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**3-Cx**

# RESILIENT SEATED BUTTERFLY VALVE

TECHNICAL SALES MANUAL



BRAY.COM

 **Bray**<sup>®</sup>

THE HIGH PERFORMANCE COMPANY

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## OVERVIEW

### RESILIENT SEATED BUTTERFLY VALVE

The 3-Cx resilient seated butterfly valve features a molded-in seat, a profiled disc sealing edge, and stem bearings. These features provide optimized performance and efficient automation solutions for a long cycle life without compromising bubble tight sealing.

#### MEDIA

- > Gas
- > Vacuum
- > Water
- > Wastewater
- > Brackish Water
- > Cooling Water
- > Acids
- > Alkalis
- > Chemicals



### SPECIFICATIONS

<b>Size Range<sup>1</sup></b>	DN 50 to 600
<b>Temperature Range</b>	-20°C to 121°C
<b>Maximum Operating Pressure</b>	10 bar   16 bar
<b>Body Style</b>	One-piece   Wafer, Lug
<b>Tightness Test</b>	EN 12266-1 Rate A
<b>Velocity Limits (On-Off Service)</b>	Fluids: 9 m/s Gases: 54 m/s
<b>Vacuum Rating</b>	0 to 0.001 micron

#### NOTES

<sup>1</sup> Other sizes on request.

### DESIGN STANDARDS

<b>Valve Design</b>	EN 12569   EN 593   NE 167
<b>Material Standard</b>	EN 16668   AD2000 W0
<b>Food Contact</b>	EC 1935
<b>Marking</b>	EN 19   DIN EN IEC 61406   DIN 91406
<b>Top Flange</b>	ISO 5211
<b>Flange Drilling</b>	EN 1092-1 PN 10   PN 16
<b>Face-to-Face</b>	EN 558 Series 20
<b>Testing Standard</b>	EN 12266-1 & 2
<b>AutoID/ID Link</b>	DIN 91406/IEC 61406

### MATERIAL OPTIONS<sup>1</sup>

<b>Body</b>	Ductile Iron, Low Temperature (EN 5.3103)
<b>Disc</b>	Stainless Steel (EN 1.4408)
<b>Stem</b>	Stainless Steel (EN 1.4542)
<b>Seat</b>	EPDM (molded-in)

#### NOTES

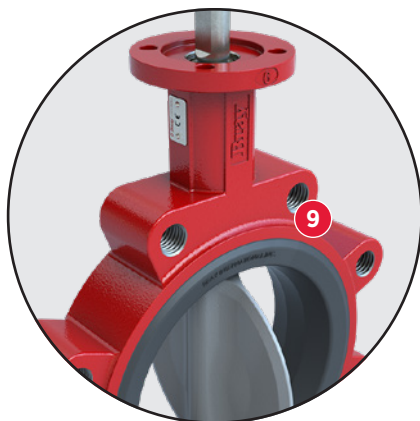
<sup>1</sup> Other materials are available on request.

### CERTIFICATIONS & APPROVALS

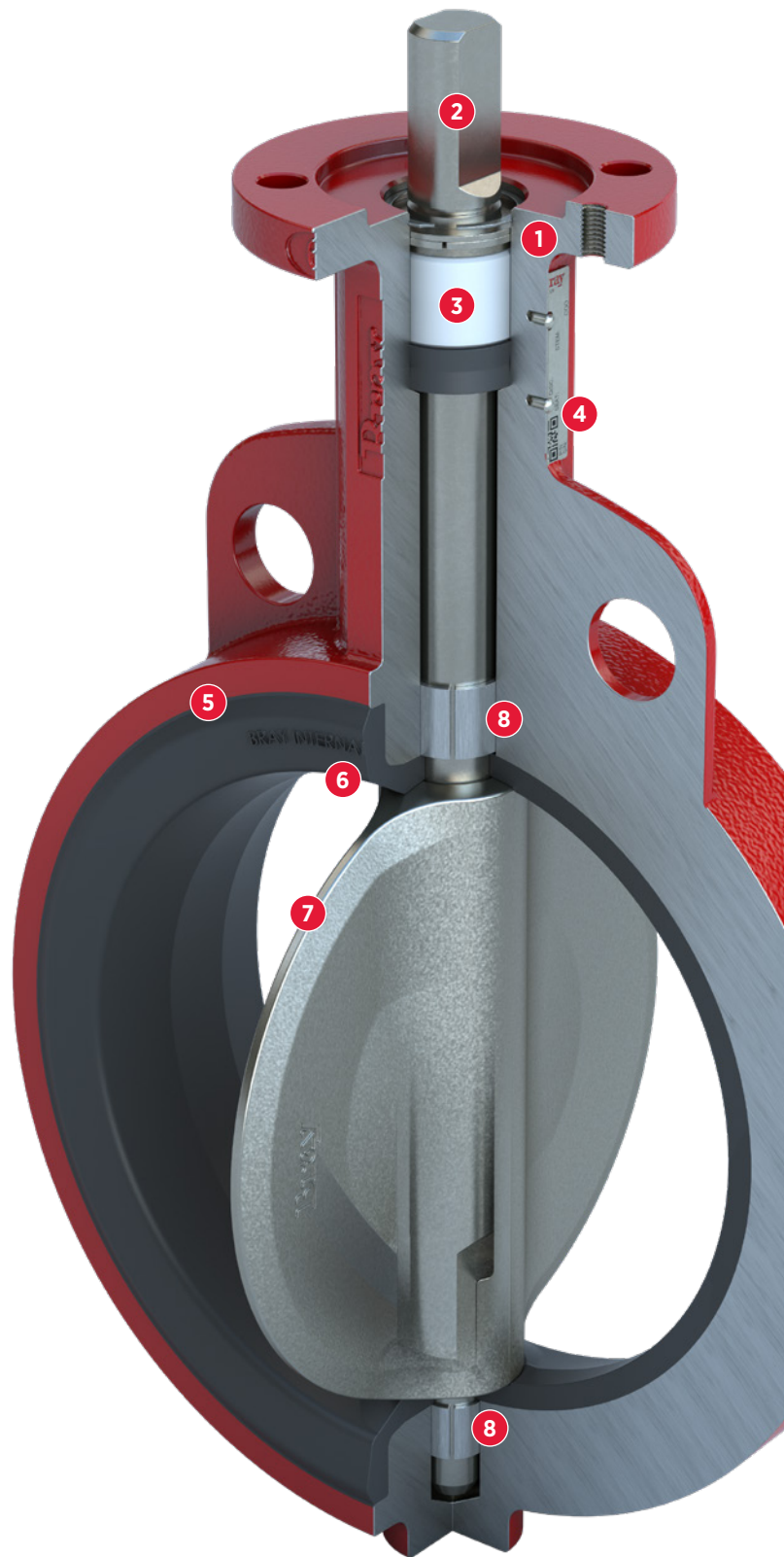
<b>Certifications</b>	CE: PED 2014/68/EU SIL 3 capable
<b>Fugitive Emissions</b>	ISO 15848-1 TA-Luft 2021
<b>Approvals</b>	ATEX 2014/34/EU

