Figure HP
BUTTERFLY VALVES

FNW™

HIGH PERFORMANCE BUTTERFLY VALVE

Features:

- Bi-directional Bubble-tight Shutoff
- Suitable for Saturated Steam Service to 150 PSI
- Double Off-Set Configuration with Conical Angled Disc
- Available in Wafer (3" to 12") or Lug (3" to 24")
- Stocked in Carbon by Stainless and All Stainless Steel Configurations
- Dead-end Service Rated to Full 285 PSI Pressure Differential in the Preferred Flow Direction *
- Vacuum rated to 29.91"Hg (0.3750 Torr) +
- Easy access reverse packing gland (up to 12")
- ISO Top-works for Manual or Direct Mount Actuation (up to 12")
- Low Maintenance
- Manufactured in ISO 9001 Facility

Standards:

- Design: API 609
- Mounting Pad: ISO 5211
- End Flange: ASME B16.5
- Wall Thickness: ASME B16.34
- Face to Face: API 609
- Pressure/Temp Rating: ANSI B16.34
- Material Rating: ANSI B16.34
- Shell/Seat Test: API 598
  - Body: CS - 3.2 MPa (464 PSI)
    SS - 3.0 MPa (435 PSI)
  - Seat Hydro: 2.3 MPa (333 PSI)
  - Seat Air: 0.6 MPa (87 PSI)

Options

FNW offers many options and modifications for valves. These include, but are not limited to: Actuation including chain wheels, square drive nuts, worm-gear operators, and pneumatic and electric operators. Also available are various control accessories, stem extensions, and custom mounting hardware. Contact FNW with your specific application needs.

* Preferred Flow Direction is defined as having the seat retainer ring facing upstream. For non-preferred flow direction (seat retainer ring facing downstream), a downstream flange is required on 10 inch and larger valves for full 285 PSI differential. Without a downstream flange, dead-end service in the non-preferred flow direction is limited to 230 PSI for 10 and 12 inch valves, 150 PSI for 14 inch and larger valves. Pressures listed are for non-shock ambient temperatures.

\+ Vacuum measurements are often made in inches of mercury below atmospheric pressure. The values calculated here assume standard atmospheric pressure of 29.92 inches of mercury.

Standard Materials

Ref. No.	Description	Material		Qty	Remarks
		CS Body	SS Body		
1	Body	A216 WCB	A351 CF8M	1	
2	Retainer Ring	A105	A351 CF8M	1	
3	Seat	RTFE (25%GF)		1	
4	Disc	A351 CF8M		1	
5	Stem	A 564 630 (UNS S17400)		1	17-4PH
6	Stem Pin	A 564 630 (UNS S17400)		1 Set	17-4PH
7	Retaining Ring Washer	AISI 1066	A276 321	1 Set	
8	Retaining Ring Bolt	A193 B8		1 Set	
9	Spacer	A182 316		1	
10	Packing Gland Stud	A193 B7	A193 B8	2	
11	Packing Gland Nut	A194 2H	A194 8	2	
12	Packing Gland Washer	AISI 1066	A276 321	2	
13	Packing	PTFE		1	
14	Packing Gland Ring	A182 316		1	
15	Packing Gland Flange	A105	A182 F316	1	
16	Lever Plate Bolt	A193 B7	A193 B8	2	
17	Lever Plate Nut	A194 2H	A194 8	2	
18	Lever Plate Washer	AISI 1066	A276 321	2	
19	Lever	A536, GR. 65-45-12		1	
20	Rivet	A182 304		2	
21	Nameplate	A182 304		1	

Ref. No.	Description	Material		Qty	Remarks
		CS Body	SS Body		
22	Upper Stem Bearing	316+PTFE		1	
23	Lower Stem Bearing	316+PTFE		1	
24	Disc Washer	A182 316		2	
25	Disc Spring	A182 316		1	
26	Gasket	PTFE		1	8-24 Inch
27	Lower Gland Flange	A105	A182 F316	1	8-24 Inch
28	Lower Gland Bolt	A193 B7	A193 B8	4	8-24 Inch
29	Lower Gland Washer	AISI 1066	A276 321	4	8-24 Inch
30	Lower Bracket Nut	A194 2H	A194 8	8	14-24 Inch
31	Lower Bracket Washer	AISI 1066	A276 321	8	14-24 Inch
32	Lower Bracket Bolt	A193 B7	A193 B8	8	14-24 Inch
33	Bracket	AISI 1020		1	14-24 Inch
34	Upper Bracket Bolt	A193 B7	A193 B8	4	14-24 Inch
35	Upper Bracket Washer	AISI 1066	A276 321	4	14-24 Inch
36	Key	AISI 1045	A182 F321	2	14-24 Inch
37	Pin	A276 321		2	14-24 Inch
38	Gear Operator	WCB		1	6-24 Inch
39	Lever Reating Washer	AISI 1066		1	
40	Lever Retaining Bolt	A193 B7		1	
41	Notched Lever Plate	Steel (Cr Plated)		1	3-4 Inch

