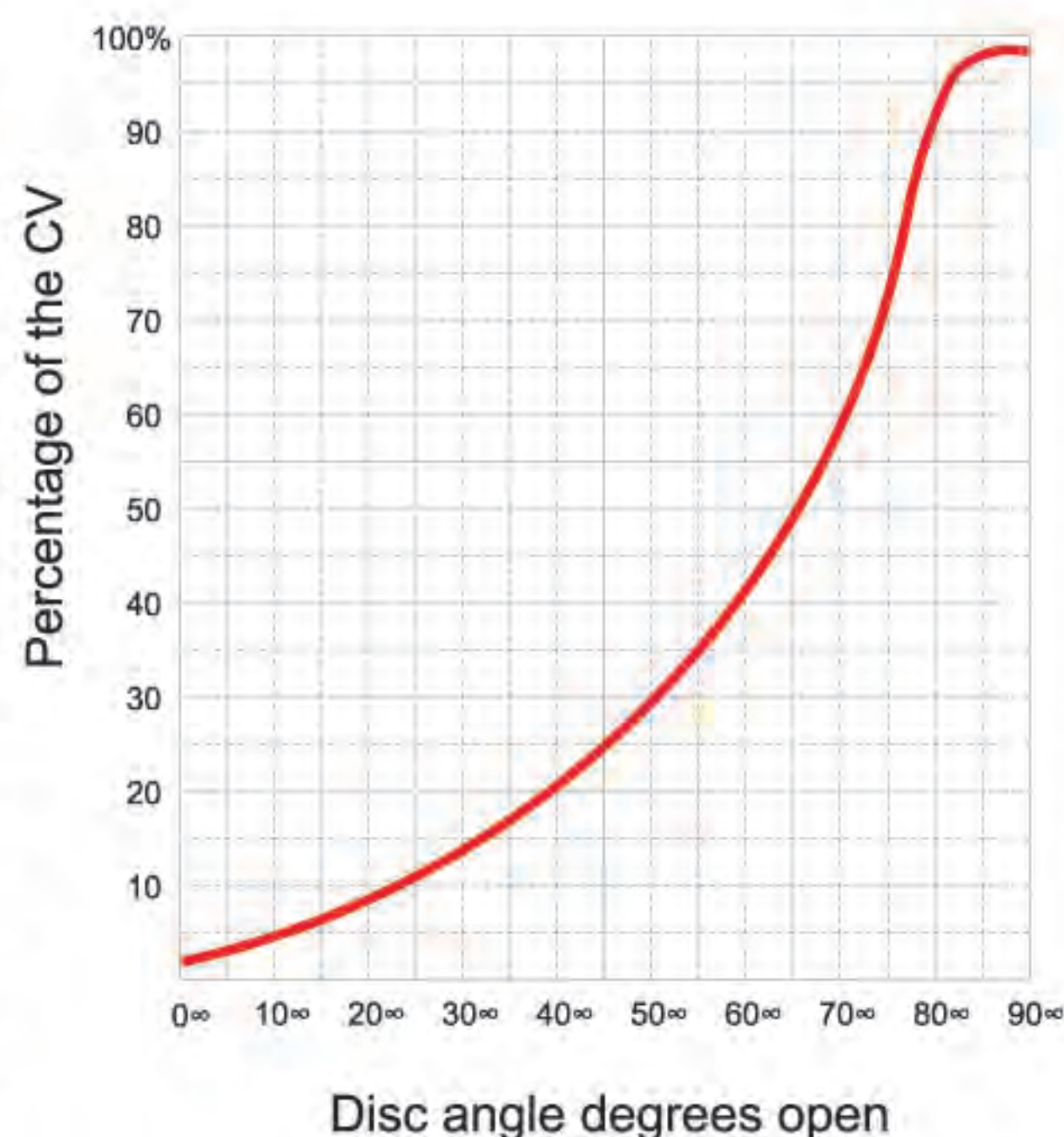
$$C_v = 1,16 K_v$$

Flow rate Coefficients Cv for Series CRB resilient seated butterfly valves.