## FEATURES & BENEFITS

- 1 ANTI-STATIC:** Electrostatic discharge through anti-static design (grounding device and top flange drilling).
- 2 STEM DESIGN:** The high-strength stem design includes blowout-proof functionality for safe operation and exceptional service life.
- 3 STEM BUSHING:** Non-corrosive, heavy duty acetal bushing absorbs actuator side thrust.
- 4 DIGITAL TAG:** Each valve is uniquely and easily identifiable by simply scanning the QR Code on the product identification tag in accordance to IEC 61406.
- 5 ROBUST FLANGE SEALING:** Tear-drop shaped seat face enables tight sealing with a wide variety of industrial flanges.
- 6 MOLDED-IN SEAT:** Tightly controlled molding process produces accurate and repeatable dimensions, which leads to consistently lower torques over the valve's lifetime.
- 7 PRECISION PROFILED DISC SEALING EDGE:** Extends the valve life by reducing seat wear.
- 8 UPPER AND LOWER STEM BEARINGS:** Reduce operating torque and increase reliability in high cycle applications.
- 9 END OF LINE CAPABILITY:** Lug style valve allows for sealing at full rated pressure, even when the downstream flange is removed.



LUG BODY STYLE



WAFER BODY STYLE

## VALVE SELECTION

### VALVE PART NUMBERING SYSTEM

Select one code from each category to build a complete valve order number.

**3X-XXXX-1XXXX-XXX**

SERIES 3-Cx		SIZE XXXX		BASE NUMBER 1XXXX		TRIM <sup>1</sup> XXX		
Code	Body Style	Code	DN	Code	Description	Code	Item	Material
3W	Wafer	M050	50	1107W	10 bar rated PN 10 flange drilling	D1T	Body	Ductile Iron - Low Temperature (EN 5.3103)
3L	Lug	M080	80	1303L	16 bar rated PN 16 flange drilling		Disc	Stainless Steel (EN 1.4408)
		M100	100				Stem	Stainless Steel (EN 1.4542)
		M125	125				Seat	EPDM (molded-in)
		M150	150					
		M200	200					
		M250	250					
		M300	300					
		M350	350					
		M400	400					
		M450	450					
		M500	500					
		M600	600					

#### NOTES

<sup>1</sup> Other materials are available on request.  
Contact Bray for additional information.