Dimensions (inches)

Size[1]	Ød	ØG	ØC	Lug		Wafer		L	A	B	L1	L2	L3	W	ØP mm (ISO)	M-Øn mm	H	ØX	K	K1
				N[2]	E[3]	N[2]	E													
3	3.39	5.00	6.00	4	5/8"-11UNC	2	0.75	1.89	7.09	3.15	10.51				Ø102 (F10)	4-Ø11	0.51	0.63	0.55	
4	4.33	6.18	7.50	8	5/8"-11UNC	2	0.75	2.13	7.87	4.09	10.51				Ø102 (F10)	4-Ø11	0.63	0.79	0.67	
5	5.16	7.32	8.50	8	3/4"-10UNC	2	0.87	2.24	9.25	4.68	12.21				Ø102 (F10)	4-Ø11	0.71	0.94	0.75	
6	6.14	8.35	9.50	8	3/4"-10UNC	2	0.87	2.24	9.92	5.31		2.44	7.87	9.84	Ø102 (F10)	4-Ø11	0.71	0.98	0.75	
8	7.99	10.63	11.75	8	3/4"-10UNC	2	0.87	2.52	12.21	7.48		2.48	9.05	11.81	Ø125 (F12)	4-Ø14	0.91	1.10	0.87	
10	10.00	12.76	14.25	12	7/8"-9UNC	2	0.95	2.80	13.94	9.84		2.48	9.05	11.81	Ø125 (F12)	4-Ø14	1.10	1.26	1.06	
12	12.01	15.00	17.00	12	7/8"-9UNC	2	0.95	3.19	17.72	11.42		3.15	10.63	15.75	Ø140 (F14)	4-Ø18	1.10	1.38	1.06	
14	13.27	16.26	18.75	12	1"-8UNC			3.62	18.90	11.81		4.72	16.54	19.69	Ø165 (F16)	4-Ø22	3.46	1.38	1.50	0.39
16	15.24	18.5	21.25	16	1"-8UNC			4.02	19.88	13.39		4.72	16.54	19.69	Ø165 (F16)	4-Ø22	3.46	1.57	1.69	0.47
18	17.24	20.98	22.76	16	1-1/8"-8UN			4.49	23.62	14.96		4.96	18.11	23.62	Ø254 (F25)	8-Ø18	3.86	1.81	1.95	0.55
20	19.25	22.99	25.00	20	1-1/8"-8UN			5.00	29.13	15.35		5.43	20.08	23.62	Ø254 (F25)	8-Ø18	3.86	1.97	2.11	0.55
24	23.27	27.24	29.50	20	1-1/4"-8UN			6.06	33.86	18.50		5.43	20.47	29.92	Ø254 (F25)	8-Ø18	3.86	2.36	2.52	0.71

1. 6" and larger valves are standard with gear operator. Gear operators for 4" and smaller valves are available upon request.
2. The N value for lug valves is tapped holes per side. For wafer valves, the number represents through holes.
3. Large body valves have blind tapped holes at the top and bottom of the valve, near the stem. For high performance butterfly valves, ANSI B16.5 requires all bolts, 1-1/8" and larger, have an 8-UN thread series.

Cv (Flow Coefficients)

