

SECTION S

DOUBLE OFFSET HIGH PERFORMANCE BUTTERFLY VALVES

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STANDARD COMPLIANCE

- ASME B16.10 "Face to Face and End to End Dimensions of Valves"
- ASME B16.34 "Valves - Flanged, Threaded, and Welding End"
- ASME B16.5 "Pipe Flanges and Flanged Fittings"
- ANSI/FCI 70-2 "For Control Valve Seat Leakage"
- MSS SP-25 "Standard Marking System for Valves"
- MSS SP-44 "Steel Pipe Line Flanges"
- MSS SP-55 "Quality Standards for Steel Castings"
- MSS SP-61 "Pressure Testing of Steel Valves"
- MSS SP-68 "High Pressure Butterfly Valves with Offset Design"
- API 598 American Petroleum Institute - "Valve Inspection and Testing"
- API 607 - 6th edition American Petroleum Institute - "Fire Test for Soft Seated Valves"
- API 609 American Petroleum Institute - "Butterfly Valves: Double Flanged, Lug and Wafer Type"
- NSF/ANSI 61 "Drinking Water System Components - Health Effects" (2" - 24", Stainless 215 & 230)
- NSF/ANSI 372 "Drinking Water System Components - Lead Content" (2" - 24", Stainless 215 & 230)

CERTIFICATIONS

- CE Marking and documented valves that conform to the European Pressure Equipment Directive (PED) 97/23/EC are available in ANSI Class 150/300/600 including soft, fire safe and metal seat configurations (sizes 2"-24" only).
- CRN No. OC17459.5CL

SERVICES

VACUUM SERVICE

- Standard Apollo high performance butterfly valves are rated for 29" Hg vacuum.

STEAM SERVICE

- The Apollo® high performance butterfly valve is well-suited for a wide range of steam applications. The application range is defined in the high performance butterfly valve pressure-temperature charts.

ADVANTAGES

DOUBLE OFFSET HIGH PERFORMANCE BUTTERFLY VALVES

ISO 5211 MOUNTING FLANGE

Universal mounting dimensions simplify valve actuation. Allows for direct mounting of several actuators.

ROCKER PACKING GLAND

Shaped packing gland compensates for uneven adjustment of gland nuts.

STEM PACKING

V-ring PTFE, UHMWPE or flat graphite provides positive sealing.

EXTENDED NECK

Allows for 2" of pipe insulation.

BODY

Robust one-piece casting in WCB carbon steel or CF8M stainless steel. Available in wafer & lug style.

POSITIVE CAST DISC STOP

Prevents seat damage from over-travel of the disc beyond the closed position. (not visible)

JACKING TAPS

Allows the use of seat retainer bolts to aid in retainer removal.

SEAT RETAINER

Reliable multi-bolt retainer holds and supports the seat. Standard valves are suitable for bi-directional dead-end service at the full pressure-temperature rating of the valve. Same material as body material.

CORROSION PROTECTION

Polyamide epoxy primer with high performance polyurethane topcoat is the standard finish for carbon steel valve bodies.

STEM

(BLOWOUT PROOF)

17-4 PH stainless steel stem with high strength, and good corrosion resistance. Designed per API 609 standard.

ANTI-EXTRUSION RING

(UNDER STEM SEALS)

Prevents the extrusion of stem seals, maintaining optimum seal.

BEARING

(UPPER)

Full length provides maximum stem support. Made of 316 SS/PTFE

SEAT

An advanced free floating, pressure assisted, solid seat design provides an interference and pressure assisted seal. This creates a positive seal under both low and high pressure requirements. The seat does not rely on any secondary components to hold it in place, assuring longer service life with less maintenance.

TANGENTIAL DISC PINS

17-4 PH stainless steel disc pins are tangentially positioned, placing them in compression rather than shear. This robust joint design eliminates potential failure of the disc-stem connection.

DISC

Standard material is 316 stainless steel.

BEARING

(LOWER)

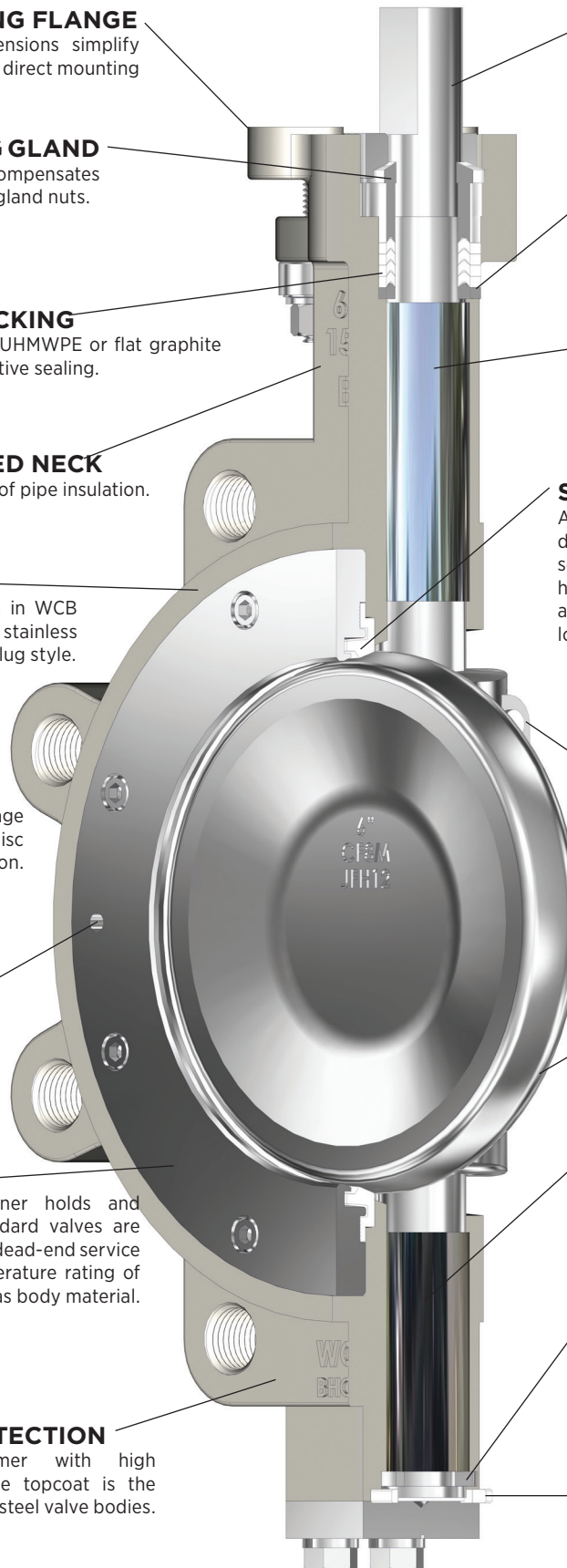
Full length provides maximum stem support. Made of 316 SS/PTFE

THRUST RING

Centers the disc. Ensures tight shutoff and long service life. Made of 316 SS.

END CAP SEAL

Made of PTFE, UHMWPE or graphite.



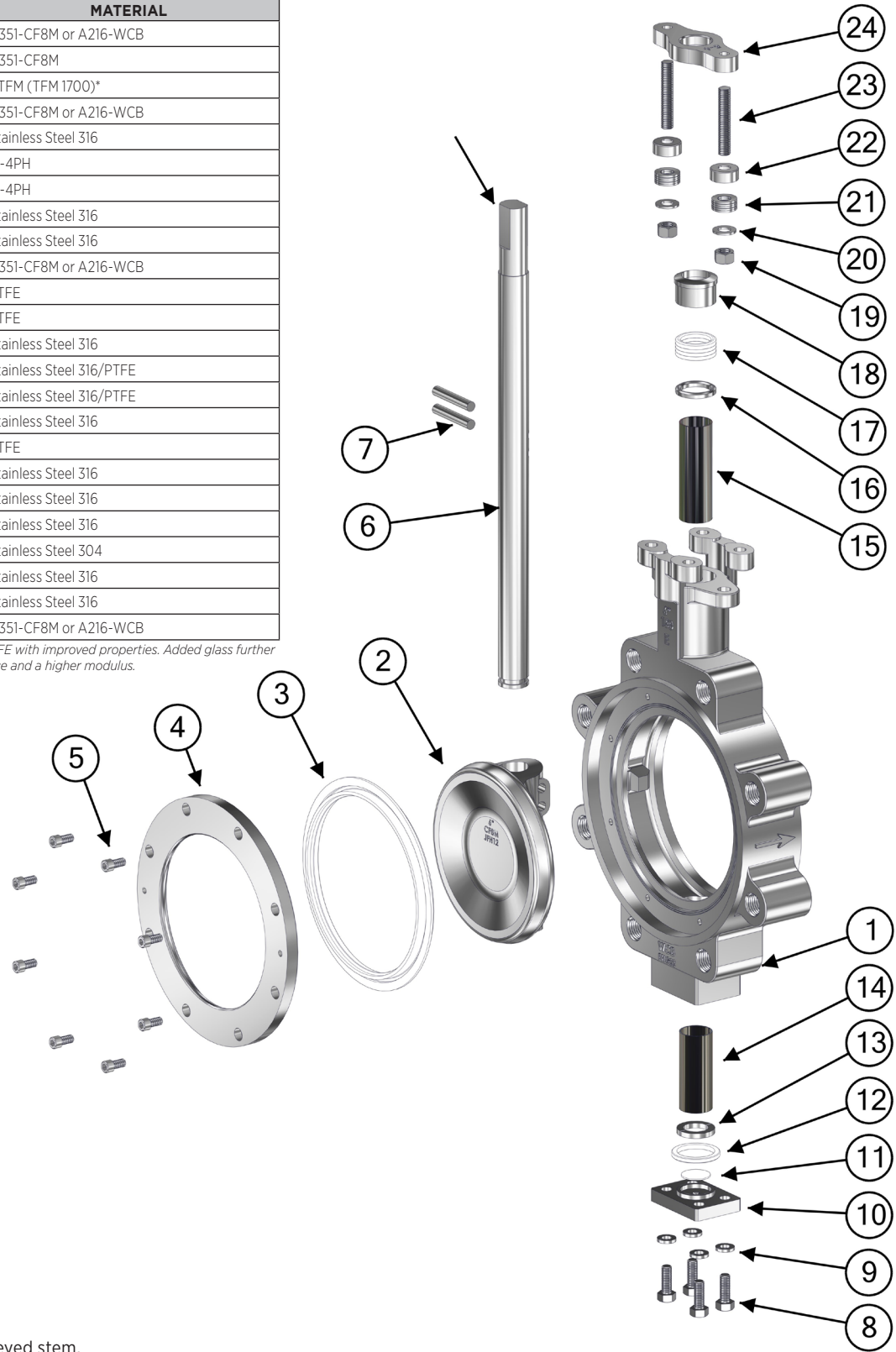
MATERIALS - SOFT SEAT

CLASS 150 - 2" THRU 24", 30", 36" | CLASS 300 - 2" THRU 24" | CLASS 600 - 3" THRU 12"