### EXAMPLE

#### 3L-M250-1107W-D1T

- > Lug body
- > DN 250
- > PN 10
- > Trim D1T

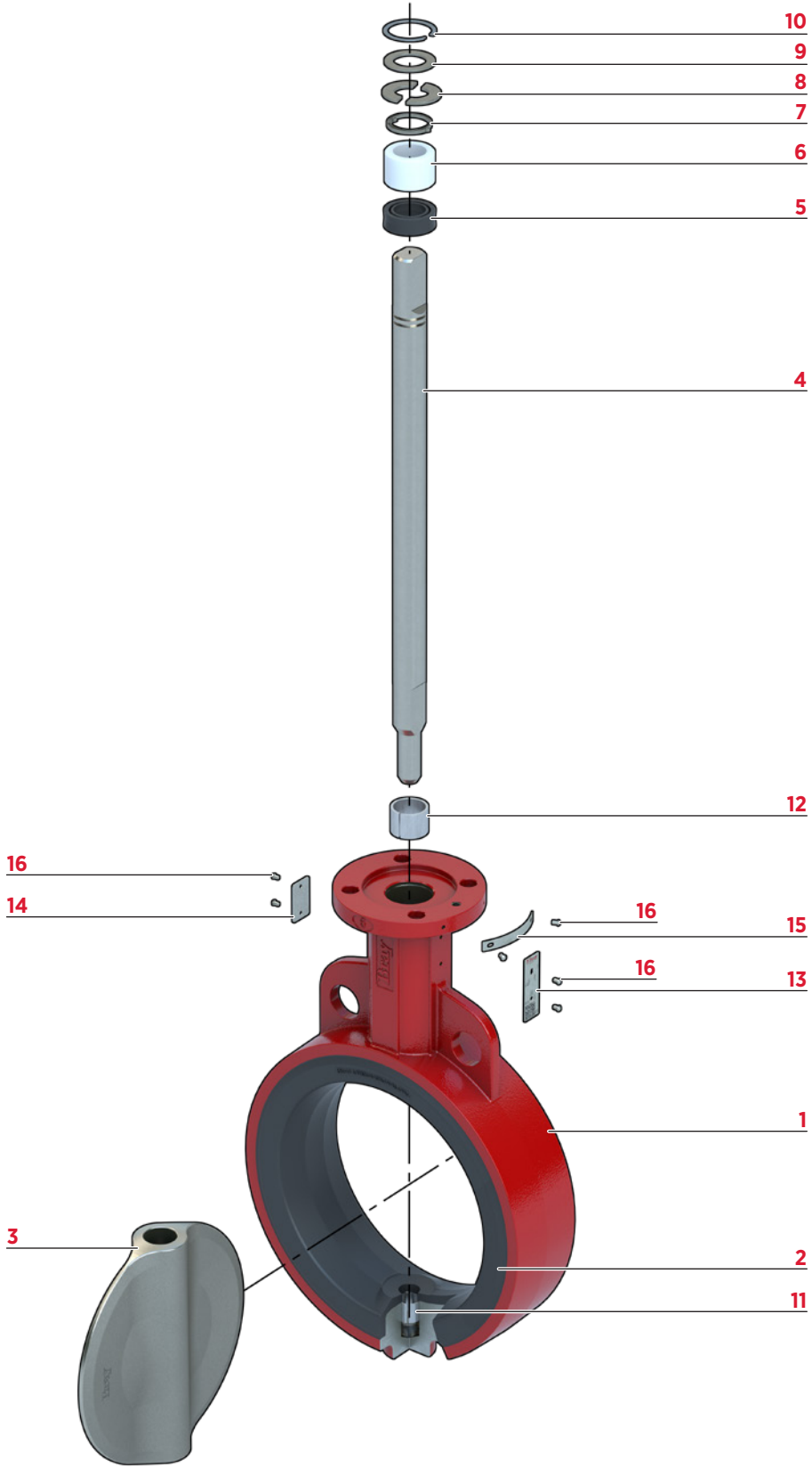
**PARTS LIST AND MATERIAL SPECIFICATIONS**

ITEM	DESCRIPTION	MATERIAL <sup>1, 2</sup>
1	Body	Ductile Iron, Low Temperature (EN 5.3103)
2	Seat (molded-in)	EPDM
3	Disc	Stainless Steel (EN 1.4408)
4	Stem	Stainless Steel (EN 1.4542)
5	Stem Seal	Buna-N
6	Stem Bushing	Acetal
7	Anti-static Device	Stainless Steel
8	Split Ring	Stainless Steel
9	Thrust Washer	Stainless Steel
10	Retaining Ring	Stainless Steel
11	Lower Stem Bearing	PTFE with Stainless Steel
12	Upper Stem Bearing	PTFE with Stainless Steel
13	Identification Tag	Stainless Steel
14	Certification Tag	Stainless Steel
15	Torque Tag	Stainless Steel
16	Drive Screw	Stainless Steel

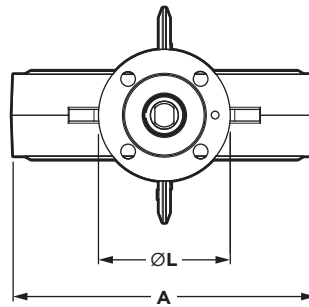
**NOTES**

- 1 Material specifications provided for reference only, and are subject to change without notice.
- 2 Additional materials available upon request.

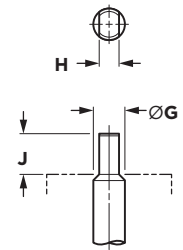
PARTS CALLOUT



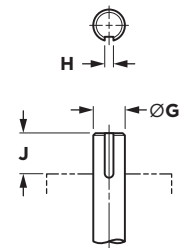
WAFER | PN 10, PN 16



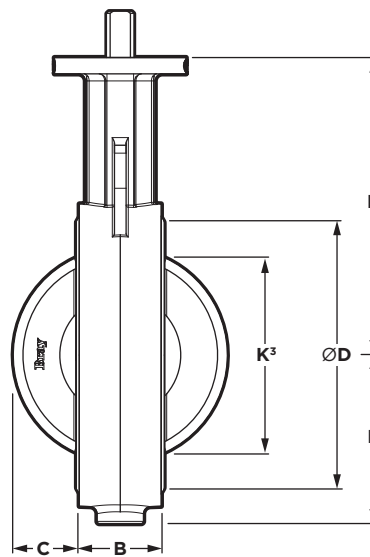
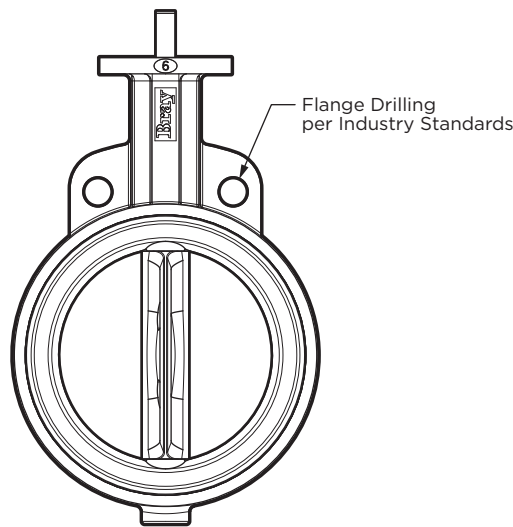
STEM DETAILS



