

**ShieldValves**<sup>TM</sup>  
More than Valves...

brands you trust.

**Resilient Seat Butterfly Valve**

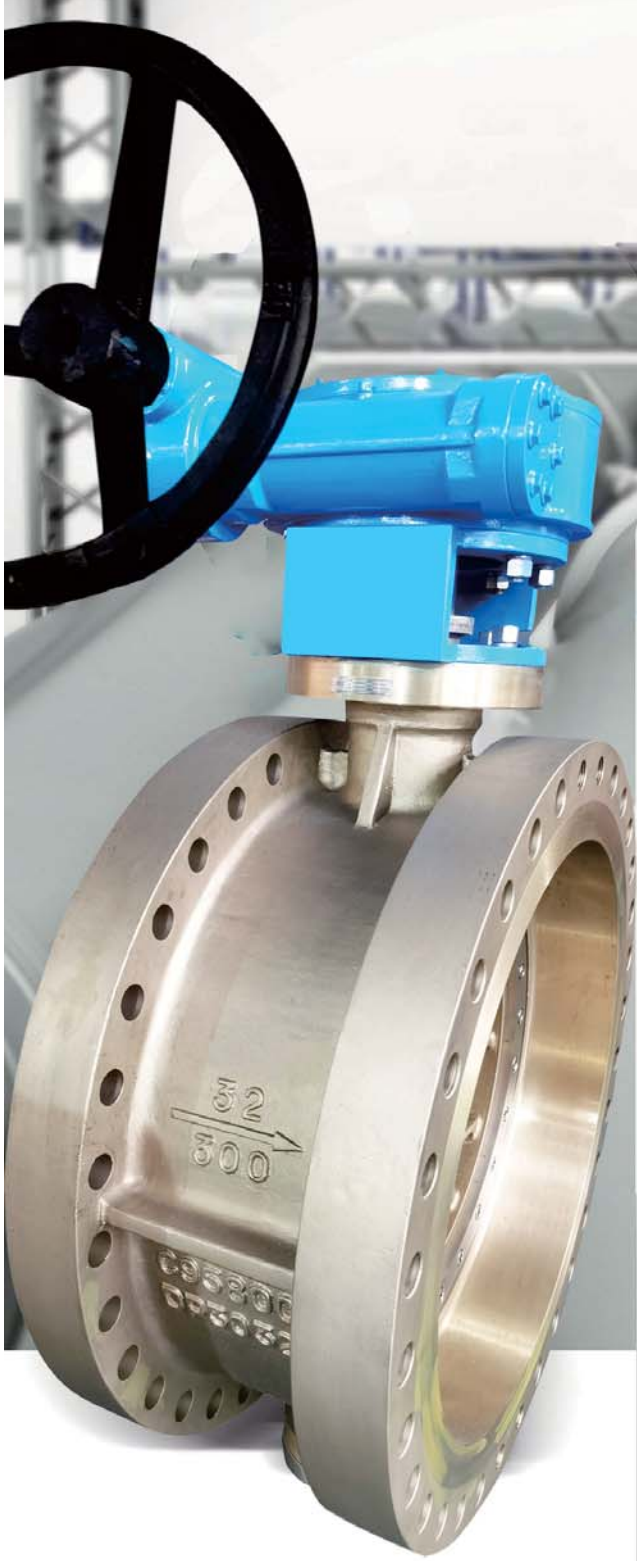


WENZHOU SHIELD VALVE IND. CO., LTD.

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## Profile

# ShieldValves



**T**hrough 20 years of field application experience, research and development, SHIELD has designed and manufactured a fully integrated and innovative product lines that offer the best compatibility, economy and quality performance in the flow control industry.

The reversed pressure rating of our recommended bi-directional metal seated butterfly valve is 100% fully equal to the positive pressure. And now, all of our seats and seal rings to the metal seated butterfly valves are replaceable, neither the production time nor the production batch. As well, our high performance butterfly valve is becoming the “Super Star” item in the world. Rugged and reliable, our products are engineered to provide years of trouble free service.

We have earned a reputation for excellence by creating products of superior value and quality, providing personalized customer service and emphasizing on-time deliveries.

Shield manufacturing facilities are certified to ISO 9001 and EU Directives, assuring product quality, precision manufacturing and internal process integrity.

## **SHIELD'S COMPANY ADVANTAGE**

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Shield Valves is an engineered valve solutions company headquartered in China. We have had a continuous customer focus on butterfly valve design, manufacture and distribution.

Our rich history of engineering customization gives us the knowledge base necessary to design valve products for the most demanding applications. We serve customers across a broad range of industries including refining, petrochemical, power, pulp and paper, LNG-cryogenics, aerospace, utilities and mining.

### **ENGINEERED VALVE SOLUTIONS**

Our experienced sales engineers work closely with engineers, original equipment manufacturers and project managers to quote the specific product configurations required.

For each solution, Shield Valves provides engineering services consulting for application, material selection, design, sizing, cavitation, noise control, cryogenic and emissions testing.




### **CUSTOMER FOCUSED SUPPORT**

Shield Valves' customer focus ensures minimized downtime by supplying original equipment replacement parts at accelerated lead times along with after-market service through:

- » Large stock of standard and special spare parts and cast components
- » Quick turnaround on all non-standard components
- » Fully warranted OEM parts of uncompromising quality
- » Dedicated customer focused personnel
- » OEM authorized service crews

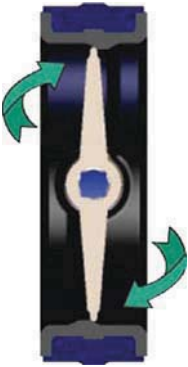


## Product range

Type		Wafer	Lug	Double Flanged
Fig.		2230	2240	2400
Picture				
Dimensions		DN40 to DN1400 1 1/2 "to 56"	DN40 to DN1400 1 1/2 "to 56"	DN50 to DN2000 2"to 80"
Assembly Between flanges	DN40(1 1/2") to DN300(12")	EN1092 PN10 or PN16 ASME B16.1 CLASS125 ASME B16.5 CLASS150 BS 10 Table D ,Table E JIS B2239 10K,16K	EN1092 PN10 or PN16 or ASME B16.1 CLASS125 ASME B16 5 CLASS150 Other standards depend on requirement	EN1092 PN10 or PN16 ASME B16.1 CLASS125 ASME B16 5 CLASS150 Other standards depend on requirement
	DN350(14") to DN600(24")	EN1092 PN10, PN16 ASME B16.1 CLASS125 ASME B16.5 CLASS150 BS10 Table D ,Table E	EN1092 PN10 or PN16 ASME B16.1 CLASS125 ASME B16.5 CLASS150 Other standards depend on requirement	EN1092 PN10 or PN16 ASME B16.1 CLASS125 ASME B16.5 CLASS150 Other standards depend on requirement
	DN600 (24") Above	EN1092 PN10 or PN16 ASME B16.1 CLASS125 ASME B16.5 CLASS150 Other standards depend on requirement	EN1092 PN10 or PN16 ASME B16.1 CLASS125 ASME B16.5 CLASS150 Other standards depend on requirement	EN1092 PN10 or PN16 ASME B16.1 CLASS125 ASME B16.5 CLASS150 Other standards depend on requirement
Standard differential pressure	2"to 8"	16 Bar ( 230 psi )	16 Bar ( 230 psi )	16 Bar ( 230 psi )
	10" and Above	10 Bar ( 145 psi )	10 Bar ( 145 psi )	10 Bar ( 145 psi )
Maximum differential pressure	2"to 24"	20 Bar ( 285 psi )	20 Bar ( 285 psi )	20 Bar ( 285 psi )
	26" and Above	16 Bar ( 230 psi )	16 Bar ( 230 psi )	16 Bar ( 230 psi )
Working Temperature		- 35°C ~ 200°C (Depends on seal)	- 35°C ~ 200°C (Depends on seal)	- 35°C ~ 200°C (Depends on seal)

## Difference between Ours valve and normal valve


### Ours construction



Seating area designed with a wave line of slope, which reduces wear between disc and seat. Sealing could be always kept by adjusting the angle of disc to compensate long time wear between seat and disc. Long life time is enhanced.