STANDARD MATERIAL LIST

PART	MATERIAL	
1	Body	A351-CF8M or A216-WCB
2	Disc	A351-CF8M
3	Seat	RTFM (TFM 1700)*
4	Seat Retainer	A351-CF8M or A216-WCB
5	Seat Retainer Bolt	Stainless Steel 316
6	Stem	17-4PH
7	Disc Pin	17-4PH
8	End Cap Bolt	Stainless Steel 316
9	Washer	Stainless Steel 316
10	End Cap	A351-CF8M or A216-WCB
11	Spacer	PTFE
12	End Cap Seal	PTFE
13	Thrust Ring	Stainless Steel 316
14	Lower Bearing	Stainless Steel 316/PTFE
15	Upper Bearing	Stainless Steel 316/PTFE
16	Anti-Extrusion Ring	Stainless Steel 316
17	Stem Packing	PTFE
18	Packing Gland	Stainless Steel 316
19	Gland Nut	Stainless Steel 316
20	Washer	Stainless Steel 316
21	Disc Spring	Stainless Steel 304
22	Disc Spring Retainer	Stainless Steel 316
23	Gland Studs	Stainless Steel 316
24	Gland Plate	A351-CF8M or A216-WCB

* TFM 1700 modified PTFE is a next-generation PTFE with improved properties. Added glass further improves the seat providing greater wear resistance and a higher modulus.



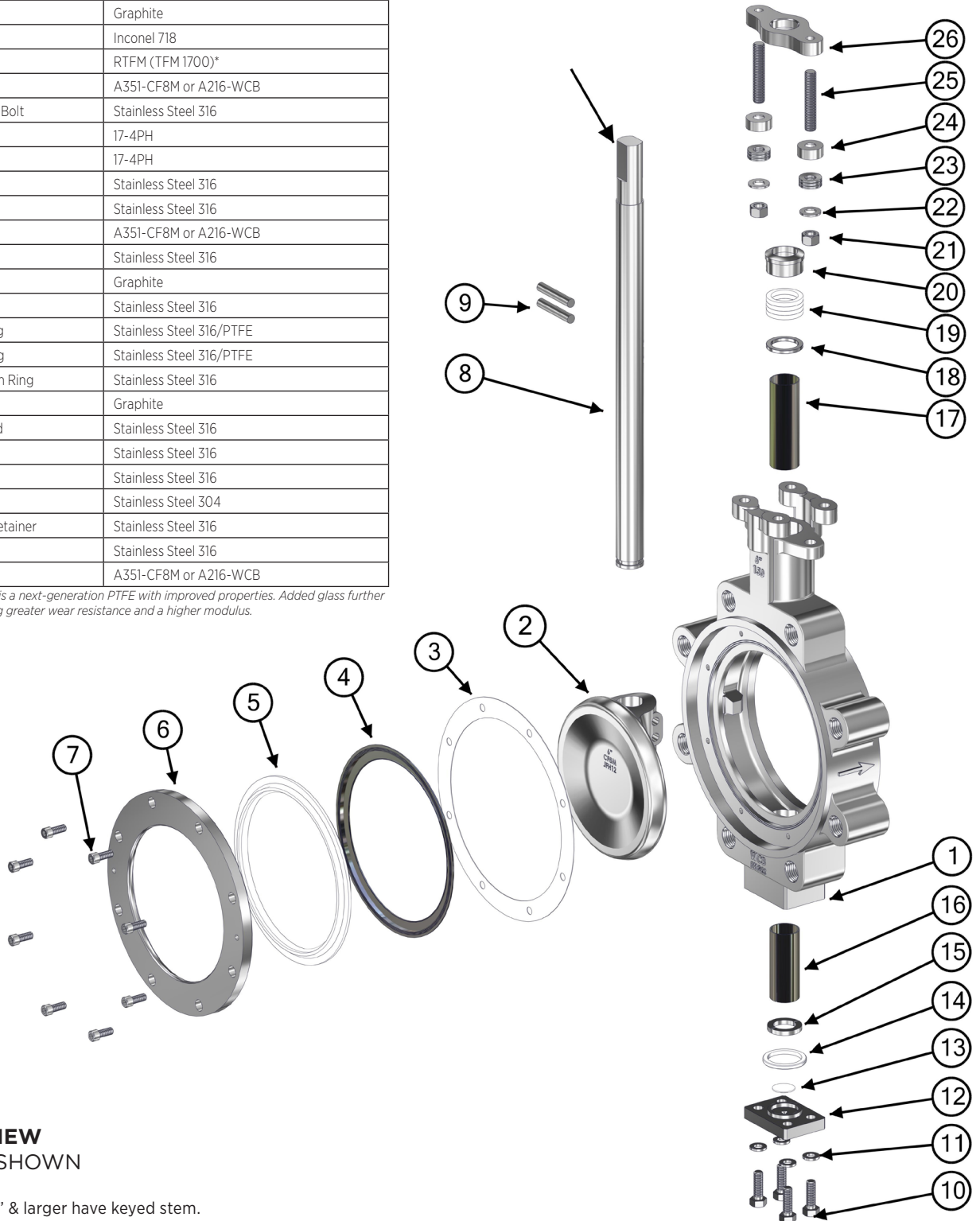
EXPLODED VIEW LUG DESIGN SHOWN NOTE

- Class 150 Size 10" & larger have keyed stem.
- Class 300 Size 8" & larger have keyed stem.
- Class 600 Size 6" & larger have keyed stem.

STANDARD MATERIAL LIST

	PART	MATERIAL
1	Body	A351-CF8M or A216-WCB
2	Disc	A351-CF8M
3	Body Seal	Graphite
4	Metal Seat	Inconel 718
5	Seat	RTFM (TFM 1700)*
6	Seat Retainer	A351-CF8M or A216-WCB
7	Seat Retainer Bolt	Stainless Steel 316
8	Stem	17-4PH
9	Disc Pin	17-4PH
10	End Cap Bolt	Stainless Steel 316
11	Washer	Stainless Steel 316
12	End Cap	A351-CF8M or A216-WCB
13	Spacer	Stainless Steel 316
14	End Cap Seal	Graphite
15	Thrust Ring	Stainless Steel 316
16	Lower Bearing	Stainless Steel 316/PTFE
17	Upper Bearing	Stainless Steel 316/PTFE
18	Anti-Extrusion Ring	Stainless Steel 316
19	Stem Packing	Graphite
20	Packing Gland	Stainless Steel 316
21	Gland Nut	Stainless Steel 316
22	Washer	Stainless Steel 316
23	Disc Spring	Stainless Steel 304
24	Disc Spring Retainer	Stainless Steel 316
25	Gland Studs	Stainless Steel 316
26	Gland Plate	A351-CF8M or A216-WCB

* TFM 1700 modified PTFE is a next-generation PTFE with improved properties. Added glass further improves the seat providing greater wear resistance and a higher modulus.



EXPLODED VIEW LUG DESIGN SHOWN

NOTE

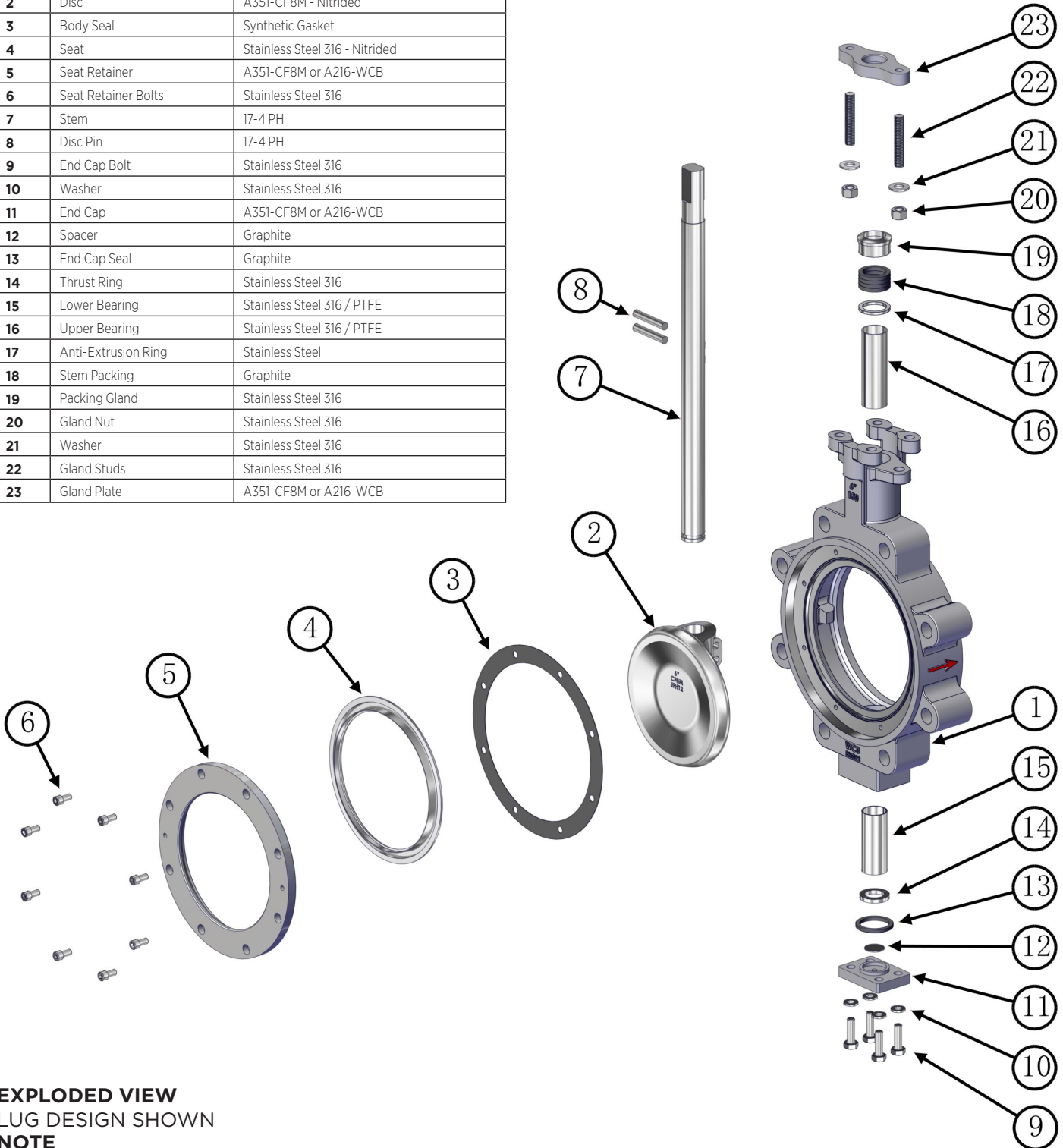
- Class 150 Size 10" & larger have keyed stem.
- Class 300 Size 8" & larger have keyed stem.
- Class 600 Size 6" & larger have keyed stem.