Stem With Flats  
≤ DN 300



Stem With Keyway  
≥ DN 350



DIMENSIONS (mm)

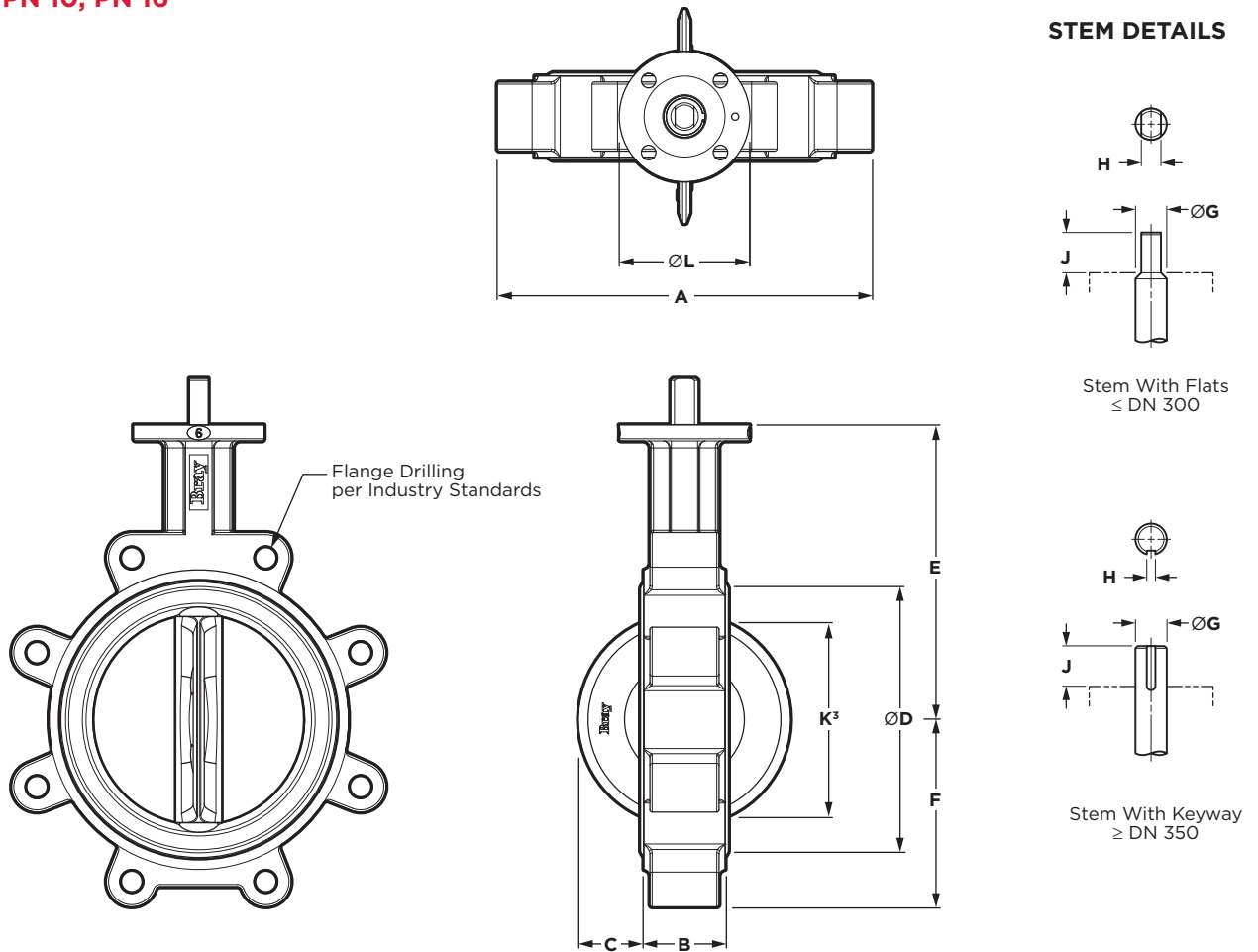
DN <sup>1</sup>	A	B	C	ØD	E	F	ØG	H	J	K <sup>3</sup>	ØL	Top Plate Drilling				Weight <sup>2</sup> Kg
												ISO	Bolt Circle	Hole Qty	Hole Dia.	
50	114	43	6	71	140	56	14	10	32	32	90	F07	70	4	10	2
80	140	46	17	100	159	71	14	10	32	64	90	F07	70	4	10	4
100	159	52	28	129	178	87	16	11	32	91	90	F07	70	4	10	5
150	209	56	49	180	203	115	19	13	32	137	90	F07	70	4	10	9
200	269	60	72	237	241	146	22	16	32	190	150	F12	125	4	15	16
250	326	68	94	291	273	181	30	22	51	242	150	F12	125	4	15	24
300	373	78	115	342	311	206	30	22	51	291	150	F12	125	4	15	32
350	433	78	134	388	346	238	35	10x10	51	331	150	F12	125	4	14	48
400	488	102	148	442	375	273	35	10x10	51	377	150	F12	125	4	14	68
500	595	127	186	548	438	356	50	12x10	64	476	210	F16	165	4	21	130
600	716	154	225	650	495	454	64	16x16	102	575	210	F16	165	4	21	185

NOTES

- 1 For sizes not shown, contact Bray for more information.
- 2 Weights are for PN 16 ductile iron bodies.
- 3 K dimension is disc chordal dimension at valve face.