By bonding the elastomer to a phenolic backing ring, complete support and stability of the seat is assured. This guarantees positive control of seating torque while eliminating seat distortion.

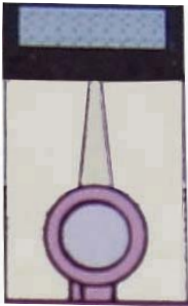


There is a groove inside backing ring, which brings a low torque between the disc and the seat when closing or opening.

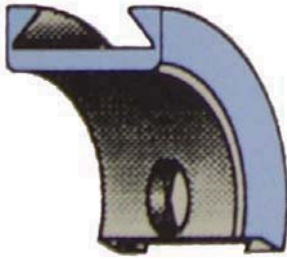


The disc is precisely machined, sealing edge is a polished ball for torque and wear control. Two-piece shaft construction enhances the Cv Value and avoids turbulence.

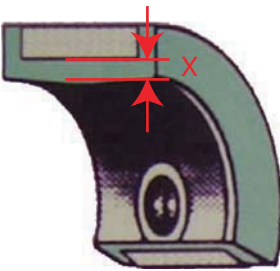
### Normal construction



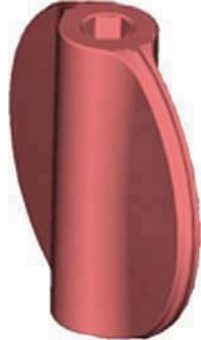
No any wave line, sealing is achieved by strong wear. Shorter life time and valve has to be thrown away if leakage happens because of wear between seat and disc.



Simple elastomer "boot" seat has no rigid support. I.D. of seating area is severely distorted when seat is installed between flanges. Disc must be opened during installation to prevent binding of disc.



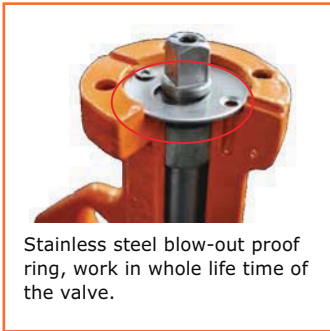
No any groove inside backing ring.



Roughly machined or just made by casting, precise dimensions are not maintained. Thicker center construction results in big Cv Value and turbulence.

continued...

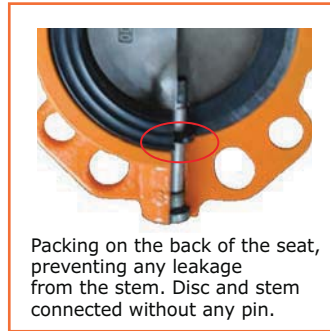
## Ours construction



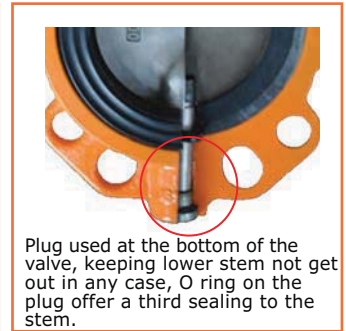
Stainless steel blow-out proof ring, work in whole life time of the valve.



Groove on top flange getting rid of wetness under actuator, offering a good protection to the expensive actuator.

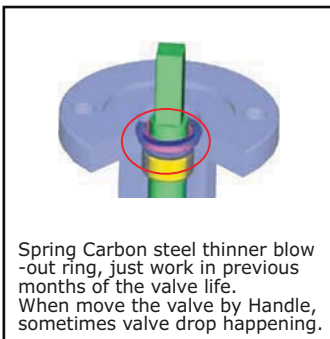


Packing on the back of the seat, preventing any leakage from the stem. Disc and stem connected without any pin.



Plug used at the bottom of the valve, keeping lower stem not get out in any case, O ring on the plug offer a third sealing to the stem.

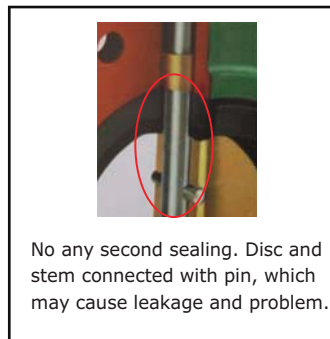
## Normal construction



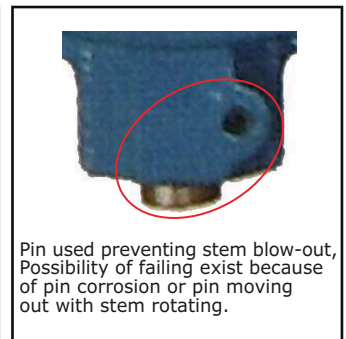
Spring Carbon steel thinner blow-out ring, just work in previous months of the valve life. When move the valve by Handle, sometimes valve drop happening.



No any groove and no any protection to actuator.

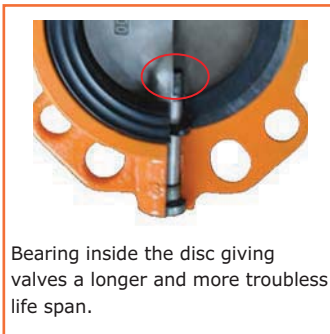


No any second sealing. Disc and stem connected with pin, which may cause leakage and problem.

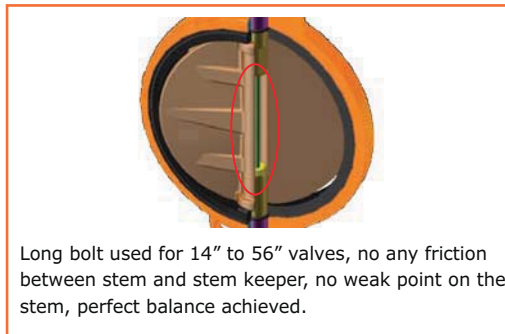


Pin used preventing stem blow-out, Possibility of failing exist because of pin corrosion or pin moving out with stem rotating.

## Ours construction



Bearing inside the disc giving valves a longer and more troubles life span.

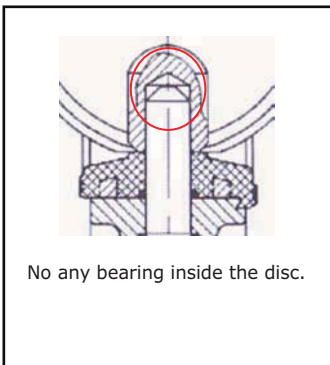


Long bolt used for 14" to 56" valves, no any friction between stem and stem keeper, no weak point on the stem, perfect balance achieved.

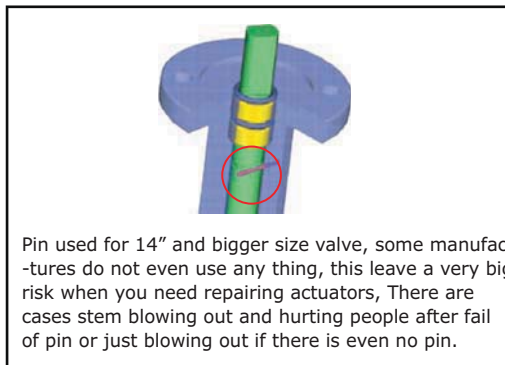


High strength aluminium alloy hand lever with ergonomic design and beautiful looking.

## Normal construction



No any bearing inside the disc.