MATERIALS - METAL SEAT

CLASS 150 - 2" THRU 24" | CLASS 300 - 2" THRU 24" | CLASS 600 - 3" THRU 12"

STANDARD MATERIAL LIST

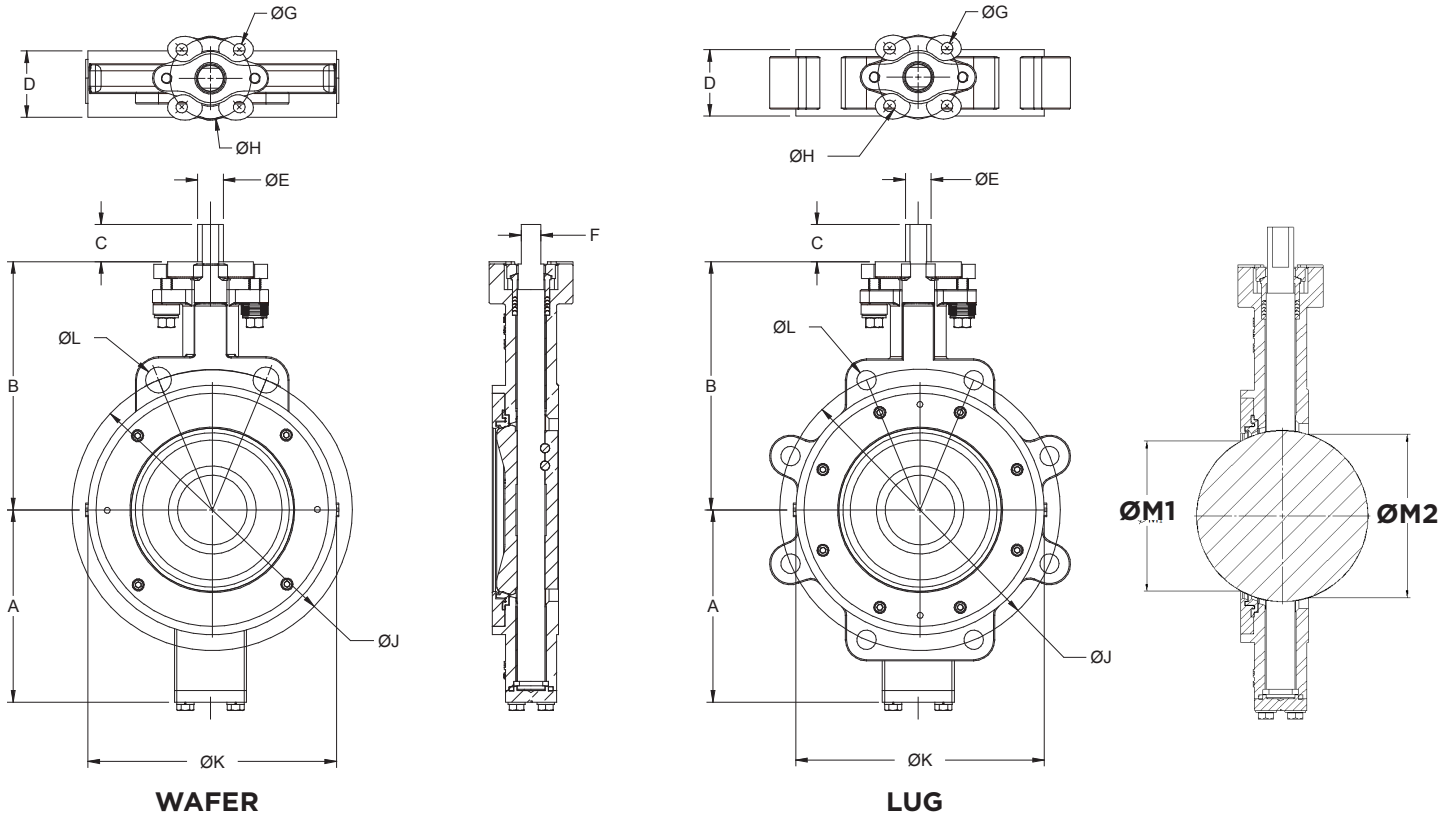
	PART	MATERIAL
1	Body	A351-CF8M or A216-WCB
2	Disc	A351-CF8M - Nitrided
3	Body Seal	Synthetic Gasket
4	Seat	Stainless Steel 316 - Nitrided
5	Seat Retainer	A351-CF8M or A216-WCB
6	Seat Retainer Bolts	Stainless Steel 316
7	Stem	17-4 PH
8	Disc Pin	17-4 PH
9	End Cap Bolt	Stainless Steel 316
10	Washer	Stainless Steel 316
11	End Cap	A351-CF8M or A216-WCB
12	Spacer	Graphite
13	End Cap Seal	Graphite
14	Thrust Ring	Stainless Steel 316
15	Lower Bearing	Stainless Steel 316 / PTFE
16	Upper Bearing	Stainless Steel 316 / PTFE
17	Anti-Extrusion Ring	Stainless Steel
18	Stem Packing	Graphite
19	Packing Gland	Stainless Steel 316
20	Gland Nut	Stainless Steel 316
21	Washer	Stainless Steel 316
22	Gland Studs	Stainless Steel 316
23	Gland Plate	A351-CF8M or A216-WCB



EXPLODED VIEW
LUG DESIGN SHOWN
NOTE

- Class 150 Size 10" & larger have keyed stem.
- Class 300 Size 8" & larger have keyed stem.
- Class 600 Size 6" & larger have keyed stem.

Four hole mounting pattern shown.
See table column "G" for number of mounting holes.