LUG | PN 10, PN 16



DN <sup>1</sup>	A		B	C	ØD	E	F	ØG	H	J	K <sup>3</sup>	ØL	Top Plate Drilling				Weight <sup>2</sup> Kg
	PN10	PN16											ISO	Bolt Circle	Hole Qty	Hole Dia.	
50	117	117	43	6	71	140	58	14	10	32	32	90	F07	70	4	10	3
80	180	180	46	17	100	159	71	14	10	32	64	90	F07	70	4	10	5
100	208	208	52	28	129	178	104	16	11	32	91	90	F07	70	4	10	7
150	258	258	56	49	180	203	129	19	13	32	137	90	F07	70	4	10	11
200	311	320	60	72	237	241	154	22	16	32	190	150	F12	125	4	15	19
250	391	391	68	94	291	273	195	30	22	51	242	150	F12	125	4	15	28
300	458	458	78	115	342	311	229	30	22	51	291	150	F12	125	4	15	42
350	512	512	78	134	388	346	252	35	10x10	51	331	150	F12	125	4	14	59
400	580	580	102	148	442	375	287	35	10x10	51	377	150	F12	125	4	14	85
500	702	702	127	186	548	438	356	50	12x10	64	476	210	F16	165	4	21	155
600	810	829	154	225	650	495	454	64	16x16	102	575	210	F16	165	4	21	224

- NOTES**
- For sizes not shown, contact Bray for more information.
  - Weights are for PN 16 ductile iron bodies.
  - K dimension is disc chordal dimension at valve face.

# VALVE TORQUE

## SEATING/UNSEATING TORQUE CLASSIFICATION SELECTION

Valve seating/unseating torques are based on application classifications as shown below. Each valve application must comply with **all** class characteristics in order to be qualified for that class. When determining classifications, follow these guidelines:

- > For aqueous processes and water, Class A torques may be used only if a Nylon 11 coated disc is selected and all other Class A characteristics apply. Otherwise, Class B torques should be used.
- > If a valve is used strictly in a throttling application (it is never put in the closed position but throttled between 20° and 80°), then Class A torques may be used provided you have checked to see that dynamic torques do not exceed the Class A torque values.
- > With the exception of dry, non-lubricating medias, one is usually safe electing to use Class B torques for sizing actuators for all other valve service applications. Seating/Unseating Torque values shown include friction bearing torques for stated differential pressure.

### PN 10, 16 | DN 50 TO DN 600

TORQUE VALUES (N m)									
	DN	PN 10			PN 16				MAST <sup>1</sup>
		Valve Differential Pressure (bar)			Valve Differential Pressure (bar)				
		3.5	6	10	3.5	6	10	16	
<b>CLASS A</b>	<b>50</b>	11	12	13	13	14	15	16	119
<b>Media Type</b> Lubricating hydrocarbons; aqueous processes and water	<b>80</b>	17	19	21	19	23	26	34	119
	<b>100</b>	21	25	28	25	30	36	53	193
<b>Media Temperature</b> 4°C to 71°C	<b>150</b>	45	50	55	55	68	82	109	293
	<b>200</b>	73	89	106	107	130	152	196	499
<b>Frequency of Valve Cycling</b> Once weekly, or more frequently	<b>250</b>	132	155	177	176	215	254	338	1477
	<b>300</b>	175	211	248	235	299	364	491	1477
	<b>350</b>	323	393	464	406	487	571	741	2118
	<b>400</b>	446	553	669	567	679	794	1020	2997
	<b>500</b>	738	933	1119	995	1188	1382	1781	5772
	<b>600</b>	1173	1551	1918	1706	2093	2480	3276	14916
<b>CLASS B</b>	<b>50</b>	12	13	14	14	15	16	18	119
<b>Media Type</b> Water; aqueous processes; all other aqueous liquids including salt water; lubricating gases	<b>80</b>	19	21	23	21	25	29	37	119
	<b>100</b>	23	27	31	27	33	40	58	193
<b>Media Temperature</b> Within seat temperature limits, not near limits	<b>150</b>	49	55	60	60	75	90	120	293
	<b>200</b>	80	98	116	118	143	167	215	499
<b>Frequency of Valve Cycling</b> Minimum once every 3 to 6 weeks, or more frequently	<b>250</b>	145	170	195	193	236	279	371	1477
	<b>300</b>	192	232	272	258	329	400	540	1477
	<b>350</b>	355	432	510	446	535	628	814	2118
	<b>400</b>	490	608	735	623	746	872	1121	2997
	<b>500</b>	811	1025	1230	1093	1305	1519	1957	5772
	<b>600</b>	1289	1704	2108	1875	2300	2725	3600	14916
<b>CLASS C</b>	<b>50</b>	15	16	18	18	19	20	23	119
<b>Media Type</b> Dry, non-lubricating, such as air, dry gas, cement, pneumatic conveying mediums	<b>80</b>	24	26	29	26	31	36	46	119
	<b>100</b>	29	34	39	34	41	50	73	193
<b>Media Temperature</b> Near or at seat temperature limits	<b>150</b>	61	69	75	75	94	113	150	293
	<b>200</b>	100	123	145	148	179	209	269	499
<b>Frequency of Valve Cycling</b> Infrequently, sometimes not cycled for long periods	<b>250</b>	181	213	244	241	295	349	464	1477
	<b>300</b>	240	290	340	323	411	500	675	1477
	<b>350</b>	444	540	638	558	669	785	1017	2118
	<b>400</b>	613	760	919	779	933	1090	1401	2997
	<b>500</b>	1014	1281	1538	1366	1631	1899	2446	5772
	<b>600</b>	1611	2130	2635	2344	2875	3406	4500	14916