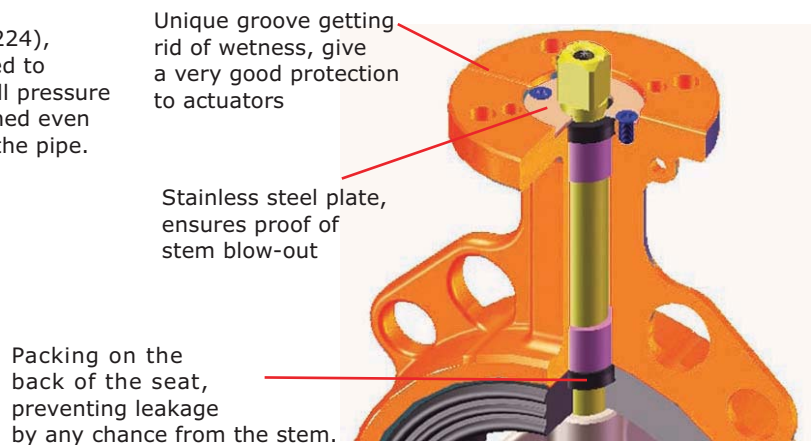
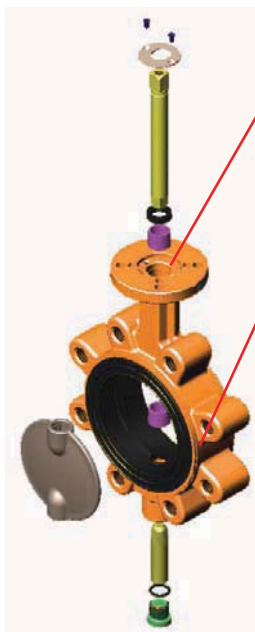
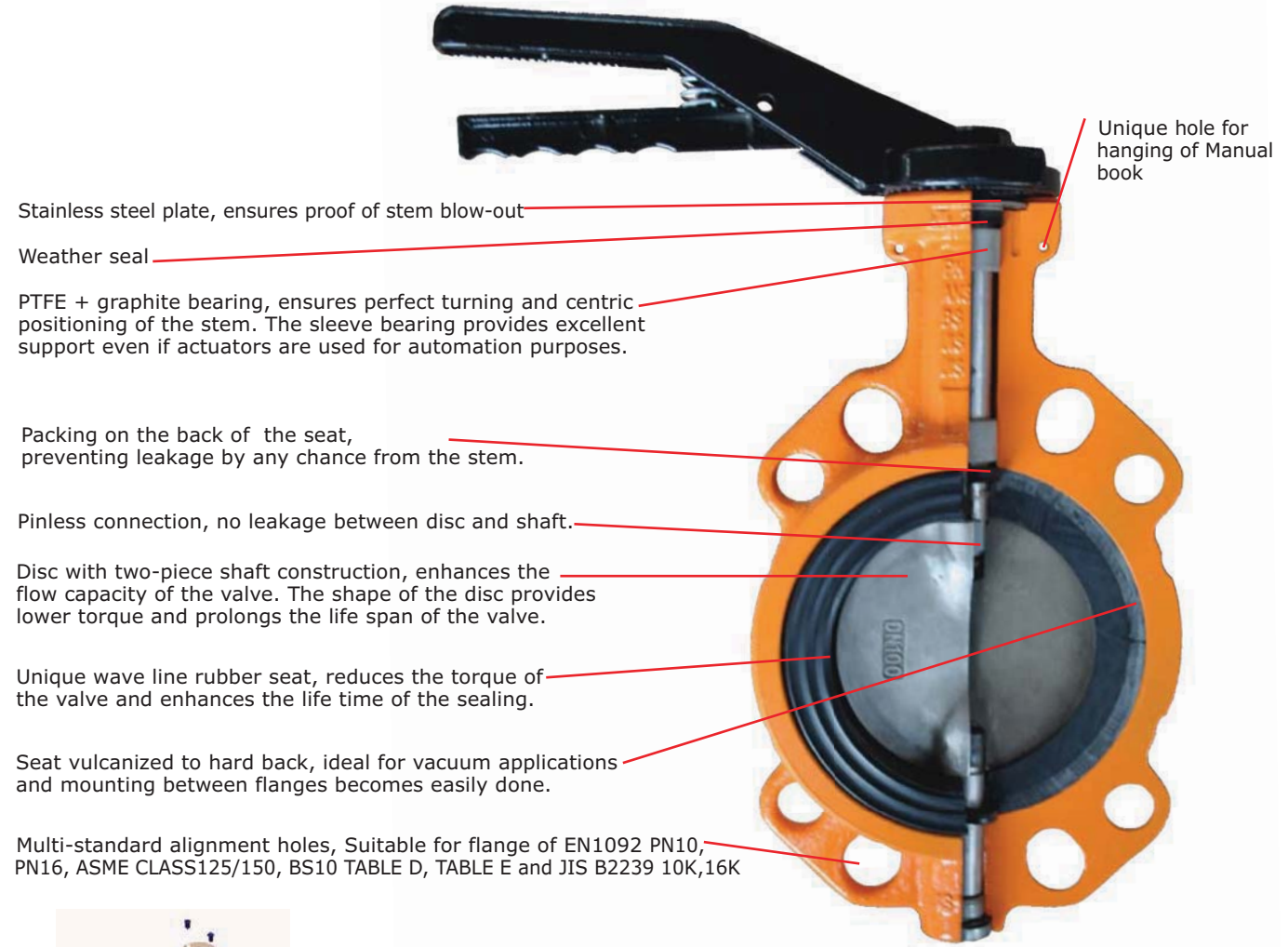
Pin used for 14" and bigger size valve, some manufactures do not even use any thing, this leave a very big risk when you need repairing actuators, There are cases stem blowing out and hurting people after fail of pin or just blowing out if there is even no pin.



Cast Iron Handlever.

## Construction Features

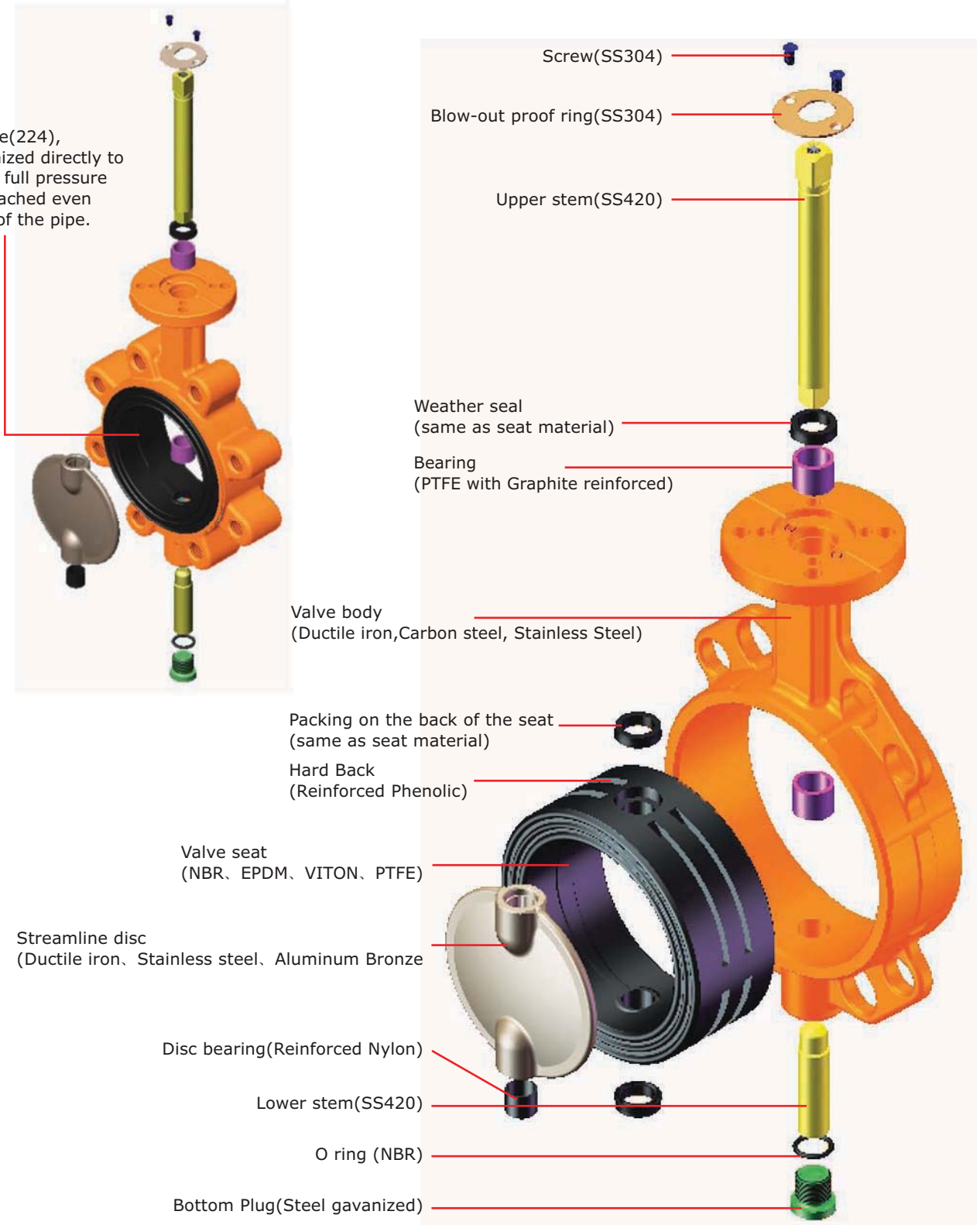
DN50(2") to DN300(12")