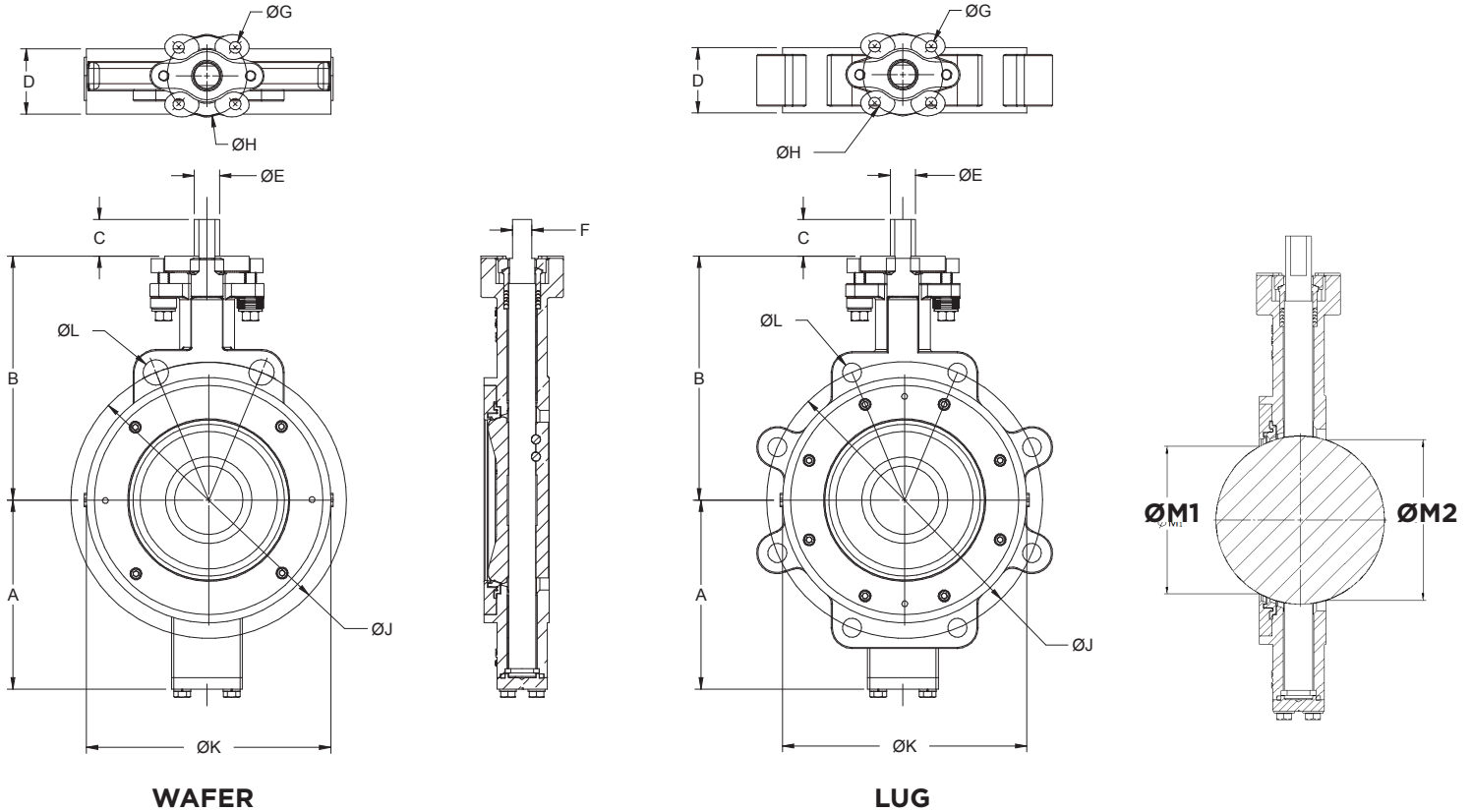


150 CLASS
DOUBLE-D AND KEYED STEM

SIZE (IN.)	SIZE DN	DIMENSIONS (IN.)														
		A	B	C	D	ØE	F	KEY	ØG	ØH**	ØJ	ØK	ØL WAFER	ØL LUG	ØM1	ØM2
2	50	3.622	5.276	1.102	1.693	0.476	0.354	--	4 x 0.394	2.756 (F07)	4.75	4.09	2 x 0.669	4 x 5/8"-11UNC-2B	0.50	1.64
2.5	65	4.016	5.787	1.102	1.850	0.555	0.433	--	4 x 0.394	2.756 (F07)	5.50	4.72	2 x 0.748	4 x 5/8"-11UNC-2B	1.48	2.06
3	80	4.331	6.142	1.102	1.890	0.555	0.433	--	4 x 0.394	2.756 (F07)	6.00	4.92	2 x 0.748	4 x 5/8"-11UNC-2B	1.67	2.58
4	100	4.764	7.008	1.260	2.126	0.713	0.551	--	4 x 0.394	2.756 (F07)	7.50	6.10	2 x 0.748	8 x 5/8"-11UNC-2B	2.76	3.46
5	125	5.591	7.598	1.260	2.244	0.874	0.669	--	4 x 0.394	2.756 (F07)	8.50	7.24	2 x 0.874	8 x 3/4"-10UNC-2B	3.94	4.49
6	150	6.496	8.386	1.259	2.244	0.874	0.669	--	4 x 0.394	2.756 (F07)	9.50	8.43	2 x 0.874	8 x 3/4"-10UNC-2B	5.02	5.46
8	200	7.165	9.449	1.260	2.520	0.992	0.748	--	4 x 0.551	4.921 (F12)	11.75	10.55	2 x 0.874	8 x 3/4"-10UNC-2B	6.95	7.26
10	250	8.386	10.827	2.165	2.795	1.102	--	0.313	4 x 0.551	4.921 (F12)	14.25	12.68	2 x 0.984	12 x 7/8"-9UNC-2B	8.85	9.15
12	300	10.236	12.283	2.165	3.189	1.417	--	0.375	4 x 0.551	4.921 (F12)	17.00	14.92	2 x 0.984	12 x 7/8"-9UNC-2B	10.37	10.70
14	350	11.811	13.307	2.559	3.622	1.654	--	0.437	4 x 0.709	5.512 (F14)	18.75	16.14	2 x 1.118	12 x 1"-8UNC-2B	11.89	12.25
16	400	13.307	15.354	3.150	4.016	1.969	--	0.500	4 x 0.866	6.496 (F16)	21.25	18.43	2 x 1.118	16 x 1"-8UNC-2B	13.59	13.94
18	450	14.803	16.732	3.149	4.488	1.969	--	0.500	4 x 0.866	6.496 (F16)	22.75	20.94	4 x 1.240	16 x 1-1/8"-8UNC-2B	15.65	15.91
20	500	15.748	17.717	4.331	5.000	2.362	--	0.625	4 x 0.866	6.496 (F16)	25.00	22.99	4 x 1-1/8"-8UNC-2B	20 x 1-1/8"-8UNC-2B	17.50	17.72
24	600	18.622	20.787	4.331	6.063	2.559	--	0.750	8 x 0.748	10.000 (F25)	29.50	27.24	4 x 1-1/4"-8UNC-2B	20 x 1-1/4"-8UNC-2B	20.94	21.01
*30	750	23.228	25.315	4.331	7.480	3.150	--	0.875	8 x 0.748	10.000 (F25)	36.00	36.42	--	28 x 1-1/4"-8UNC-2B	26.22	26.28
*36	850	26.575	28.740	4.331	7.992	3.150	--	0.875	8 x 0.906	11.732 (F30)	42.75	45.28	--	32 x 1-1/2"-8UNC-2B	32.29	32.35

*30" & 36" are Class 150 Lug Style only.
** ISO 5211 mounting/drilling pattern (F size) shown in parentheses.

Four hole mounting pattern shown.
See table column "G" for number of mounting holes.

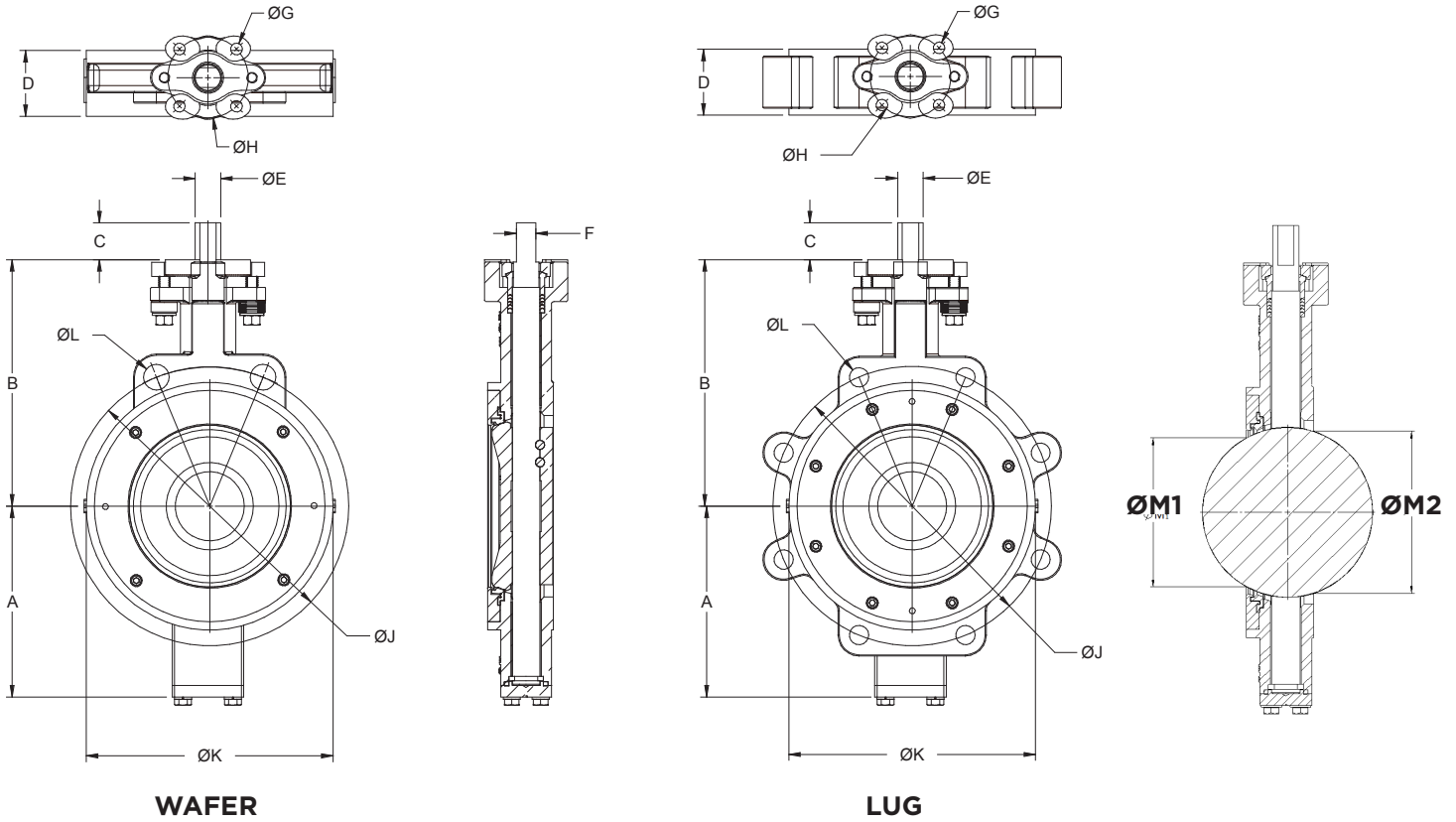


300 CLASS DOUBLE-D AND KEYED STEM

SIZE (IN.)	SIZE DN	DIMENSIONS (IN.)														
		A	B	C	D	ØE	F	KEY	ØG	ØH**	ØJ	ØK	ØL WAFER	ØL LUG	ØM1	ØM2
2	50	3.622	5.276	1.102	1.693	0.476	0.354	--	4 x 0.394	2.756 (F07)	5.00	4.17	2 x 0.709	8 x 5/8"-11 UNC-2B	0.50	1.64
2.5	65	4.016	5.787	1.102	1.850	0.555	0.433	--	4 x 0.394	2.756 (F07)	5.88	4.72	2 x 0.874	8 x 3/4"-10 UNC-2B	1.48	2.06
3	80	4.331	6.142	1.102	1.890	0.555	0.433	--	4 x 0.394	2.756 (F07)	6.62	4.92	2 x 0.874	8 x 3/4"-10 UNC-2B	1.67	2.58
4	100	4.764	7.008	1.260	2.126	0.713	0.551	--	4 x 0.394	2.756 (F07)	7.88	6.10	2 x 0.874	8 x 3/4"-10 UNC-2B	2.76	3.46
5	125	5.591	7.598	1.260	2.244	0.874	0.669	--	4 x 0.472	4.016 (F10)	9.25	7.24	2 x 0.874	8 x 3/4"-10 UNC-2B	3.94	4.49
6	150	6.496	8.386	1.259	2.323	0.874	0.669	--	4 x 0.472	4.016 (F10)	10.62	8.43	2 x 0.874	12 x 3/4"-10 UNC-2B	4.93	5.46
8	200	8.268	10.157	2.165	2.874	1.102	--	0.313	4 x 0.551	4.921 (F12)	13.00	10.55	2 x 0.984	12 x 7/8"-9 UNC-2B	6.73	7.19
10	250	9.449	11.417	2.165	3.268	1.417	--	0.375	4 x 0.551	4.921 (F12)	15.25	12.72	4 x 1"-8UNC-2B	16 x 1"-8 UNC-2B	8.44	8.85
12	300	10.63	12.795	2.559	3.662	1.654	--	0.437	4 x 0.709	5.512 (F14)	17.75	15.04	4 x 1-1/8"-8UN-2B	16 x 1-1/8"-8 UN-2B	10.17	10.62
14	350	12.756	14.764	3.150	4.606	1.969	--	0.500	4 x 0.866	6.496 (F16)	20.25	16.14	4 x 1-1/8"-8UN-2B	20 x 1-1/8"-8 UN-2B	11.55	11.89
16	400	14.37	16.732	3.149	5.236	1.969	--	0.500	4 x 0.866	6.496 (F16)	22.50	18.43	4 x 1-1/4"-8UN-2B	20 x 1-1/4"-8 UN-2B	13.21	13.55
18	450	16.043	18.209	4.331	5.866	2.362	--	0.625	8 x 0.748	10.000 (F25)	24.75	20.94	4 x 1-1/4"-8UN-2B	24 x 1-1/4"-8 UN-2B	15.36	15.54
20	500	17.795	19.882	4.331	6.260	2.835	--	0.750	8 x 0.748	10.000 (F25)	27.00	22.99	4 x 1-1/4"-8UN-2B	24 x 1-1/4"-8 UN-2B	16.93	17.27
24	600	20.315	22.835	4.331	7.126	3.150	--	0.875	8 x 0.748	10.000 (F25)	32.00	27.24	4 x 1-1/2"-8UN-2B	24 x 1-1/2"-8 UN-2B	20.57	20.57

** ISO 5211 mounting/drilling pattern (F size) shown in parentheses.

Four hole mounting pattern shown.
See table column "G" for number of mounting holes.