#### NOTES

<sup>1</sup> MAST (Maximum Allowable Stem Torque) is based on Stainless Steel (EN 1.4542).

> Dynamic torque values are not considered. See the Dynamic Torque chart in this manual for determination of dynamic torque.

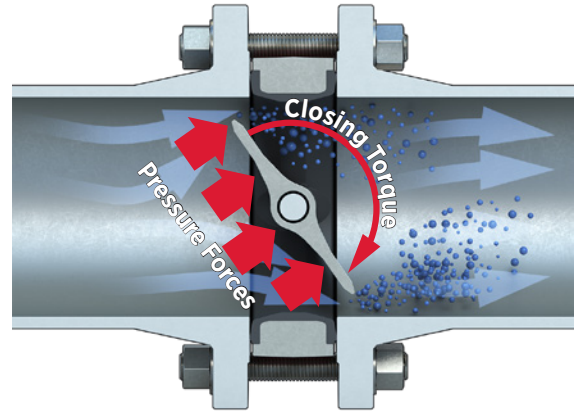
> Do not apply a safety factor to torque values when determining actuator output torque requirement.

## DYNAMIC TORQUE

### PRESSURE DISTRIBUTION

In most applications for butterfly valves (especially NPS 20 | DN 500 or smaller) the maximum torque required to operate the valve will be seating/unseating torque. However, **dynamic torque** should be considered, particularly in:

- > Control applications using larger valves (NPS 24 | DN 600 and above) where the disc is maintained in the open position.
- > Applications using larger valves (NPS 24 | DN 600 and above) where the velocity is high (16 ft./sec | 4.9m/sec).



### DYNAMIC TORQUE FACTORS

#### USING THE DYNAMIC TORQUE TABLE

- > Dynamic torque values include all bearing friction and stem-seal friction torques.
- > Dynamic torque values are per 1 psi  $\Delta P$  (1 bar  $\Delta P$ ). To determine dynamic torque (lb-in) (N m) at a desired angle of opening, multiply the pressure drop  $\Delta P$  at this angle by the appropriate dynamic torque factor in the charts below.
- > Bray recommends sizing control valves between 20° and 70°, with 60° the preferred angle.
- > Dynamic torque will tend to close all Bray valves whose disc are symmetrical to the stem.

**DYNAMIC TORQUE FACTORS (N m/bar)**

DN	Angle of Opening									
	90°	80°	75°	70°	60°	50°	40°	30°	20°	10°
50	0.00	5.00	5.03	3.51	2.05	1.19	0.74	0.37	0.21	0.19
80	0.00	16.25	16.34	11.39	6.66	3.87	2.41	1.20	0.67	0.60
100	0.00	37.80	38.00	26.49	15.49	8.99	5.61	2.79	1.56	1.40
150	0.00	110.32	110.91	77.33	45.22	26.24	16.38	8.14	4.54	4.09
200	0.00	268.16	269.58	187.97	109.91	63.79	39.82	19.79	11.04	10.82
250	0.00	530.35	533.16	371.76	217.38	126.16	78.75	39.14	21.83	19.65
300	0.00	924.11	929.00	647.77	378.77	219.82	137.22	68.20	38.04	34.24
350	0.00	1328.71	1335.74	931.38	544.61	316.06	197.29	98.06	54.70	49.23
400	0.00	2019.28	2029.97	1415.46	827.66	480.33	299.83	149.03	83.12	74.81
450	0.00	2915.29	2930.72	2043.53	1194.92	693.46	432.88	215.15	120.01	108.01
500	0.00	4043.50	4064.89	2834.37	1657.34	961.83	600.40	298.42	166.45	149.80
600	0.00	7004.49	7041.56	4909.94	2871.00	1666.17	1040.07	516.94	288.34	259.50

**NOTE**

> Example: DN 100 Valve; 60° Open with a 2 bar pressure drop: [Td = (15.49)(2) = 30.98 N m]