## Valve parts

DN350(14") to DN1400(56")

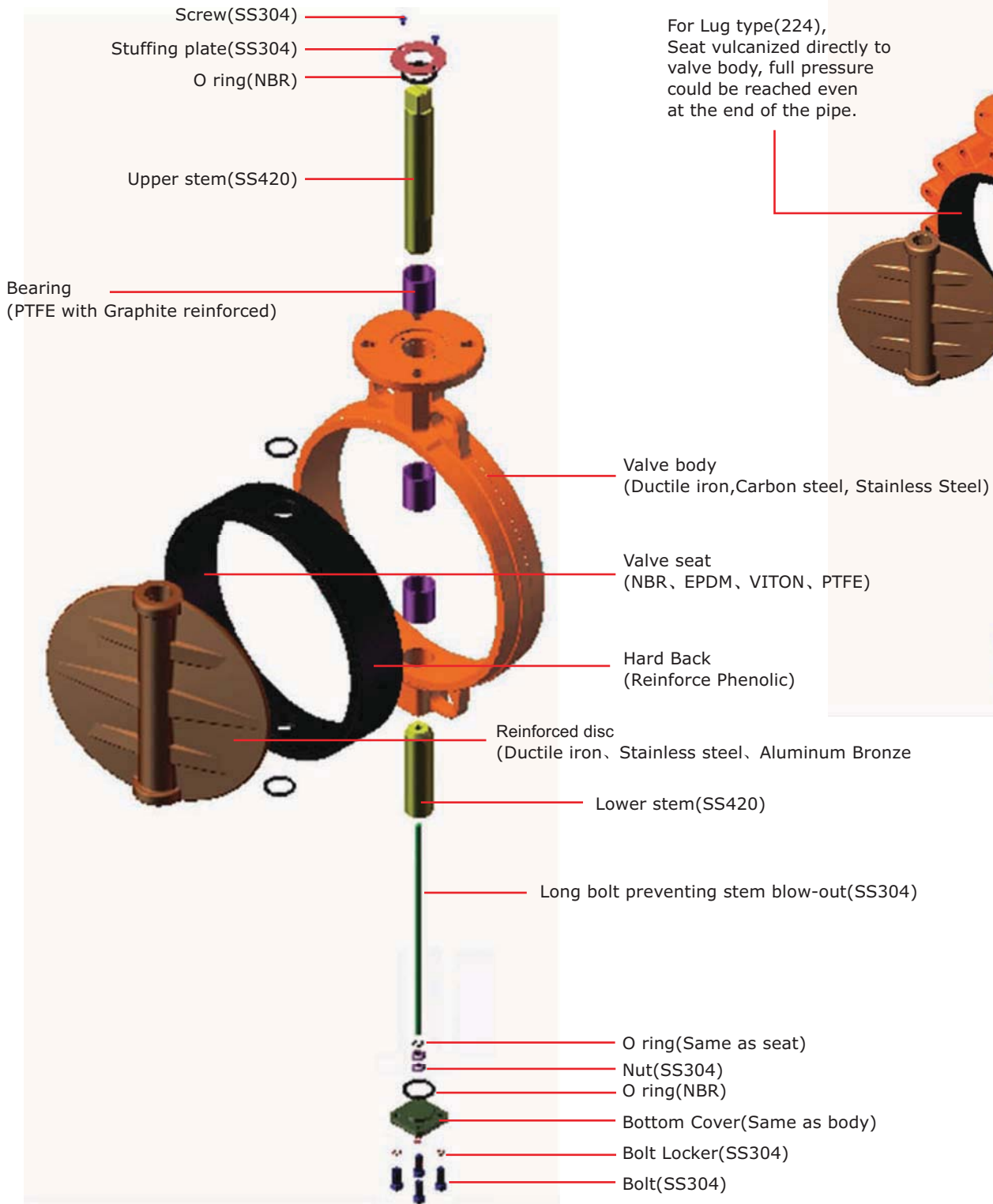
For Lug type(224),  
Seat vulcanized directly to  
valve body, full pressure  
could be reached even  
at the end of the pipe.



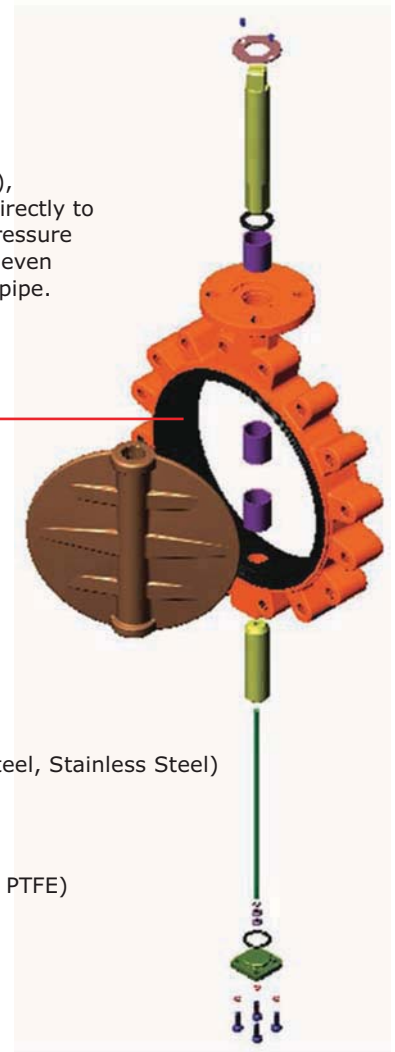


## Valve parts

DN350(14") to DN1400(56")



For Lug type(224),  
Seat vulcanized directly to  
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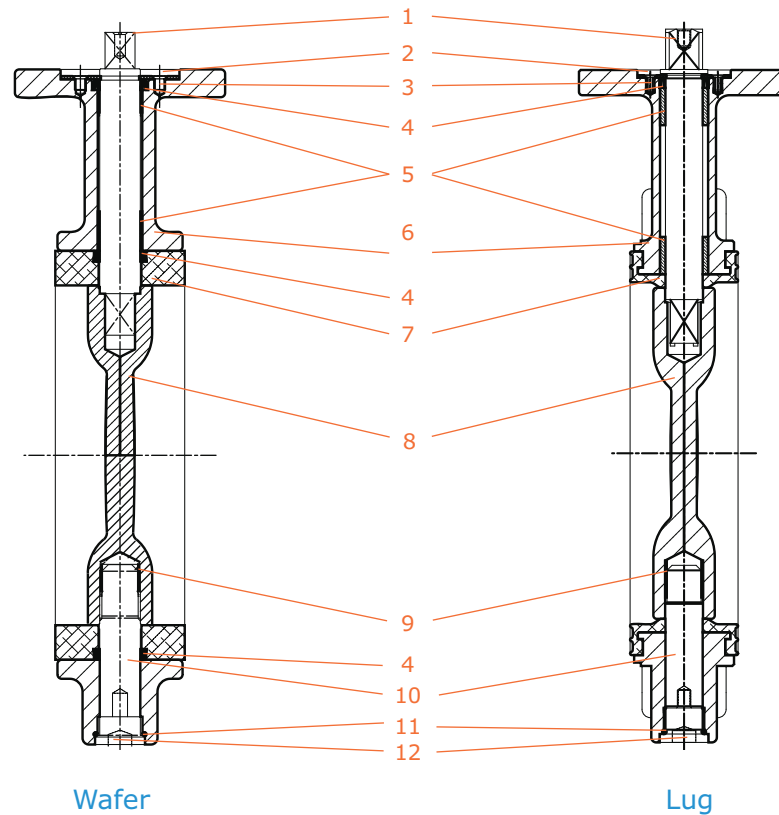