600 CLASS
DOUBLE-D AND KEYED STEM

SIZE (IN.)	SIZE DN	DIMENSIONS (IN.)														
		A	B	C	D	ØE	F	KEY	ØG	ØH**	ØJ	ØK	ØL WAFER	ØL LUG	ØM1	ØM2
3	80	4.705	6.496	1.260	2.126	0.713	0.551	--	4 x 0.394	2.756 (F07)	6.62	5.71	2 x 0.866	8 x 3/4"-10 UNC-2B	1.87	2.68
4	100	5.748	7.717	1.260	2.520	0.874	0.669	--	4 x 0.551	4.921 (F12)	8.50	6.85	2 x 0.984	8 x 7/8"-9 UNC-2B	2.79	3.37
6	150	7.953	9.724	2.165	3.071	1.417	--	0.375	4 x 0.551	4.921 (F12)	11.50	9.45	4 x 1"-8UNC-2B	12 x 1"-8 UNC-2B	4.52	5.26
8	200	9.528	11.614	3.150	4.016	1.890	--	0.500	4 x 0.906	6.496 (F16)	13.75	11.65	4 x 1-1/8"-8UN-2B	12 x 1-1/8"-8 UN-2B	6.14	6.82
10	250	11.024	13.386	3.150	4.606	1.969	--	0.500	4 x 0.906	6.496 (F16)	17.00	13.86	4 x 1-1/4"-8UN-2B	16 x 1-1/4"-8 UN-2B	7.99	8.61
12	300	12.913	15.354	4.331	5.512	2.362	--	0.625	8 x 0.709	10.000 (F25)	19.25	16.34	4 x 1-1/4"-8UN-2B	20 x 1-1/4"-8 UN-2B	9.56	10.13

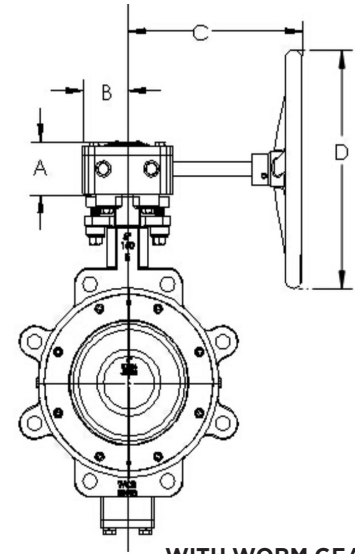
(5" size not available)

** ISO 5211 mounting/drilling pattern (F size) shown in parentheses.

CLASS 150

RTFM & UHMWPE SEAT

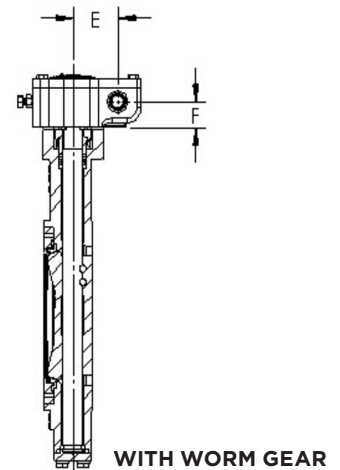
VALVE SIZE		GEAR RATIO	DIMENSIONS IN INCHES						
INCHES	DN		A	B	C	D	E	F	G
2"	50	37:1	2.24	2.11	7.87	11.81	2.09	1.14	8.82
2.5"	65	37:1	2.24	2.11	7.87	11.81	2.09	1.14	8.82
3"	80	37:1	2.24	2.11	7.87	11.81	2.09	1.14	8.82
4"	100	37:1	2.24	2.11	7.87	11.81	2.09	1.14	12.82
5"	125	37:1	2.24	2.11	7.87	11.81	2.09	1.14	12.82
6"	150	37:1	2.24	2.11	7.87	11.81	2.09	1.14	12.82
8"	200	37:1	2.76	2.11	10.94	11.81	2.09	1.50	22.00
10"	250	37:1	2.76	2.11	10.94	11.81	2.09	1.50	22.00
12"	300	34:1	3.43	2.50	12.87	11.81	2.80	1.59	22.00
14"	350	55:1	4.06	4.39	13.07	15.75	4.11	1.93	—
16"	400	55:1	4.06	4.39	13.07	15.75	4.11	1.93	—
18"	450	55:1	4.06	4.39	13.07	15.75	4.11	1.93	—
20"	500	55:1	4.06	4.39	13.07	15.75	4.11	1.93	—
24"	600	52:1	4.96	4.92	13.11	15.75	5.12	2.40	—
30"	750	280:1	6.65	7.48	18.90	24.00	7.00	3.54	—
36"	850	360:1	8.15	9.06	20.90	24.00	8.26	4.29	—



CLASS 300

RTFM & UHMWPE SEAT

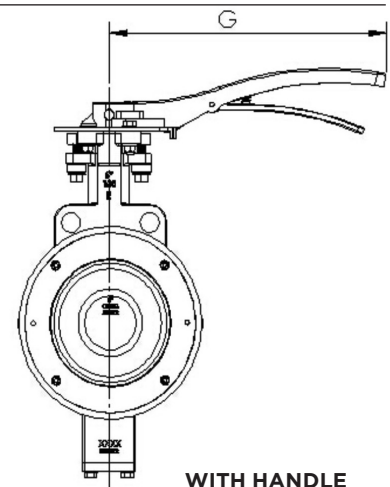
VALVE SIZE		GEAR RATIO	DIMENSIONS (IN.)						
INCHES	DN		A	B	C	D	E	F	G
2"	50	37:1	2.24	2.11	7.87	11.81	2.09	1.14	8.82
2.5"	65	37:1	2.24	2.11	7.87	11.81	2.09	1.14	8.82
3"	80	37:1	2.24	2.11	7.87	11.81	2.09	1.14	8.82
4"	100	37:1	2.24	2.11	7.87	11.81	2.09	1.14	12.82
5"	125	37:1	2.76	2.11	10.94	11.81	2.09	1.50	12.82
6"	150	37:1	2.76	2.11	10.94	11.81	2.09	1.50	12.82
8"	200	34:1	3.43	2.50	12.87	11.81	2.80	1.59	22.00
10"	250	34:1	3.43	2.50	12.87	11.81	2.80	1.59	22.00
12"	300	55:1	4.06	4.39	13.07	15.75	4.11	1.93	—
14"	350	55:1	4.06	4.39	13.07	15.75	4.11	1.93	—
16"	400	55:1	4.06	4.39	13.07	15.75	4.11	1.93	—
18"	450	52:1	4.96	4.92	13.11	15.75	5.12	2.40	—
20"	500	280:1	6.65	7.48	18.90	24.00	7.00	3.54	—
24"	600	280:1	6.65	7.48	18.90	24.00	7.00	3.54	—



CLASS 600

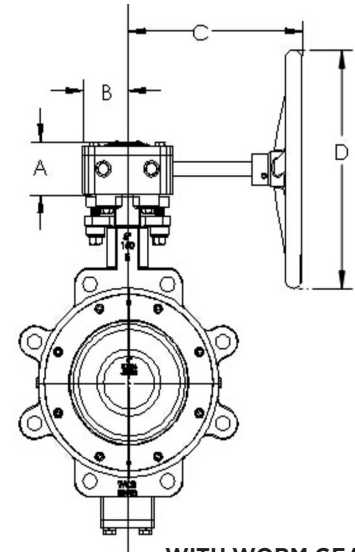
RTFM SEAT

VALVE SIZE		GEAR RATIO	DIMENSIONS (IN.)					
INCHES	DN		A	B	C	D	E	F
3"	80	37:1	2.24	2.11	7.87	11.81	2.09	1.14
4"	100	37:1	2.76	2.11	10.94	11.81	2.09	1.50
6"	150	34:1	2.76	2.11	10.94	11.81	2.09	1.50
8"	200	55:1	4.06	4.39	13.07	15.75	4.11	1.93
10"	250	55:1	4.06	4.39	13.07	15.75	4.11	1.93
12"	300	52:1	4.96	4.92	13.11	15.75	5.12	2.40



CLASS 150
FIRE SAFE & METAL SEAT

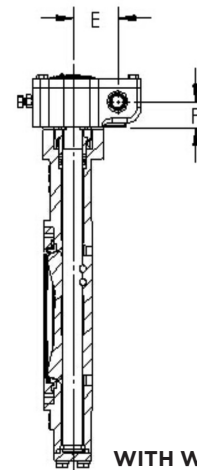
VALVE SIZE		GEAR RATIO	DIMENSIONS (IN.)						
INCHES	DN		A	B	C	D	E	F	G
2"	50	37:1	2.24	2.11	7.87	11.81	2.09	1.14	8.82
2.5"	65	37:1	2.24	2.11	7.87	11.81	2.09	1.14	8.82
3"	80	37:1	2.24	2.11	7.87	11.81	2.09	1.14	8.82
4"	100	37:1	2.24	2.11	7.87	11.81	2.09	1.14	12.82
5"	125	37:1	2.24	2.11	7.87	11.81	2.09	1.14	12.82
6"	150	37:1	2.24	2.11	7.87	11.81	2.09	1.14	12.82
8"	200	37:1	2.76	2.11	10.94	11.81	2.09	1.50	22.00
10"	250	34:1	3.43	2.50	12.87	11.81	2.80	1.59	22.00
12"	300	55:1	4.06	4.39	13.07	15.75	4.11	1.93	22.00
14"	350	55:1	4.06	4.39	13.07	15.75	4.11	1.93	—
16"	400	55:1	4.06	4.39	13.07	15.75	4.11	1.93	—
18"	450	52:1	4.96	4.92	13.11	15.75	5.12	2.40	—
20"	500	52:1	4.96	4.92	13.11	15.75	5.12	2.40	—
24"	600	280:1	6.65	7.48	18.90	24.00	7.00	3.54	—