PN 10, 16 | DN 50 TO DN 600

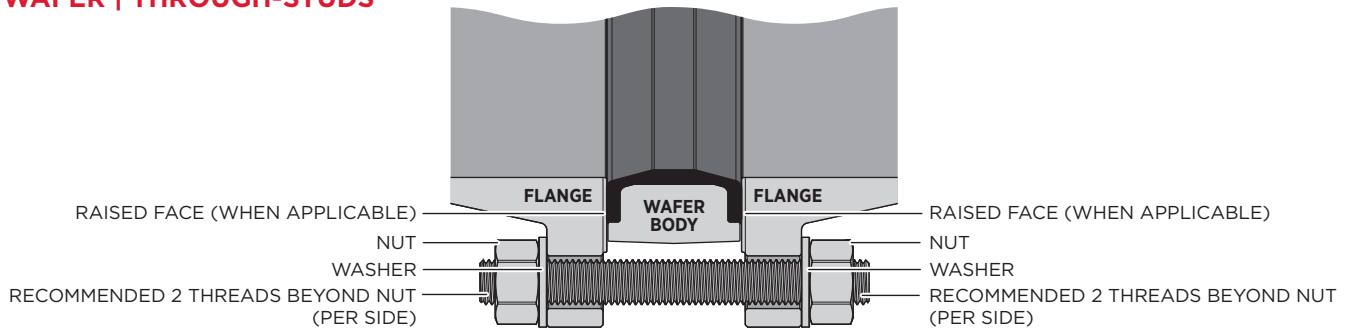
VALVE SIZING COEFFICIENTS (Kv Values <sup>1</sup> )									
DN <sup>2</sup>	Disc Position (Degrees)								
	90°	80°	70°	60°	50°	40°	30°	20°	10°
50	75	74	63	57	40	25	13	3	1
65	160	153	122	85	57	38	22	7	1
80	311	292	221	148	97	61	37	19	2
100	640	596	437	268	166	102	67	32	7
150	1644	1483	1029	655	414	257	151	74	11
200	3257	2920	1813	1079	652	371	220	105	16
250	5762	5029	2891	1734	1051	630	316	154	32
300	8707	7314	4291	2481	1467	872	426	208	60
350	10032	8018	4819	2879	1708	987	527	248	95
400	13317	10565	6411	3841	2293	1338	730	364	127
500	21910	16986	10210	6103	3642	2124	1160	584	199
600	34078	25138	14900	8881	5301	3107	1693	823	274

NOTES

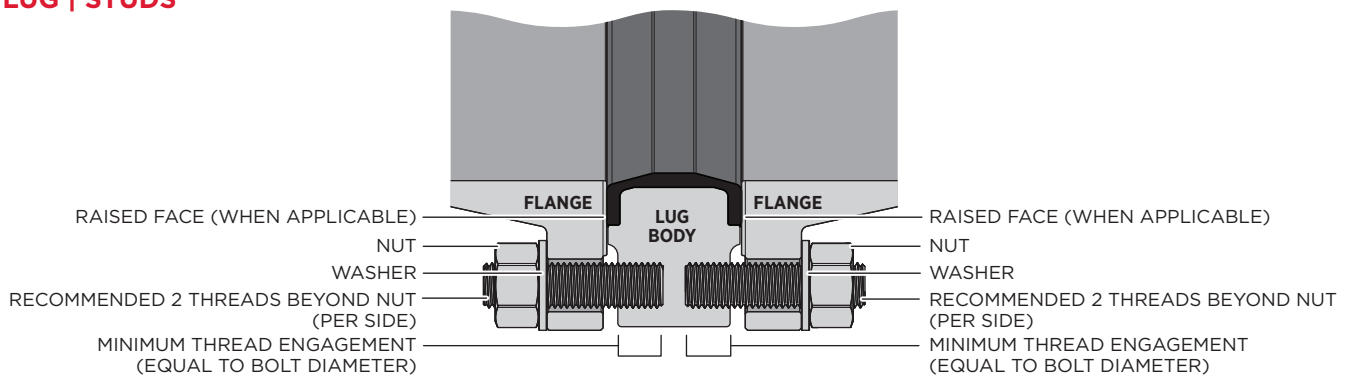
- 1 Kv value is the volume of water in cubic meters/hour (m<sup>3</sup>/hr) that will flow through a given restriction or valve opening with a pressure drop of one (1) bar at room temperature. (Kv varies with the valve size, angle of opening, and the manufacturer's valve style.)
- 2 For sizes not shown, contact Bray for more information.