## Structure and material

DN40 to DN300

Type 2230 Wafer

Type 2240 Lug



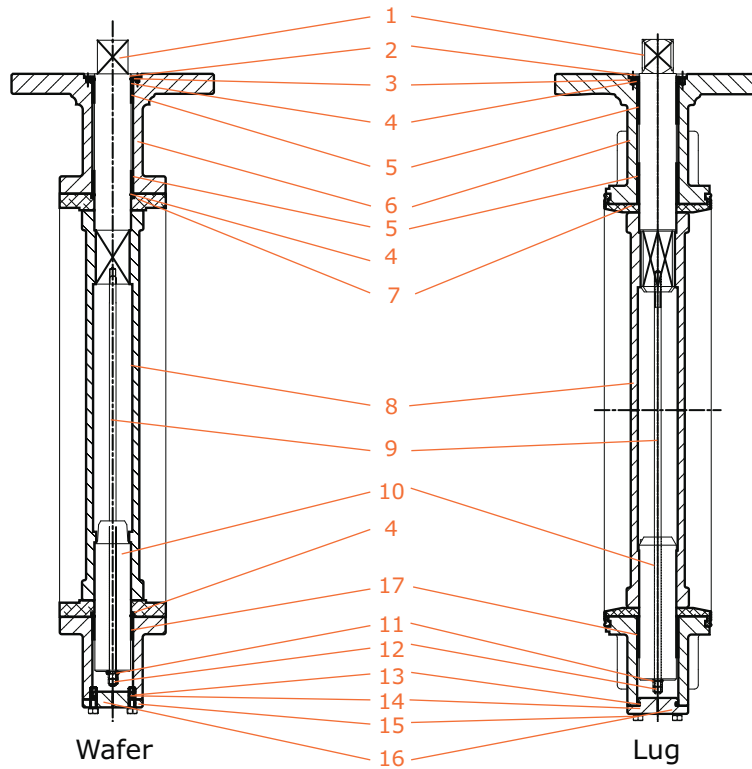
Wafer

Lug

No.	Description	Material	Standard Coating
1	Stem	Stainless Steel - AISI 420	
2	Preventing Plate	Stainless Steel - AISI 304	
3	Screw	Stainless Steel - AISI 304	
4	Packing	NBR EPDM FPM PTFE	
5	Bushings	PTFE+Graphite	
6	Body	Ductile Iron - ASTM A536 Gr 65-45-12 (GGG40) Carbon Steel - ASTM A216 WCB (GSC25N) Stainless Steel - ASTM A351 CF8M	3 layer coating EPOXY/EPOXY/PUR 160μ RAL 2008
7	Seat	NBR EPDM-H FPM PTFE on silicone backup (2230 only)	
8	Disc	Stainless steel - ASTM A351 CF8M Low alloy stainless steel - ASTM A276 (SS201) Ductile iron - ASTM A536 Gr 65-45-12 (GGG40) Alu-bronze - ASTM B148 C95800 Duplex Hastelloy	Rilsan Halar PFA
9	Bushing	PTFE+Graphite	
10	Stem	Stainless Steel - AISI 420	
11	O-ring	NBR	
12	Plug	Steel	Galvanized

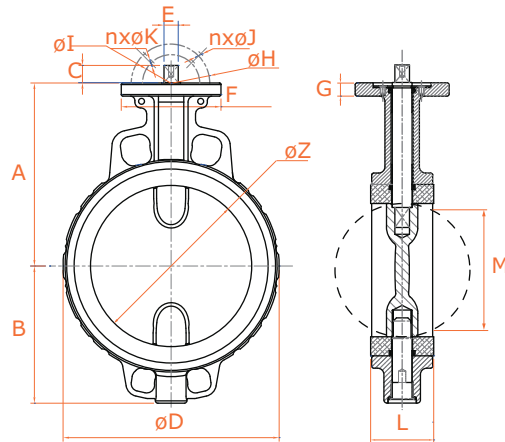
Other materials available.

- Structure and material
- DN350 to DN600
- Type 2230 Wafer
- Type 2240 Lug



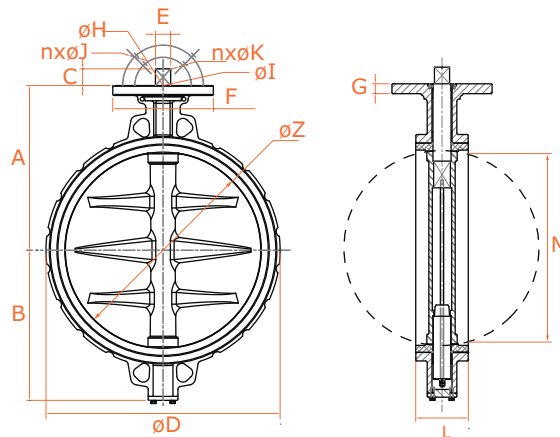
No.	Description	Material	Standard Coating
1	Stem	Stainless Steel - AISI 420 Stainless Steel - AISI 431 (ANSI 150 and PN16)	
2	Preventing Plate	Stainless Steel - AISI 304	
3	Screw	Stainless Steel - AISI 304	
4	O-ring	NBR	
5	Bushings	PTFE+Graphite	
6	Body	Ductile iron - ASTM A536 Gr 65-45-12 (GGG40) Carbon Steel - ASTM A216 WCB (GSC25N) Stainless Steel - ASTM A351 CF8M	3 layer coating EPOXY/EPOXY/PUR 160µ RAL 2008
7	Seat	NBR EPDM-H FPM PTFE on silicone backup (2230 only)	
8	Disc	Low alloy stainless steel - ASTM A276 (SS201) Ductile Iron - ASTM A536 Gr 65-45-12 (GGG40) Stainless Steel - ASTM A351 CF8M Alu-bronze - ASTM B148 C95800 Duplex Hastelloy	Rilsan Halar PFA
9	Screw	Stainless Steel - AISI 420	
10	Stem	Stainless Steel - AISI 420 Stainless Steel - AISI 431 (ANSI 150 and PN16)	
11	O-ring	NBR	
12	Nut	Stainless Steel - AISI 304	
13	O-ring	NBR	
14	Bolt	Stainless Steel - AISI 304	
15	Washers	Stainless Steel - AISI 304	
16	Cover	Same as body material	
17	Bushing	PTFE + Graphite	

■ Dimensions (mm)  
Type 2230 Wafer  
DN40 to DN300



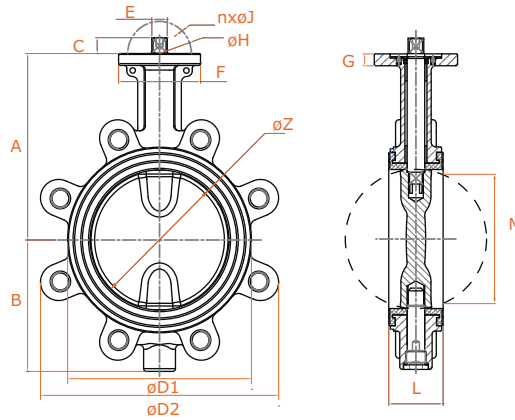
Dim.	A	B	C	D	E	F	G	øH	øI	nxøJ	nxøK	L	M	øZ	ISO	Weight [kg] free stem
DN40	113	63.0	13.5	82.4	11	65	10	50	-	4 x 7	-	37	29.6	44.3	F05	2.2
DN50	126	72.0	13.5	99.0	11	65	10	50	-	4 x 7	-	43	34.6	55.2	F05	2.4
DN65	134	78.0	13.5	113.4	11	65	10	50	-	4 x 7	-	46	47.7	66.3	F05	3.1
DN80	157	91.5	13.5	128.7	11	65	10	50	-	4 x 7	-	46	69.1	83.0	F05	4.0
DN100	167	108.5	17.5	156.7	14	90	13	70	50	4 x 9	4 x 7	52	87.2	101.5	F05/F07	6.0
DN125	180	124.0	17.5	190.3	14	90	13	70	-	4 x 9	-	56	116.5	129.3	F07	7.7
DN150	203	137.0	18.5	213.0	17	90	13	70	-	4 x 9	-	56	144.0	154.5	F07	9.2
DN200	228	167.0	24.5	265.8	22	125	15	102	-	4 x 11	-	60	191.1	200.3	F10	14.7
DN250	266	207.0	24.5	324.2	22	125	15	102	-	4 x 11	-	68	240.6	250.0	F10	22.4
DN300	291	236.0	27.0	376.8	27	150	15	125	102	4 x 14	4 x 11	78	290.7	301.0	F10/F12	31.9