WITH WORM GEAR

CLASS 300
FIRE SAFE & METAL SEAT

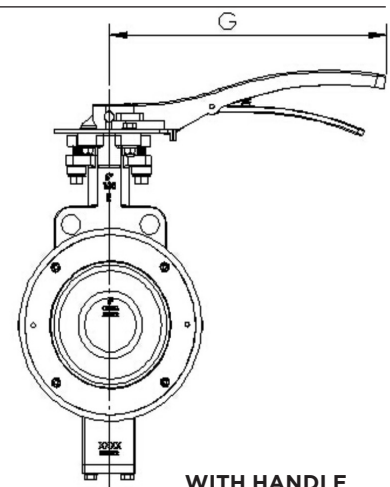
VALVE SIZE		GEAR RATIO	DIMENSIONS (IN.)						
INCHES	DN		A	B	C	D	E	F	G
2"	50	37:1	2.24	2.11	7.87	11.81	2.09	1.14	8.82
2.5"	65	37:1	2.24	2.11	7.87	11.81	2.09	1.14	8.82
3"	80	37:1	2.24	2.11	7.87	11.81	2.09	1.14	8.82
4"	100	37:1	2.24	2.11	7.87	11.81	2.09	1.14	12.82
5"	125	37:1	2.76	2.11	10.94	11.81	2.09	1.50	12.82
6"	150	37:1	2.76	2.11	10.94	11.81	2.09	1.50	12.82
8"	200	34:1	3.43	2.50	12.87	11.81	2.80	1.59	22.00
10"	250	55:1	4.06	4.39	13.07	15.75	4.11	1.93	22.00
12"	300	55:1	4.06	4.39	13.07	15.75	4.11	1.93	—
14"	350	52:1	4.96	4.92	13.11	15.75	5.12	2.40	—
16"	400	52:1	4.96	4.92	13.11	15.75	5.12	2.40	—
18"	450	280:1	6.65	7.48	18.90	24.00	7.00	3.54	—
20"	500	280:1	6.65	7.48	18.90	24.00	7.00	3.54	—
24"	600	360:1	8.15	9.06	20.90	24.00	8.26	4.29	—



WITH WORM GEAR

CLASS 600
FIRE SAFE & METAL SEAT

VALVE SIZE		GEAR RATIO	DIMENSIONS (IN.)					
INCHES	DN		A	B	C	D	E	F
3"	80	37:1	2.24	2.11	7.87	11.81	2.09	1.14
4"	100	34:1	3.43	2.50	12.87	11.81	2.80	1.59
6"	150	55:1	4.06	4.39	13.07	15.75	4.11	1.93
8"	200	55:1	4.06	4.39	13.07	15.75	4.11	1.93
10"	250	52:1	4.96	4.92	13.11	15.75	5.12	2.40
12"	300	280:1	8.86	5.91	15.04	17.72	9.02	3.23



WITH HANDLE

FLOW DATA

DOUBLE OFFSET HIGH PERFORMANCE BUTTERFLY VALVES

Cv values (US gallons per minute) represent the flow of 60°F water through a 100% open valve at a pressure drop of 1 psi.

The metric equivalent, Kv, is the flow of water at 16°C through the valve in cubic meters per hour at a pressure drop of 1 kg/cm2. To convert Cv to Kv, multiply the Cv by 0.8569.

RATED FLOW COEFFICIENT (CV)

215L/215W

SIZE		CLASS	ANGLE OF DISC OPENING (DEGREES)								
INCHES	DN		10°	20°	30°	40°	50°	60°	70°	80°	90°
2"	50	150	2	5	12	18	30	45	62	81	89
2.5"	65	150	2.5	8	20	32	50	74	103	134	145
3"	80	150	4	13	30	46	76	108	156	194	212
4"	100	150	8	23	53	84	136	192	279	347	376
5"	125	150	15	43	102	160	261	371	539	669	728
6"	150	150	26	67	154	242	391	463	808	1004	1091
8"	200	150	53	126	296	466	761	1077	1567	1945	2134
10"	250	150	82	199	461	728	1188	1683	2444	3041	3298
12"	300	150	112	272	636	994	1630	2309	3346	4161	4559
14"	350	150	145	342	800	1258	2063	2921	4237	5268	5687
16"	400	150	195	464	1088	1708	2791	3958	5739	7135	7710
18"	450	150	252	600	1404	2204	3608	5108	7416	9215	9996
20"	500	150	323	778	1813	2848	4662	6606	9585	11914	12931
24"	600	150	472	1232	2878	4519	7393	10475	15199	18900	20551
30"	750	150	490	1550	3800	7650	11000	15850	21850	27450	30900
36"	850	150	520	2050	5200	9980	15000	22100	31950	43800	49650

RATED FLOW COEFFICIENT (CV)

230L/230W

SIZE		CLASS	ANGLE OF DISC OPENING (DEGREES)								
INCHES	DN		10°	20°	30°	40°	50°	60°	70°	80°	90°
2"	50	300	2	5	12	18	30	45	62	81	89
2.5"	65	300	2.5	8	20	32	50	74	103	134	145
3"	80	300	4	13	30	46	76	108	156	194	212
4"	100	300	8	23	53	84	136	192	279	347	376
5"	125	300	15	43	102	160	261	371	539	669	728
6"	150	300	25	62	145	227	371	526	764	950	1034
8"	200	300	44	107	252	398	650	917	1334	1659	1843
10"	250	300	73	170	403	631	1033	1460	2119	2638	2910
12"	300	300	100	238	551	865	1420	2009	2917	3624	3895
14"	350	300	128	309	717	1126	1843	2613	3786	4707	5130
16"	400	300	166	395	922	1446	2368	3352	4869	6053	6562
18"	450	300	233	561	1306	2057	3363	4764	6911	8593	9310
20"	500	300	284	686	1598	2510	4113	5824	8452	10506	11378
24"	600	300	413	1078	2513	3947	6460	9153	13281	16511	17955

RATED FLOW COEFFICIENT (CV)

260L/260W

SIZE		CLASS	ANGLE OF DISC OPENING (DEGREES)								
INCHES	DN		10°	20°	30°	40°	50°	60°	70°	80°	90°
3"	80	600	3	9	21	32	53	75	110	136	148
4"	100	600	5	15	33	52	85	122	176	220	238
6"	150	600	16	40	93	147	242	341	496	616	668
8"	200	600	32	75	171	268	429	621	904	1124	1177
10"	250	600	52	124	294	464	757	1071	1555	1931	2060
12"	300	600	70	165	379	599	978	1387	2011	2500	2695

- This chart should be used as a general guide.
- Cv = the volume of water in U.S. gallons per minute that will pass through a given valve opening with a pressure drop of 1 psig at room temperature.

TORQUE CONSTANTS

DOUBLE OFFSET HIGH PERFORMANCE BUTTERFLY VALVES

RTFM & UHMWPE SEAT TORQUE RATING (IN-LB)

SIZE	PSIG	CLASS 150				CLASS 300					CLASS 600					
		ΔP=100	ΔP=150	ΔP=200	ΔP=285	ΔP=100	ΔP=150	ΔP=200	ΔP=285	ΔP=740	ΔP=150	ΔP=500	ΔP=800	ΔP=1000	ΔP=1200	ΔP=1480
2"	in-lb	204	230	266	332	248	332	381	425	531	-	-	-	-	-	-
2.5"	in-lb	239	283	319	398	301	398	443	478	575	-	-	-	-	-	-
3"	in-lb	257	301	345	434	327	434	487	540	664	407	513	841	974	1,106	1,283
4"	in-lb	398	469	531	664	469	664	761	867	1,106	620	841	1,540	1,823	2,106	2,487
5"	in-lb	558	655	743	929	620	885	1,062	1,239	1,664	-	-	-	-	-	-
6"	in-lb	726	850	974	1,212	858	1,221	1,505	1,779	2,460	974	1,363	2,593	3,089	3,575	4,248
8"	in-lb	1,328	1,549	1,770	2,213	1,646	2,354	2,921	3,487	4,868	1,912	2,673	5,080	6,045	7,009	8,319
10"	in-lb	2,213	2,575	2,947	3,682	2,575	3,682	4,691	5,699	8,142	3,177	4,437	8,434	10,036	11,638	13,806
12"	in-lb	2,867	3,345	3,823	4,779	3,629	5,177	6,522	7,877	11,151	4,788	6,682	12,709	15,116	17,523	20,798
14"	in-lb	4,938	5,761	6,584	8,231	6,053	8,646	11,186	13,735	19,913	-	-	-	-	-	-
16"	in-lb	6,903	8,054	9,204	11,505	8,461	12,080	14,788	17,496	24,072	-	-	-	-	-	-
18"	in-lb	9,717	11,337	12,956	16,196	11,903	17,010	20,461	23,913	32,303	-	-	-	-	-	-
20"	in-lb	12,930	15,089	17,240	21,550	15,842	22,629	26,816	30,993	41,153	-	-	-	-	-	-
24"	in-lb	19,859	23,169	26,479	33,099	24,329	34,754	40,595	46,436	60,623	-	-	-	-	-	-
30"	in-lb	30,090	35,400	40,710	49,472	-	-	-	-	-	-	-	-	-	-	-
36"	in-lb	48,233	58,145	68,057	84,849	-	-	-	-	-	-	-	-	-	-	-

FIRE SAFE SEAT TORQUE RATING (IN-LB)