Flow rate Coefficients - Cv Values

Valve (inch)	Disc Opening (Degrees)								
	-10°	20°	30°	40°	50°	60°	70°	80°	90°
2	0.0	1.3	5	14	26	40	52	59	60
2 ½	0.0	1.4	6	21	44	74	107	138	151
3	0.7	1.5	8	29	67	115	175	234	262
4	1.7	15	48	107	196	318	463	589	647
5	3	32	99	206	362	579	832	1045	1141
6	4	47	145	295	510	810	1160	1450	1580
8	6	84	2539	450	751	1190	1754	2385	2892
10	9	133	360	652	1064	1683	2524	3596	4593
12	12	192	509	899	1449	2283	3470	5085	6682
14	75	340	770	1400	2200	3400	5600	7900	10000
16	100	440	1000	1800	2800	4500	7400	10800	13000
18	130	570	1300	2300	3600	5800	9600	15000	18000
20	150	710	1600	2900	4600	7200	12000	18400	22000
24	220	1000	2300	4000	6400	10000	16500	25900	30000
30	340	1500	3600	6200	9900	16000	26000	42500	47000
36	500	2600	5200	9100	15000	23000	38000	65000	70000
40	870	2905	6270	11400	20148	30590	46310	59460	81580
42	950	3880	6720	12500	21800	31600	47530	63500	97300
44	1080	4750	8530	13800	22700	34500	49500	74300	105000
48	1230	5770	9030	14300	23500	37500	56300	89500	117000

VALVE CHARACTERISTICS



The graph at side gives the percentage of the Cv valve at any intermediate angle between 0°C and 90°C