■ Dimensions (mm)  
Type 2230 Wafer  
DN350 to DN600



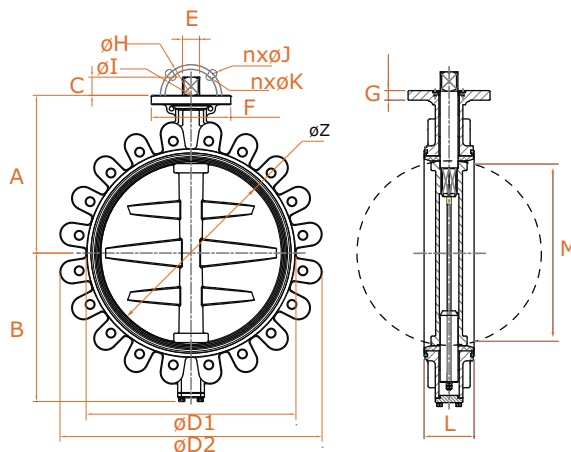
Dim.	A	B	C	D	E	F	G	øH	øI	nxøJ	nxøK	L	M	øZ	ISO	Weight [kg] free stem
DN350	332	258.0	30	411.7	27	175	19	140	125	4 x 18	4 x 14	78	329.6	338.7	F12/F14	49.0
DN400	363	301.5	30	471.2	27	175	20	140	125	4 x 18	4 x 14	102	376.3	389.9	F12/F14	68.8
DN450	397	333.0	39	528.0	36	210	25	165	140	4 x 22	4 x 18	114	425.6	440.6	F14/F16	97.2
DN500	425	378.0	49	580.4	46	210	25	165	140	4 x 22	4 x 18	127	474.7	491.4	F14/F16	123.6
DN600	498	438.0	49	687.9	46	300	30	254	165	8 x 18	4 x 22	154	573.0	593.3	F16/F25	207.9

■ Dimensions (mm)  
Type 2240 Lug  
DN40 to DN300



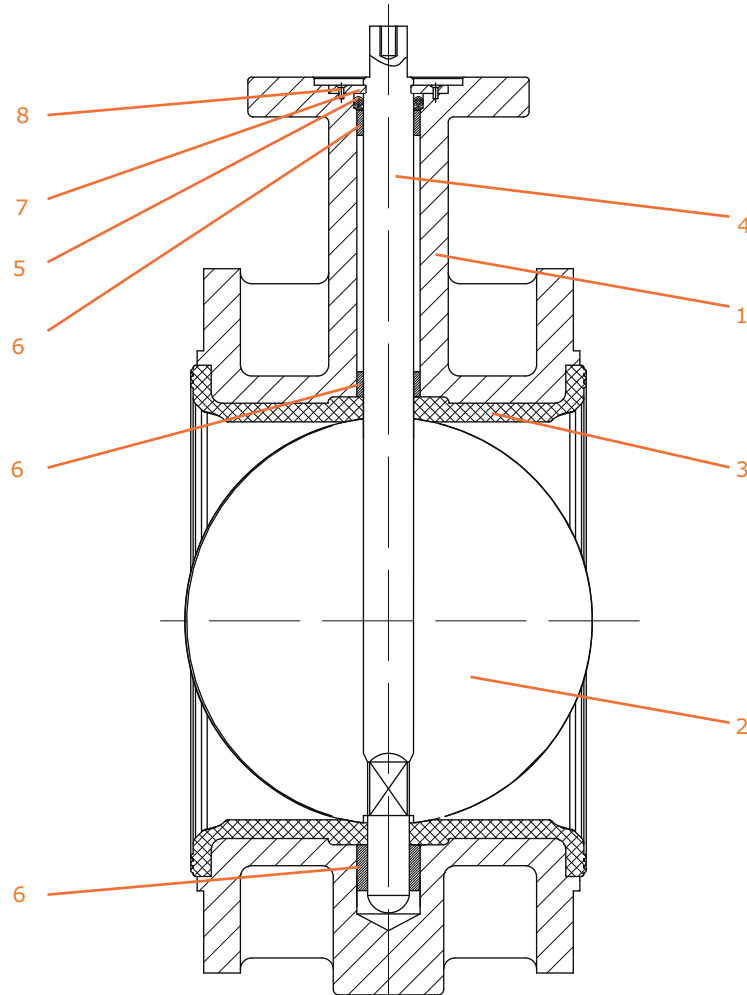
Dim.	A	B	C	D1	D2	E	F	G	øH	øI	nxøJ	nxøK	L	M	øZ	ISO	Weight [kg] free stem
DN40	113	67.0	13.5	82.0	112.0	11	65	10	50	-	4 x 7	-	37	29.6	44.3	F05	3.0
DN50	126	76.0	13.5	93.0	122.4	11	65	10	50	-	4 x 7	-	43	34.6	55.2	F05	3.2
DN65	134	82.0	13.5	107.0	136.5	11	65	10	50	-	4 x 7	-	46	47.7	66.3	F05	3.9
DN80	157	96.0	13.5	116.0	180.0	11	65	10	50	-	4 x 7	-	46	69.1	83.0	F05	5.4
DN100	167	113.5	17.5	146.0	198.3	14	90	13	70	50	4 x 9	4 x 7	52	87.2	101.5	F05/F07	7.4
DN125	180	129.0	17.5	175.0	226.0	14	90	13	70	-	4 x 9	-	56	116.5	129.3	F07	9.4
DN150	203	143.0	17.5	202.0	261.7	17	90	13	70	-	4 x 9	-	56	144.0	154.5	F07	12.1
DN200	228	172.0	24.5	253.0	314.5	22	125	15	102	-	4 x 11	-	60	191.1	200.3	F10	18.5
DN250	266	213.0	24.5	307.0	380.0	22	125	15	102	-	4 x 11	-	68	240.6	250.0	F10	28.6
DN300	291	242.0	27.0	360.0	428.4	27	150	15	125	102	4 x 14	4 x 11	78	290.7	301.0	F10/F12	38.7

■ Dimensions (mm)  
Type 2240 Lug  
DN350 to DN600



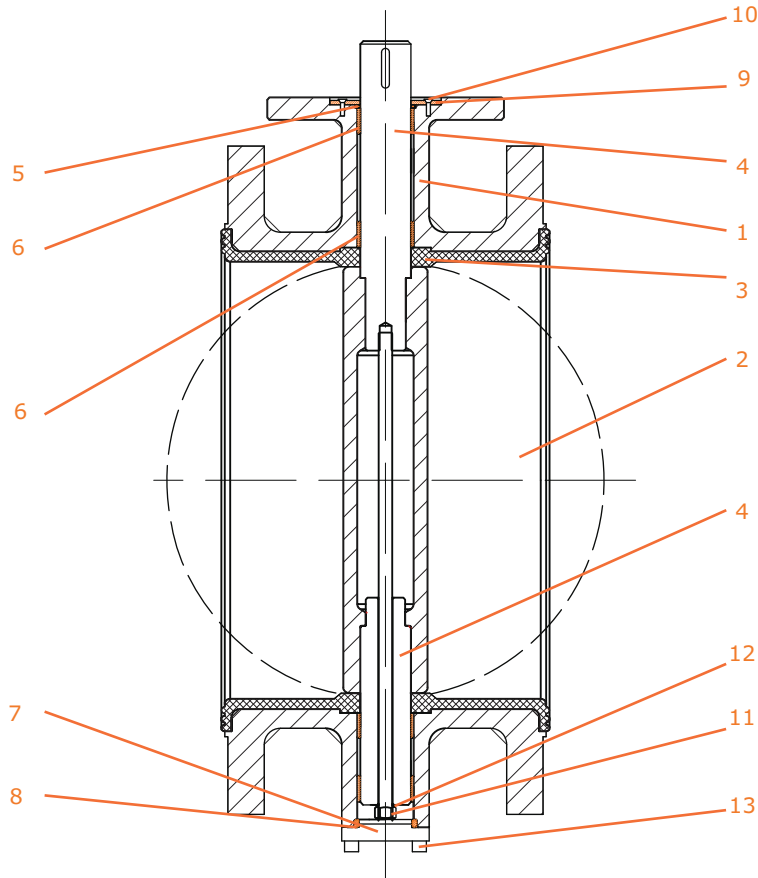
Dim.	A	B	C	D1	D2	E	F	G	øH	øI	nxøJ	nxøK	L	M	øZ	ISO	Weight [kg] free stem
DN350	332	278.0	28.5	393.0	493.0	27	179	19	140	125	4 x 18	4 x 14	78	329.6	338.7	F12/F14	56.3
DN400	363	321.5	28.5	456.0	555.1	27	179	20	140	125	4 x 18	4 x 14	102	376.3	389.9	F12/F14	83.5
DN450	397	353.0	39.0	514.0	636.8	36	214	25	165	140	4 x 22	4 x 18	114	425.6	440.6	F14/F16	130.8
DN500	425	400.0	49.0	565.4	706.0	46	214	25	165	140	4 x 22	4 x 18	127	474.7	491.4	F14/F16	174.8
DN600	498	460.0	51.5	668.9	830.5	46	304	31	256	165	8 x 18	4 x 22	154	573.0	593.3	F16/F25	268.6