SIZE	PSIG	CLASS 150				CLASS 300					CLASS 600					
		ΔP=100	ΔP=150	ΔP=200	ΔP=285	ΔP=100	ΔP=150	ΔP=200	ΔP=285	ΔP=740	ΔP=150	ΔP=500	ΔP=800	ΔP=1000	ΔP=1200	ΔP=1480
2"	in-lb	434	504	584	726	504	726	770	814	929	-	-	-	-	-	-
2.5"	in-lb	460	540	620	770	540	770	823	885	1,018	-	-	-	-	-	-
3"	in-lb	584	681	779	974	681	974	1,035	1,097	1,257	866	1,208	1,549	1,788	2,027	2,354
4"	in-lb	708	832	947	1,186	832	1,186	1,248	1,319	1,478	1,402	1,887	2,372	2,797	3,230	3,814
5"	in-lb	965	1,124	1,283	1,602	1,133	1,620	1,894	2,177	2,850	-	-	-	-	-	-
6"	in-lb	1,345	1,566	1,788	2,239	1,584	2,257	2,531	2,805	3,478	4,485	5,213	6,204	7,186	8,531	
8"	in-lb	2,089	2,443	2,788	3,487	2,513	3,584	4,160	4,735	6,133	7,077	8,455	9,832	11,691	13,558	16,089
10"	in-lb	3,283	3,832	4,381	5,478	4,027	5,753	6,673	7,602	9,841	11,400	13,616	15,833	18,833	21,833	25,913
12"	in-lb	5,168	6,036	6,894	8,620	6,230	8,894	10,470	12,045	15,877	17,542	20,949	24,355	28,975	33,595	39,869
14"	in-lb	6,912	8,062	9,213	11,514	8,363	11,948	14,426	16,904	22,913	-	-	-	-	-	-
16"	in-lb	8,770	10,231	11,700	14,620	10,655	15,222	18,682	22,152	30,559	-	-	-	-	-	-
18"	in-lb	12,567	14,664	16,762	20,948	15,178	21,683	27,541	33,409	47,640	-	-	-	-	-	-
20"	in-lb	16,859	19,674	22,479	28,099	20,196	28,851	37,993	47,126	69,322	-	-	-	-	-	-
24"	in-lb	25,072	29,249	33,426	41,781	30,046	42,923	56,622	70,331	103,607	-	-	-	-	-	-

METAL SEAT TORQUE RATING (IN-LB)

SIZE	PSIG	CLASS 150				CLASS 300					CLASS 600					
		ΔP=100	ΔP=150	ΔP=200	ΔP=285	ΔP=100	ΔP=150	ΔP=200	ΔP=285	ΔP=740	ΔP=150	ΔP=500	ΔP=800	ΔP=1000	ΔP=1200	ΔP=1480
2"	in-lb	478	558	637	797	558	797	850	903	1,027	-	-	-	-	-	-
2.5"	in-lb	513	593	681	850	593	850	912	974	1,124	-	-	-	-	-	-
3"	in-lb	637	743	850	1,062	743	1,062	1,133	1,204	1,381	832	1,035	1,699	1,965	2,230	2,593
4"	in-lb	797	929	1,062	1,328	929	1,328	1,398	1,460	1,628	1,496	2,018	3,708	4,381	5,053	5,965
5"	in-lb	1,062	1,239	1,416	1,770	1,248	1,788	2,089	2,398	3,133	-	-	-	-	-	-
6"	in-lb	1,487	1,735	1,982	2,478	1,770	2,522	2,814	3,106	3,823	2,947	4,106	7,815	9,301	10,788	12,797
8"	in-lb	2,257	2,637	3,009	3,761	2,726	3,894	4,540	5,177	6,744	4,443	6,204	11,797	14,036	16,275	19,311
10"	in-lb	3,797	4,434	5,052	6,328	4,646	6,638	7,584	8,531	10,824	6,558	9,151	17,417	20,718	24,019	28,506
12"	in-lb	5,947	6,938	7,930	9,912	7,558	10,797	12,302	13,815	17,470	11,001	15,364	29,223	34,772	40,321	47,843
14"	in-lb	8,655	10,098	11,540	14,426	10,841	15,488	18,196	20,904	27,488	-	-	-	-	-	-
16"	in-lb	10,965	12,797	14,620	18,275	14,249	20,355	23,691	27,037	35,143	-	-	-	-	-	-
18"	in-lb	15,718	18,337	20,957	26,196	19,514	27,878	33,949	40,029	54,782	-	-	-	-	-	-
20"	in-lb	21,081	24,594	28,108	35,135	25,709	36,728	45,648	54,578	76,252	-	-	-	-	-	-
24"	in-lb	31,382	36,612	41,843	52,304	38,595	55,136	67,251	79,367	108,793	-	-	-	-	-	-

• Under certain conditions, hydrodynamic torque can meet or exceed seating and unseating torques. When designing valve systems, hydrodynamic torque must be considered to help ensure correct selection of actuation.

• All published double offset High Performance Butterfly Valve torque charts have a 10% safety factor included.

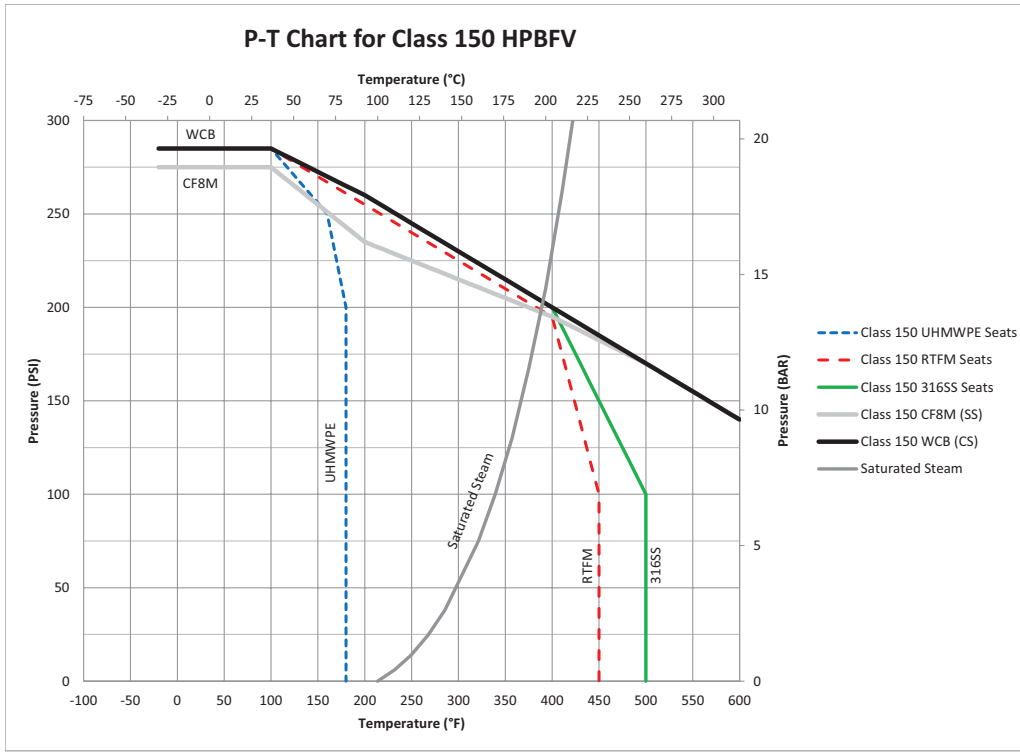
RTFM & UHMWPE SEAT

VALVE SIZE		CLASS 150		CLASS 300		CLASS 600	
INCHES	DN	WAFER LB (KG)	LUG LB (KG)	WAFER LB (KG)	LUG LB (KG)	WAFER LB (KG)	LUG LB (KG)
2"	50	9.2 (4.2)	10.9 (5.0)	9.2 (4.2)	12.2 (5.5)	—	—
2.5"	65	11.7 (5.3)	13.0 (5.9)	11.7 (5.3)	15.4 (7.0)	—	—
3"	80	12.4 (5.6)	14.2 (6.4)	12.4 (5.6)	17.7 (8.0)	18.2 (8.2)	22.5 (10.2)
4"	100	17.9 (8.1)	23.5 (10.7)	18.0 (8.2)	25.7 (11.6)	31.5 (14.3)	41.1 (18.6)
5"	125	24.0 (10.9)	31.0 (14.1)	25.3 (11.5)	34.9 (15.8)	—	—
6"	150	30.6 (13.9)	38.0 (17.2)	32.4 (14.7)	47.0 (21.2)	71.4 (32.4)	90.6 (41.1)
8"	200	46.7 (21.2)	56.3 (25.5)	60.0 (27.2)	82.8 (37.5)	136.6 (62.0)	167.1 (75.8)
10"	250	68.5 (31.1)	86.4 (39.2)	96.8 (43.9)	129.5 (58.7)	200.2 (90.8)	279.8(126.9)
12"	300	104.2 (47.3)	133.0 (60.3)	143.4 (65.0)	189.0 (85.7)	325.0 (147.4)	452.3 (205.2)
14"	350	138.7 (62.9)	183.3 (83.1)	218.0 (98.9)	325.0 (147.4)	—	—
16"	400	206.9 (93.8)	273.6 (124.1)	309.1 (140.2)	443.9 (201.4)	—	—
18"	450	278.9 (126.5)	340.6 (154.5)	438.7 (199.0)	634.7 (288.0)	—	—
20"	500	357.2 (162.0)	440.8 (199.9)	575.0 (260.8)	782.7 (355.0)	—	—
24"	600	574.3 (260.5)	709.4 (321.8)	840.2 (381.1)	1,201.9 (545.2)	—	—
30"	750	—	1,392.6 (633.0)	—	—	—	—
36"	850	—	2,142.8 (974.0)	—	—	—	—