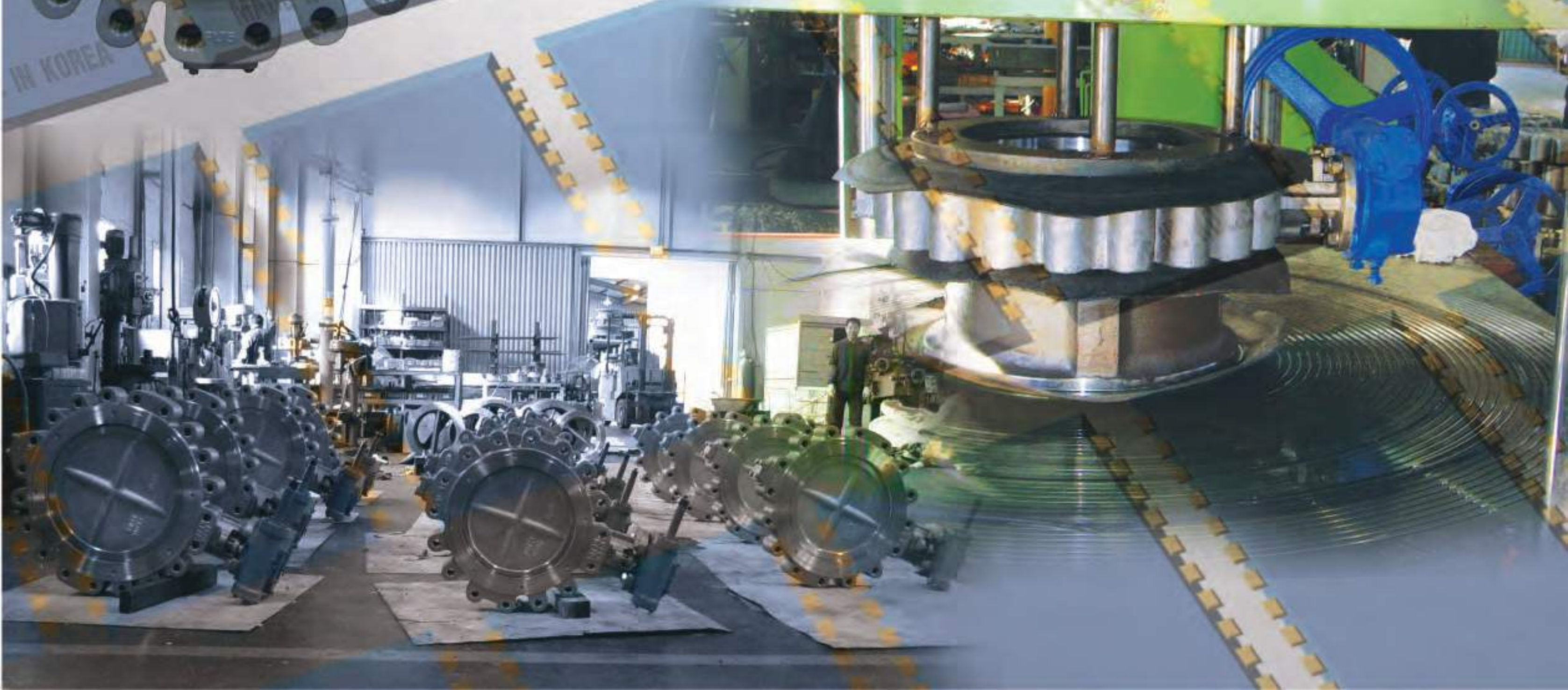
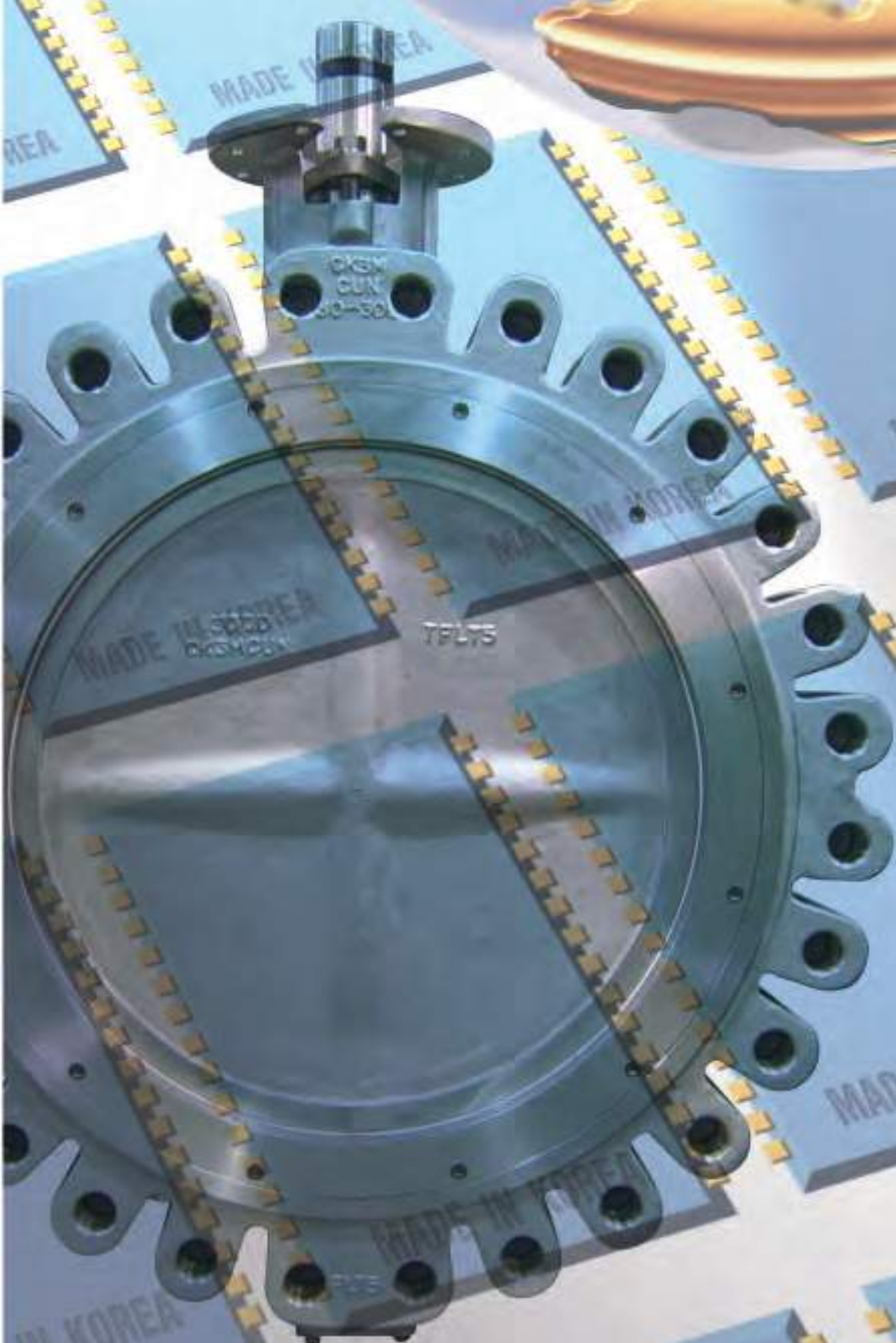
Note :