- Structure and material
- DN50 to DN300
- Type 2400 Double Flanged



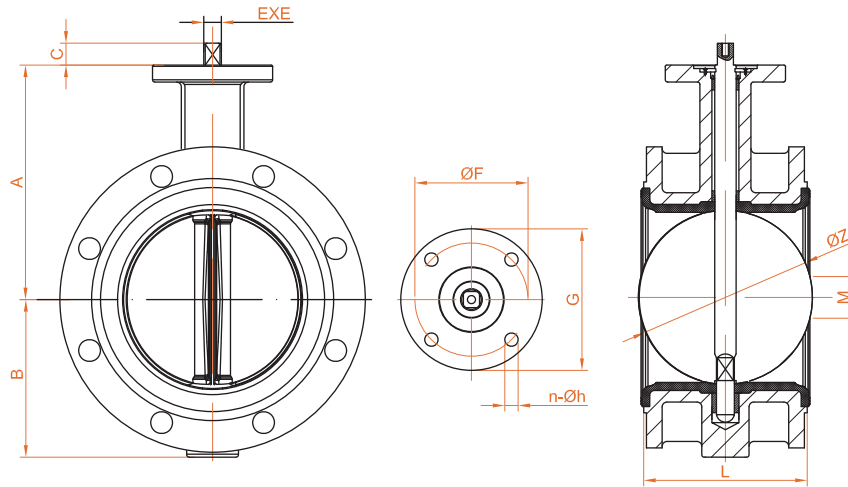
No.	Description	Material	Standard Coating
1	Body	Ductile iron - ASTM A536 Gr 65-45-12 (GGG40) Carbon steel - ASTM A216 WCB (GSC25N) Stainless steel - ASTM A351 CF8M	3 layer coating EPOXY/EPOXY/PUR 160μ RAL 2008
2	Disc	Low alloy stainless steel - ASTM A276 (SS201) Ductile iron - ASTM A536 Gr 65-45-12 (GGG40) Stainless steel - ASTM A351 CF8M Alu-bronze - ASTM B148 C95800 Duplex Hastelloy	Rilsan Halar PFA
3	Seat	NBR EPDM-H FPM	
4	Stem	Stainless steel - SS420 for PN16 Stainless Steel - SS431 for PN20	
5	Weather seal	Same material as seat	
6	Bushing	PTFE+Graphite	
7	Preventing ring	Stainless steel - AISI 304	
8	Screw	Stainless steel - AISI 304	

- Structure and material
- DN350 to DN600
- Type 2400 Double Flanged



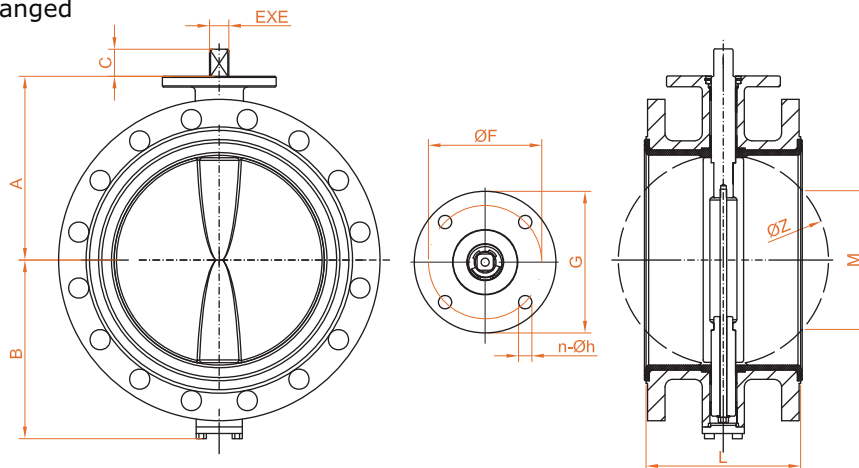
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3	Seat	NBR EPDM-H FPM	
4	Stem	Stainless steel - SS420 for PN10 Stainless Steel - SS431 for PN16 and PN20	
5	O ring	NBR	
6	Bushing	PTFE+Graphite	Graphite inner coating
7	Bottom cover	Same as body material	Polyester RAL 2008
8	O-type ring	NBR	
9	Preventing ring	Stainless steel - AISI 304	
10	Screw	Stainless steel - AISI 304	
11	Bolt & Nut	Stainless steel - AISI 304	
12	O ring	Same material as seat	
13	Bolt	Stainless steel - AISI 304	

■ Dimensions (mm)  
Type 2400-Double flanged  
DN50 to D350



Dim.	A	B	C	E	ØF	G	Top Flange	n-Øh	L	M	ØZ	Weight [kg] Free stem
DN50	142	80	14	11	50	65	F05	4 - 8	108	-	53	9.0
DN65	155	89	14	11	50	65	F05	4 - 8	112	-	65	12.0
DN80	161	95	14	11	50	65	F05	4 - 8	114	-	79	15.0
DN100	180	114	14	14	50	65	F05	4 - 8	127	-	104	18.0
DN125	193	127	20	14	70	90	F07	4 - 8	140	-	124	20.7
DN150	205	139	20	17	70	90	F07	4 - 10	140	68.8	156	23.9
DN200	250	175	25	22	102	125	F10	4 - 12	152	134.4	203	34.7
DN250	282	203	25	22	102	125	F10	4 - 12	165	189.0	251	49.5
DN300	326	242	27	22	102	125	F10	4 - 12	178	243.8	302	65.4

■ Dimensions (mm)  
Type 2400-Double flanged  
D3N50 to D600



Dim.	A	B	C	E	ØF	G	Top Flange	n-Øh	L	M	ØZ	Weight [kg] Free stem
DN350	358	267	30	22	125	150	F12	4 - 14	190	274.7	334	134.1
DN400	380	301	30	22	125	150	F12	4 - 14	216	324.7	390	119.3
DN450	422	381	40	27	140	175	F14	4 - 18	222	381.0	441	144.0
DN500	479	387	40	27	140	175	F14	4 - 18	229	435.8	492	168.8
DN600	562	457	50	36	165	210	F16	4 - 23	267	529.5	593	248.0



## Torques and flow capacities for type 2230/2240

Kv-valve rated flow coefficients (m<sup>3</sup>/h at 1 bar ΔP)

Opening angle

Dim.	Sizing - Torque / Nm *1	Sizing - Torque / Nm *2	10°	20°	30°	40°	50°	60°	70°	80°	90°
DN40	14	22	<1	<1	4	12	17	32	45	53	62
DN50	15	22	<1	<1	5	14	29	47	71	98	107
DN65	23	34	1	2	11	27	50	77	122	171	213
DN80	32	45	3	6	28	54	91	140	213	301	404
DN100	48	54	5	14	57	108	175	262	404	594	799
DN125	77	84	6	27	84	156	248	385	624	954	1239
DN150	110	124	7	51	129	224	363	572	977	1535	1929
DN200	195	210	22	114	229	401	639	1018	1755	2880	3484
DN250	290	455	33	171	334	634	970	1530	2650	4403	5753
DN300	402	672	49	250	490	925	1416	2231	3865	6641	8828
DN350	793	910	118	301	631	1131	1918	3081	4963	8884	10308
DN400	1094	1120	153	393	824	1478	2506	4024	6482	11603	13464
DN450	1497	1200	195	498	1043	1871	3170	5093	8210	14686	17041
DN500	2100	1372	240	615	1288	2309	3913	6287	10128	18130	21038
DN600	3500	2910	345	885	1853	3326	5635	9054	14584	26109	30295

\*1) NBR / EPDM / FPM, \*2) PTFE (Only available as type 2230)

Kv = The number of m<sup>3</sup> per hour of 20° C water at 1 bar pressure drop.