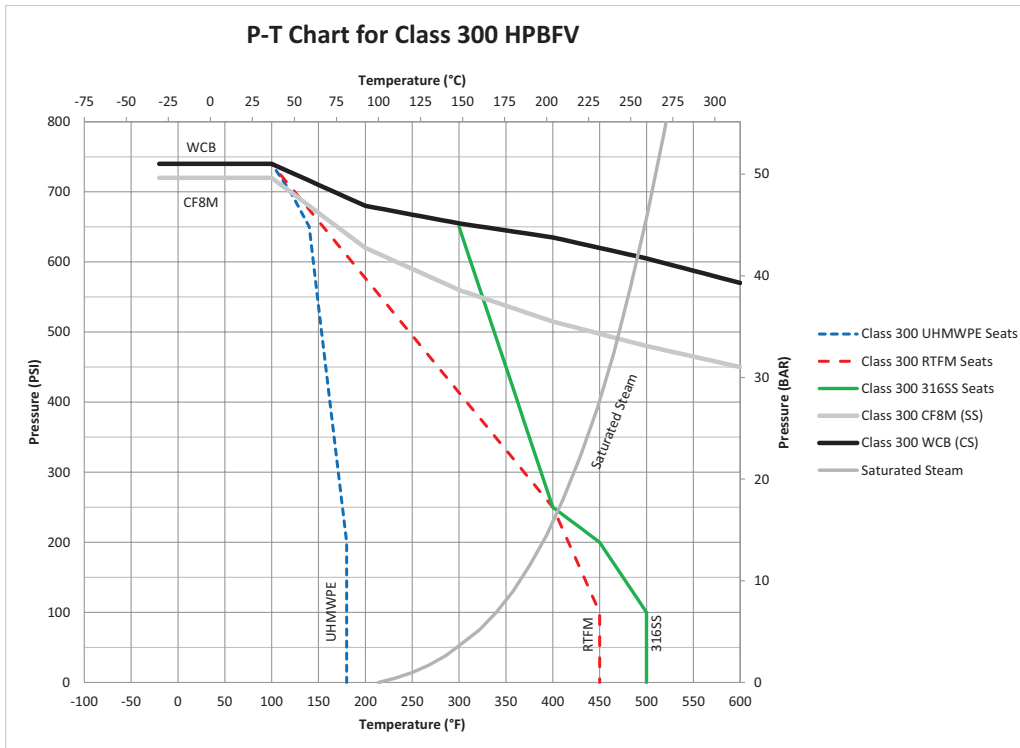
FIRE SAFE & METAL SEAT

VALVE SIZE		CLASS 150		CLASS 300		CLASS 600	
INCHES	DN	WAFER LB (KG)	LUG LB (KG)	WAFER LB (KG)	LUG LB (KG)	WAFER LB (KG)	LUG LB (KG)
2"	50	9.3 (4.2)	11.0 (5.0)	9.3 (4.2)	12.2 (5.5)	—	—
2.5"	65	11.8 (5.3)	13.0 (5.9)	11.8 (5.3)	15.5 (7.0)	—	—
3"	80	12.4 (5.6)	14.3 (6.5)	12.4 (5.6)	17.8 (8.1)	18.3 (8.3)	22.6 (10.2)
4"	100	18.0 (8.2)	23.6 (10.7)	18.1 (8.2)	25.8 (11.7)	31.7 (14.4)	41.3 (18.7)
5"	125	24.1 (10.9)	31.2 (14.1)	25.4 (11.5)	35.0 (15.9)	—	—
6"	150	30.8 (14.0)	38.2(17.3)	32.6 (14.8)	46.9 (21.3)	71.7 (32.5)	91.1 (41.3)
8"	200	47.0 (21.3)	56.6 (25.7)	60.3 (27.3)	83.1 (37.7)	137.3 (62.3)	168.0 (76.2)
10"	250	68.8 (31.2)	86.8 (39.4)	97.2 (44.1)	130.0 (59.0)	201.2 (91.3)	281.2 (127.5)
12"	300	104.8 (47.5)	133.6 (60.6)	143.9 (65.3)	189.8 (86.1)	326.7 (148.2)	454.6 (206.2)
14"	350	139.4 (63.3)	184.2 (83.5)	218.9 (99.3)	326.3 (148.0)	—	—
16"	400	207.9 (94.3)	275.0 (124.7)	310.3 (140.7)	445.7 (202.2)	—	—
18"	450	280.2 (127.1)	342.3 (155.3)	440.5 (199.8)	637.2 (289.0)	—	—
20"	500	359.0 (162.8)	443.0 (200.9)	577.3 (261.8)	785.9 (356.5)	—	—
24"	600	577.2 (261.8)	712.9 (323.4)	843.5 (382.62)	1,206.7 (547.4)	—	—

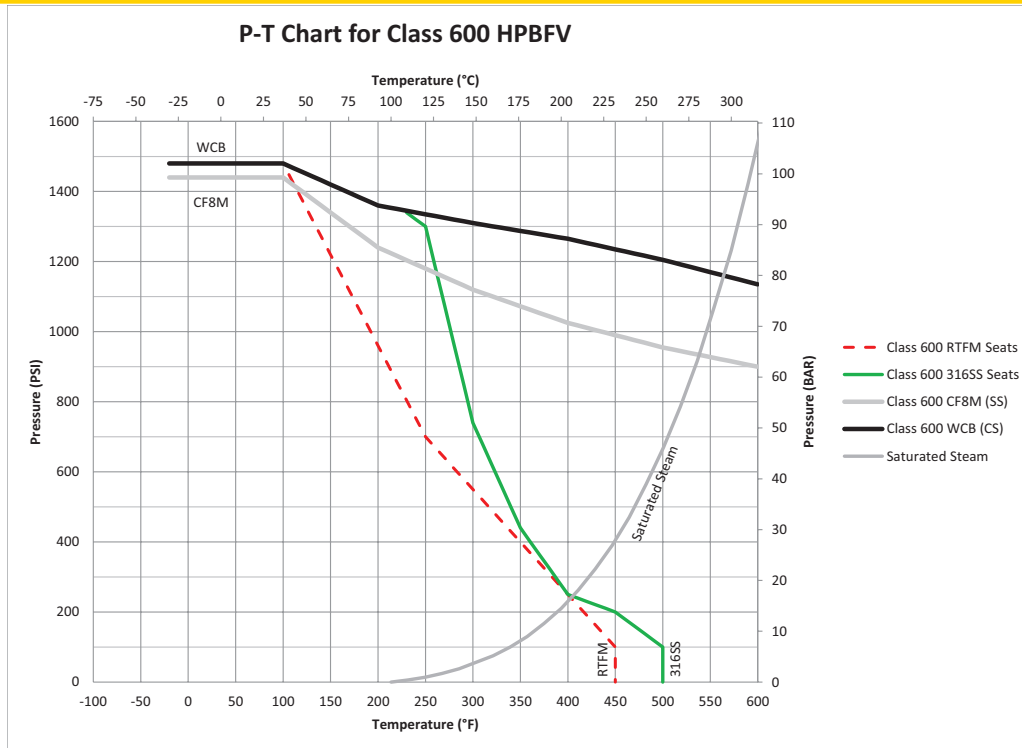
CLASS 150



CLASS 300



CLASS 600



HOW TO SPECIFY

DOUBLE OFFSET HIGH PERFORMANCE BUTTERFLY VALVES

2	15	L	06	C	S	P	8T	A	0	
VALVE TYPE	CLASS	VALVE STYLE	SIZE	BODY MATERIAL	DISC MATERIAL	STEM & PIN MATERIAL	SEAT MATERIAL	SPECIAL SERVICE	OPERATOR	
2 - DOUBLE OFFSET	15 (150)	L - LUG	02 (2")	CARBON STEEL	STAINLESS STEEL	P - 17-4 PH SS	8T - RTFM (TFM 1700 W/GLASS)	A - STANDARD APOLLO	0 - BARE STEM	
	30 (300)	W - WAFER	25 (2.5")	C - A216 WCB	S - A351 CF8M (316 SS)				1 - LEVER OPERATOR ⁴	
	60 (600) ¹		03 (3")						2 - WORM GEAR OPERATOR	
				04 (4")			A - ALLOY 20			
				05 (5")	STAINLESS STEEL	A - A351 CN7M (ALLOY 20)	B - 317 SS	2F - TFM/INCONEL, GRAPHITE SEALS (FIRE SAFE)		5 - WORM GEAR OPERATOR W/ CHAIN WHEEL
				06 (6")	S - A351 CF8M (316 SS)	B - A351 CG8M (317 SS)	H - HASTELLOY® C			
				08 (8")			J - DUPLEX	2M - 316SS (METAL SEATED)		
				10 (10")			K - SUPER DUPLEX			7 - LOCKING WORM GEAR OPERATOR
				12 (12")	A - A351 CN7M (ALLOY 20)	J - A995 CD3MN (2205 DUPLEX)	M - MONEL®			8 - LOCKING WORM GEAR OPERATOR W/ CHAIN WHEEL
				14 (14")						
				16 (16")	B - A351 CG8M (317 SS)	K - A995 CD3MWCUN (2507 SUPER DUPLEX)	S - 316 SS			
				18 (18")						
				20 (20")	J - A995 CD3MN (2205 DUPLEX)					
				24 (24")						
				30 (30") ²	K - A995 CD3MWCUN (2507 SUPER DUPLEX)	NICKEL ALLOYS				
				36 (36") ²		H - A494 CW12MW (HASTELLOY® C)				
					NICKEL ALLOYS	M - A494 M-35-1 (MONEL®)				
				H - A494 CW12MW (HASTELLOY® C)						
				M - A494 M-35-1 (MONEL®)						

EXAMPLE:
215L06CSP8TA0 = 6" Class 150 Lug, Carbon Steel Body, SS Disc, 17-4 PH Stem, TFM 1700 Seats, Standard Service, Bare Stem

(¹) Represents close wrought equivalent
¹ Class 600 valves available in sizes 3" through 12" (excluding 5" size)
² 215L Only
³ UHMWPE not available in Class 600
⁴ Standard handle can be locked in the full open or fully closed position.
 Lever operators are available with 2"-12" class 150 valves (215), and 2"-10" class 300 valves (230)
 See table for Lever Handle Availability & Maximum Differential Pressure

Safety Warning:

Gear operators are normally specified for larger high performance butterfly valves because the force of the pipeline flow on the disc can be too great to safely use a handle.

LEVER HANDLE AVAILABILITY & MAXIMUM DIFFERENTIAL PRESSURE

		SOFT SEAT (CODES: 8T & 21)		FIRE-SAFE SEAT (CODE: 2F)		METAL SEAT (CODE: 2M)		
		PSI	BAR	PSI	BAR	PSI	BAR	
Class 150	215	2"-6"	Full Rating		Full Rating		Full Rating	
		8"	150	10.3	Not Available		Not Available	
		10"-12"	50	3.4	Not Available		Not Available	
Class 300	230	2"-4"	Full Rating		Full Rating		Full Rating	
		6"-8"	150	10.3	Not Available		Not Available	
		10"	50	3.4	Not Available		Not Available	

PAGE	DATE	DESCRIPTION
S-6	20JUL16	Added metal seat exploded view page
S-7 THRU S-9	20JUL16	Added disc cord drawing and dimensions to Columns ØM1 & ØM2
	25APR16	Added bolt hole count to Column G and ISO mounting pattern designation to Column H
S-13	20JUL16	Added metal seat torque rating table
S-14 THRU S-16	20JUL16	Updated pressure temperature rating charts
S-17	04MAY17	Clarified body & disc material
	20JUL16	Updated seat material list
	09MAY16	Clarified lever operator footnote. Added safety warning for 8" and larger valves.
	20APR16	Added additional stem material list and updated specification note 3