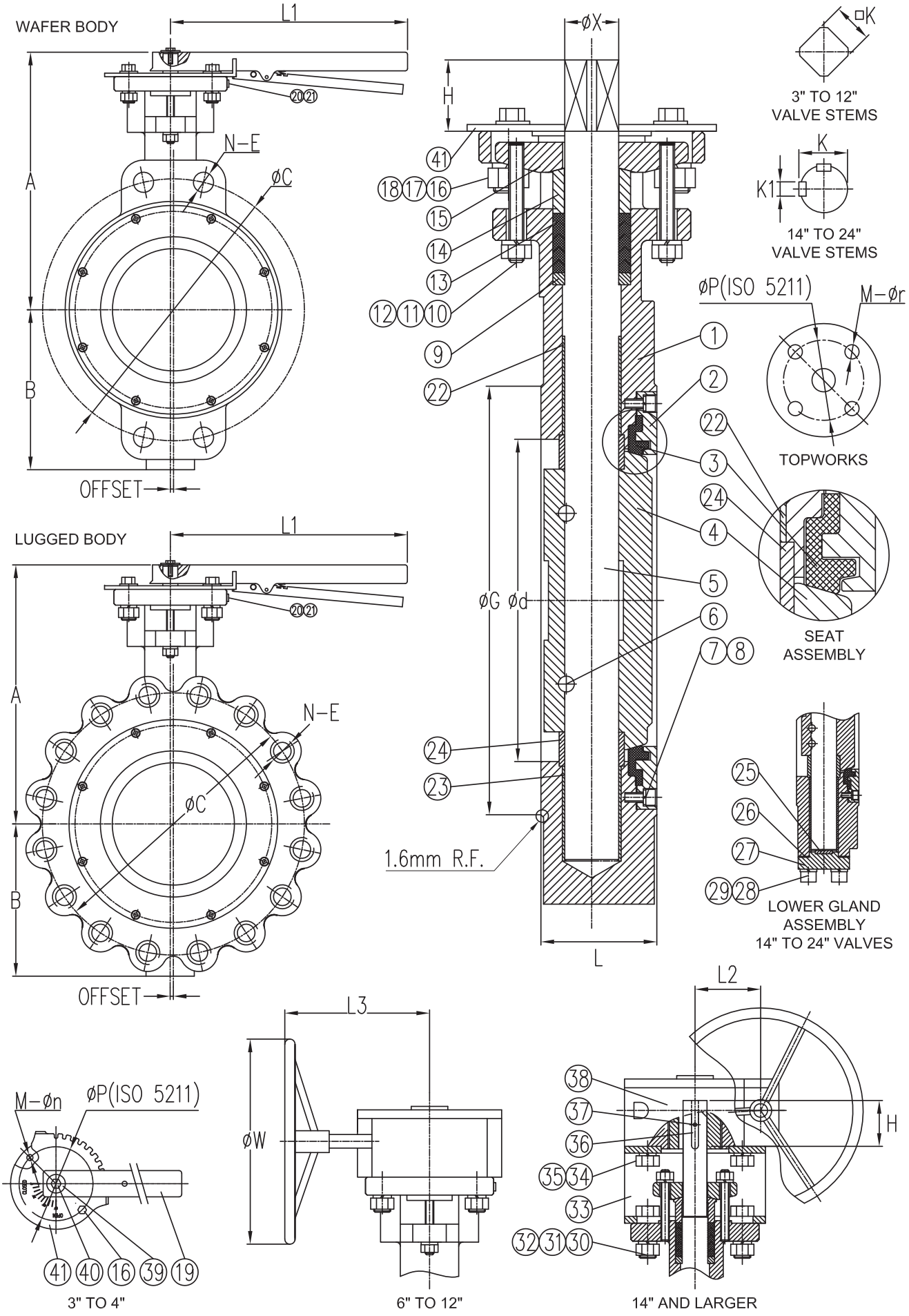
Size	Disc Opening								
	10°	20°	30°	40°	50°	60°	70°	80°	90°
3	6	16	24	36	52	76	113	146	162
4	15	37	55	80	117	172	256	329	365
6	39	98	147	215	313	460	685	880	978
8	70	176	264	387	563	827	1,232	1,584	1,760
10	131	328	492	722	1,050	1,542	2,296	2,952	3,280
12	196	490	735	1,078	1,568	2,303	3,430	4,410	4,900
14	214	536	804	1,179	1,715	2,519	3,752	4,824	5,360
16	307	768	1,152	1,690	2,458	3,610	5,376	6,912	7,680
18	380	950	1,425	2,090	3,040	4,465	6,650	8,550	9,500
20	537	1,342	2,013	2,952	4,294	6,307	9,394	12,078	13,420
24	752	1,880	2,820	4,136	6,016	8,836	13,160	16,920	18,800

The size of butterfly valve used for control purposes should be calculated on the basis of the operating characteristics. In order to achieve optimum control, the flow coefficient (Cv) of a valve needs to be considered. Cv is the volume of water in U.S. gallons per minute that passes through the valve at a pressure drop of 1 PSI at 68°F. Flow for a given Cv is typically calculated from the following formula.

$$Q = Cv \times \sqrt{\frac{\Delta P \times 62.4}{D}}$$

Where:

Q = Valve flow rate in gallons per minute (US GPM)
ΔP = Pounds per square inch (PSI) pressure drop across valve
62.4 = Conversion factor for fluids computed in relation to water
D = Density of fluids in pounds per cubic foot