# FLANGE TO VALVE BOLTING DATA

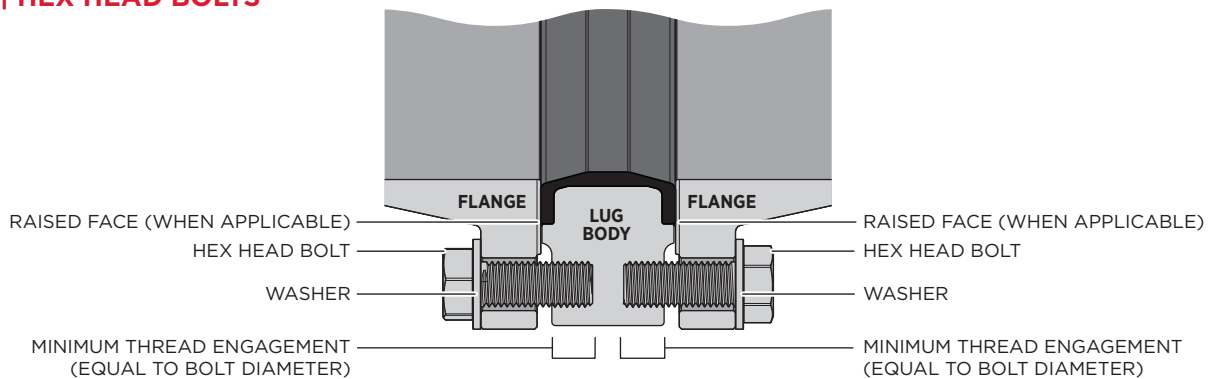
## WAFER | THROUGH-STUDS



## LUG | STUDS

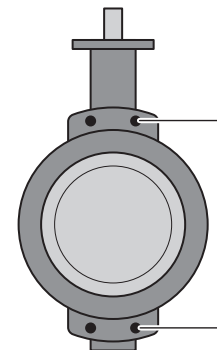


## LUG | HEX HEAD BOLTS



## IMPORTANT INFORMATION

- > Refer to appropriate Bray dimensional drawings for specific valve drilling information.
- > Lug threads may be tapped from both sides, and therefore tap may not be continuous.
- > Minimum bolt engagement must be equal to the diameter of the bolt.
- > When bolting the valve into the line, use standard bolting torque as recommended by applicable piping standards. Additional force from the flange bolts is not required.



**CAUTION**  
Tapped holes at neck locations **do not** permit through-holes.

**PN 10 | WAFER | THROUGH-STUD**

Valve Size	Fastener Size	Through Stud	Washer	Nut
DN	Ø-Thread	Qty	Qty	Qty
50	M16 x 2.0	4	8	8
80	M16 x 2.0	8	16	16
100	M16 x 2.0	8	16	16
150	M20 x 2.5	8	16	16
200	M20 x 2.5	8	16	16
250	M20 x 2.5	12	24	24
300	M20 x 2.5	12	24	24
350	M20 x 2.5	16	32	32
400	M24 x 3.0	16	32	32
500	M24 x 3.0	20	40	40
600	M27 x 3.0	20	40	40

**PN 10 | LUG | STUDS**

Valve Size	Fastener Size	Stud	Washer	Nut
DN	Ø-Thread	Qty	Qty	Qty
50	M16 x 2.0	8	8	8
80	M16 x 2.0	16	16	16
100	M16 x 2.0	16	16	16
150	M20 x 2.5	16	16	16
200	M20 x 2.5	16	16	16
250	M20 x 2.5	24	24	24
300	M20 x 2.5	24	24	24
350	M20 x 2.5	32	32	32
400	M24 x 3.0	32	32	32
500	M24 x 3.0	40	40	40
600	M27 x 3.0	40	40	40

**PN 10 | LUG | BOLTS**

Valve Size	Fastener Size	Hex Head Bolt	Washer	Nut
DN	Ø-Thread	Qty	Qty	Qty
50	M16 x 2.0	8	8	—
80	M16 x 2.0	16	16	—
100	M16 x 2.0	16	16	—
150	M20 x 2.5	16	16	—
200	M20 x 2.5	16	16	—
250	M20 x 2.5	24	24	—
300	M20 x 2.5	24	24	—
350	M20 x 2.5	24	24	—
400	M24 x 3.0	32	32	—
500	M24 x 3.0	40	40	—
600	M27 x 3.0	40	40	—

**PN 16 | WAFER | THROUGH-STUD**

Valve Size	Fastener Size	Through Stud	Washer	Nut
DN	Ø-Thread	Qty	Qty	Qty
50	M16 x 2.0	4	8	8
80	M16 x 2.0	8	16	16
100	M16 x 2.0	8	16	16
150	M20 x 2.5	8	16	16
200	M20 x 2.5	8	16	16
250	M24 x 3.0	12	24	24
300	M24 x 3.0	12	24	24
350	M24 x 3.0	16	32	32
400	M27 x 3.0	16	32	32
500	M30 x 3.5	20	40	40
600	M33 x 3.5	20	40	40

**PN 16 | LUG | STUDS**

Valve Size	Fastener Size	Stud	Washer	Nut
DN	Ø-Thread	Qty	Qty	Qty
50	M16 x 2.0	8	8	8
80	M16 x 2.0	16	16	16
100	M16 x 2.0	16	16	16
150	M20 x 2.5	16	16	16
200	M20 x 2.5	24	24	24
250	M24 x 3.0	24	24	24
300	M24 x 3.0	24	24	24
350	M24 x 3.0	32	32	32
400	M27 x 3.0	32	32	32
500	M30 x 3.5	40	40	40
600	M33 x 3.5	40	40	40

**PN 16 | LUG | BOLTS**

Valve Size	Fastener Size	Hex Head Bolt	Washer	Nut
DN	Ø-Thread	Qty	Qty	Qty
50	M16 x 2.0	8	8	—
80	M16 x 2.0	16	16	—
100	M16 x 2.0	16	16	—
150	M20 x 2.5	16	16	—
200	M20 x 2.5	24	24	—
250	M24 x 3.0	24	24	—
300	M24 x 3.0	24	24	—
350	M24 x 3.0	32	32	—
400	M27 x 3.0	32	32	—
500	M30 x 3.5	40	40	—
600	M33 x 3.5	40	40	—

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## **GLOBAL HEADQUARTERS**

### **Bray International, Inc.**

13333 Westland East Blvd.

Houston, Texas 77041

Tel: +1.281.894.5454

## **GERMANY**

### **Bray Armaturen & Antriebe GmbH**

Halskestraße 25

47877 Willich

Germany

T: +49 2154 88 75-0

E: [sales.germany@bray.com](mailto:sales.germany@bray.com)

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