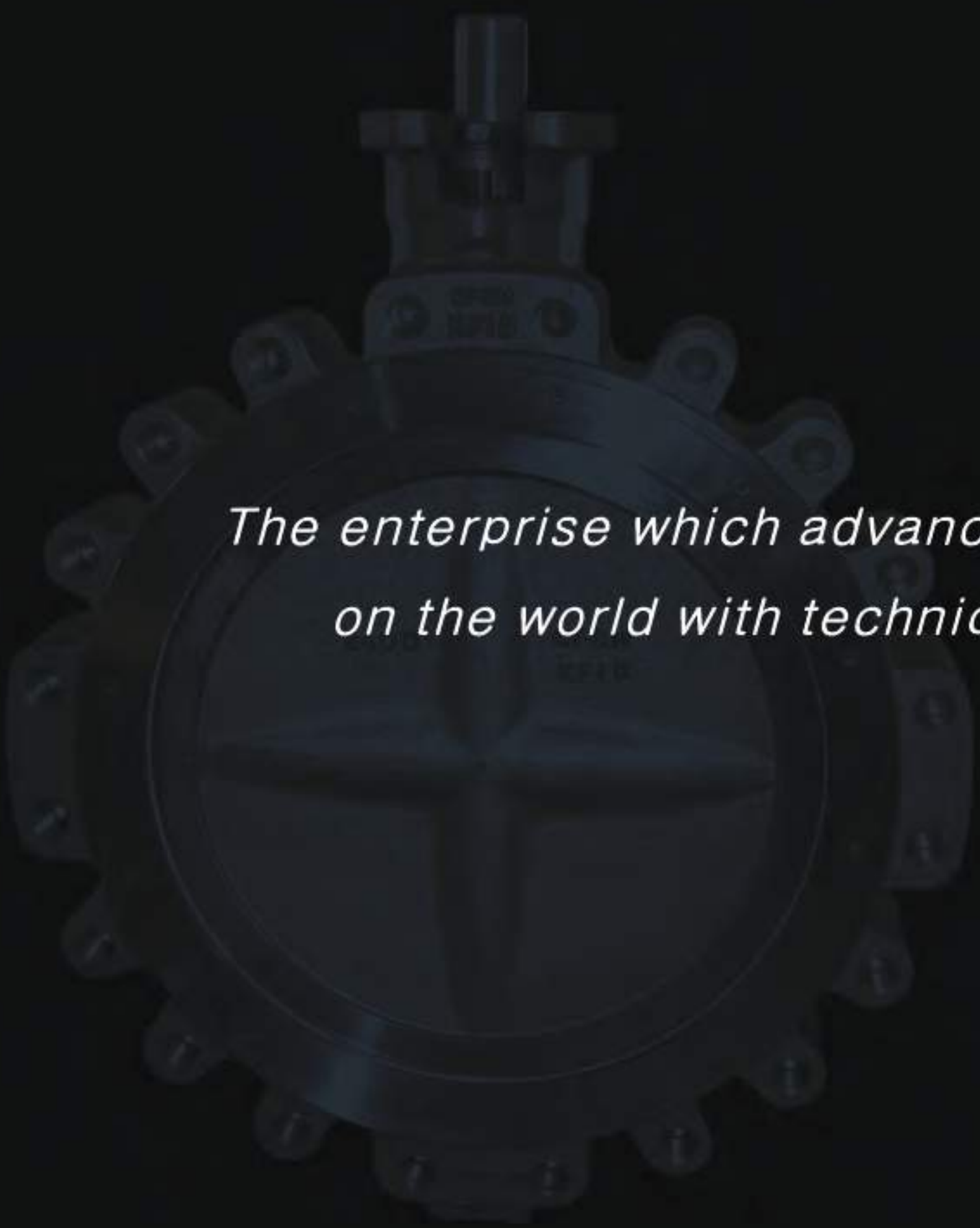
Cv = The flow rate of water in U.S.gpm that will pass through a valve with a pressure drop of 1 psi @ 60°F



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which advance
on the world with
technique of best*





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S&W IND. Co.,Ltd.

1146-34, Moa Ri, Chunbuk-Myeun, Gyeongju-Si, Gyeongsangbuk-Do, Korea

Tel. +82-54-772-6341 Fax. +82-54-772-1441 E-mail : snwind12@kornet.net