WAFER BODY
L1
N-E
øC
A
B
OFFSET
LUGGED BODY
øX
H
øK
3" TO 12"
VALVE STEMS
K
K1
14" TO 24"
VALVE STEMS
øP(ISO 5211)
M-ør
TOPWORKS
SEAT
ASSEMBLY
øG ød
1.6mm R.F.
L
LOWER GLAND
ASSEMBLY
14" TO 24" VALVES
M-øn
3" TO 4"
L3
øW
6" TO 12"
L2
14" AND LARGER

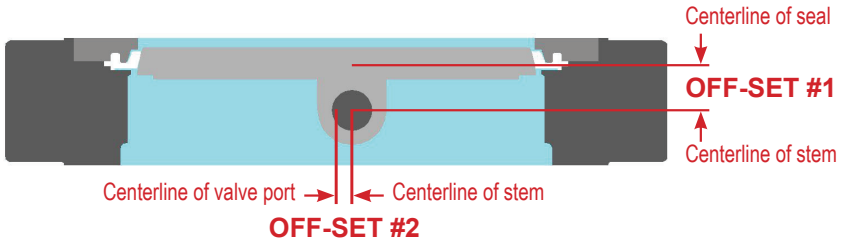
FNW™

Figure HP
BUTTERFLY VALVES

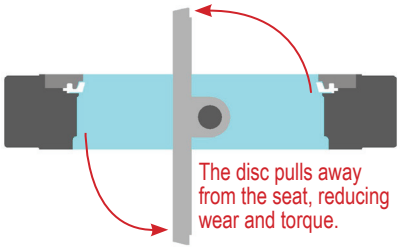
Double Off-Set Design

The valve is designed with two offsets. The first offset is between the seat sealing surface and the centerline of the valve stem, putting the stem behind the sealing surface. Since the stem does not penetrate the sealing surface, there is a complete, uninterrupted, 360° seat seal. The second offset is between the centerline of the valve stem and the centerline of the valve port. This double-offset creates an eccentric seating action that reduces seat wear and torque. The disc cams into the seat for a bubble tight shut-off. The cam action is improved by the conical angle of the valve disc.

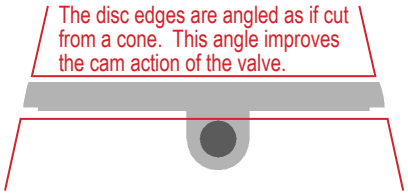
DOUBLE OFF-SET



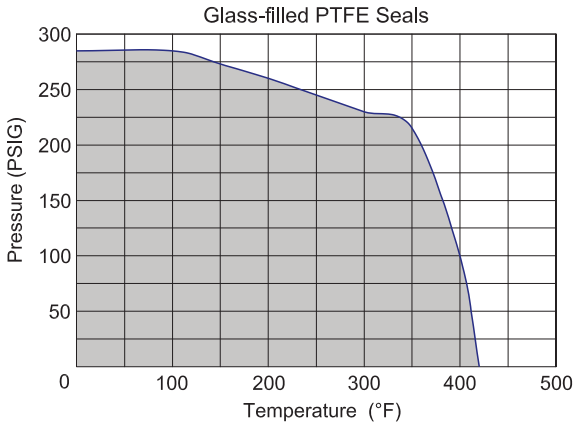
CAM ACTION



CONICAL ANGLED DISC



Pressure/Temperature



Weight (Lbs)

Size	Wafer	Lug
3	18	22
4	24	29
5	35	40
6	59	70
8	79	95
10	110	130
12	148	189
14		291
16		383
18		498
20		661
24		991

Torque (in-lbs)

Size	Differential Pressure*	
	150 PSI	285 PSI
3	270	338
4	436	578
5	657	858
6	962	1,292
8	1,726	2,359
10	2,616	3,683
12	3,878	5,567
14	5,555	7,942
16	7,415	10,708
18	9,494	13,965
20	13,868	20,108
24	21,522	31,919

* Torques shown are for the preferred flow direction (valve retaining ring facing upstream pressure).

Figure Number Matrix

F N W HP 1 L S T G X

CLASS	CONNECTION	BODY MATERIAL	SEAT	OPERATOR	SIZE CODES
1 = 150#	W = WAFER L = LUG	C = WCB - CARBON STEEL S = CF8M - STAINLESS STEEL	T = RTFE	L = LEVER (STANDARD TO 4") G = GEAR (STANDARD ON 6" TO 24")	3 = M, 4 = P, 5 = S, 6 = U, 8 = X, 10 = 10, 12 = 12, 14 = 14, 16 = 16, 18 = 18, 20 = 20, 24 = 24

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