Cv = 1.167 Kv.

Cv = The number of US gallons per minute of 60° F water at 1 psi pressure drop.

## Torques and flow capacities for type 2400

Kv-valve rated flow coefficients (m<sup>3</sup>/h at 1 bar ΔP)

Opening angle

Dim.	Sizing Torque / Nm	10°	20°	30°	40°	50°	60°	70°	80°	90°
DN50	23	1	3	9	21	39	64	93	104	109
DN65	29	2	6	17	39	72	123	177	199	208
DN80	44	4	10	26	63	114	193	278	313	327
DN100	75	7	13	37	85	151	226	452	567	604
DN125	100	11	30	59	148	247	435	740	919	991
DN150	125	17	45	89	223	372	654	1112	1380	1486
DN200	213	30	68	160	267	482	749	1417	2434	2674
DN250	288	49	127	254	425	764	1189	2252	3867	4260
DN300	450	75	195	380	655	1171	1823	3453	5929	6538
DN350	850	101	262	526	871	1580	2456	4648	7981	8817
DN400	1225	130	342	684	1123	2051	3188	6039	10358	11392
DN450	1688	169	445	890	1484	2672	4156	7868	13508	14859
DN500	2125	212	560	1121	1864	3363	5231	9903	16999	18624
DN600	3625	312	820	1640	2734	4923	7657	14493	24889	27342

Kv = The number of m<sup>3</sup> per hour of 20° C water at 1 bar pressure drop.

Cv = 1.167 Kv.

Cv = The number of US gallons per minute of 60° F water at 1 psi pressure drop.

### Note:

- The charted torque values are based on lubricating media. Temperatures from 0° C to 80° C. Valves are activated at least once a month. For other liquid applications and lubricating gases, multiply values by 1.1. For non-lubricating and dry media, multiply values by 1.2.
- The charted operating torque is the sum of all friction and resistance for opening and closing of the disc within the standard differential pressure of 2" to 8" 16bar, 10" and bigger size 10bar.
- The effect of dynamic torque is not considered in tabulation.
- **Sizing torque:** Torque required when using Actuator or Gear.

## Valve sizing

Determining the size of butterfly valves for control purposes should not be done on the basis of the nominal diameter of the pipe but should be calculated on the basis of the operating characteristics in order to attain the correct control characteristics.

Butterfly valves Type 2230 / Type 2240 from Coreline are designed with approximately equal percentage characteristics over an opening angle of 65°.

You only need to consider the opening angle when determining the size of control valves. When determining the valve nominal diameter calculate the Kv value from the below formula:

Example: DN 100

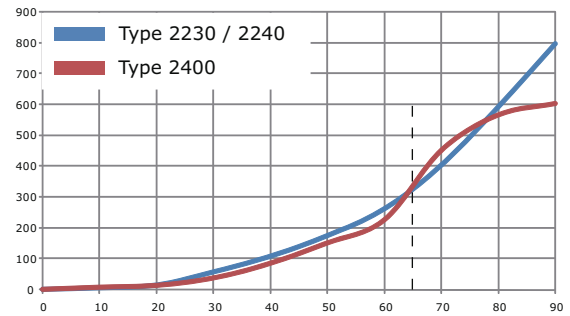
**Liquid:**  

$$K_v = Q \times \sqrt{\frac{\rho}{\Delta p}}$$

**Gas:**  

$$K_v = \frac{V_N}{514} \sqrt{\frac{G \times T}{\Delta p \times p_d}}$$

$K_v$  = Flow coefficient.  
 $Q$  = Max. flow volume in m<sup>3</sup>/h.  
 $\rho$  = Exact weight in kg/dm<sup>3</sup>.  
 $\Delta p$  = Pressure drop in bar.  
 $V_N$  = Max. flow in Nm<sup>3</sup>/h.  
 $G$  = Exact weight in kg/Nm<sup>3</sup>.  
 $T$  = Absolute temp. in Kelvin.  
 $P_d$  = Absolute pressure downstream in bar



## Approvals

- CE - according to PED 97/23/EC
- 3.1 certificate according to EN 10204
- NBR / EPDM certification
- ATEX certification



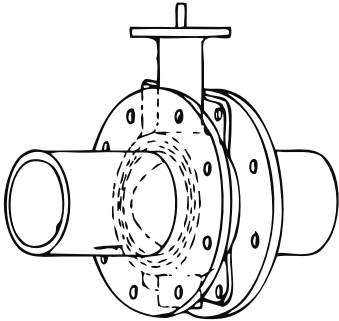
## Chart for temperature and resistance

Liner	Temperature	Suitable for	Unsuitable for
EPDM-H	- 15 °C + 120 °C	Water, steam, alcohol, glycol, caustic soda, ozone, food products, glycerine, milk, oxygen, air, saturated salt, iron chloride, gelatine, dry hydrogen sulphide, potassium chloride, sodium, magnesium chloride	Mineral oil, chlorine compounds, ketones, acetyl, chloride, asphalt, bromine, butane, butyl, petrol, diesel oil, acid, fish oil, freon, chlorine, natural gas, exhaust gas, nitric acid
NBR	- 10 °C + 80 °C	Mineral oil, grease, air, seawater, gas, boric acid, aluminium chloride, ammonia gas, citric acid, diesel oil, fish oil, petrol, gelatine, glycerine, magnesium chloride, lactic acid, linseed oil, natural gas	Ozone, acetone, aniline, chlorine dioxide, chromic acid, phenol, ethyl acetate, freon 21+22+23, hot nitric acid, styrene, hydrogen sulphide, isopropyl acetate, oxygen, sulphuric acid
NATURAL RUBBER	- 30 °C + 80 °C	Abrasive medium, aluminium chloride, sugar beet fluid, boric acid, potassium chloride, citric acid, magnesium chloride, ferritic nitrate, formic acid, gelatine, sugar, glycerine, lactic acid, nitrogen	Steam, aniline, asphalt, butadiene, diesel oil, ethane, ethyl acetate, hydraulic oil, hydrochloric acid, linseed oil, methane, mineral oil, oxygen, styrene, soyabean oil, turpentine
HYPALON*	- 20 °C + 75 °C	Mineral, organic and inorganic chemicals, air, oxygen, fish oil, glycerine, citric acid, ozone, sodium sulphate	Ammonia, diesel oil, grease, ketone, methyl, phenol, propyl, bromine, nitric acid, tar, urea, varnish, lectine
SILICONE*	- 40 °C + 170 °C	Food products, ammonia gas, barium, boric acid, potassium, bisulphite, citric acid, copper cyanide, glycerine, nitrogen, lactic acid	Steam and hot water (max. 100° C), asphalt, diesel oil, ethane, freon, ethyl chloride, methane, nitric acid, olive oil, propane, turpentine
FPM	- 20 °C + 170 °C	Oil, mineral acid, grease, phosphorus, tannic acid, gelatine, glycol, oxygen, slaked lime, carbon acid, natural gas, pulp, salt, sugar, sulphur	Hot water, steam, ketone, ammonia gas, acetone, formaldehyde, cellulose acetate, freon, urea, ethanoic acid, methyl
PTFE on silicone backup	-40 °C +180 °C	Solvents and corrosive media.	Alkaline metals and abrasive materials.

Note: materials marked with \* available on special request only.

## Installation Guide

### Installation guide for Butterfly Valves

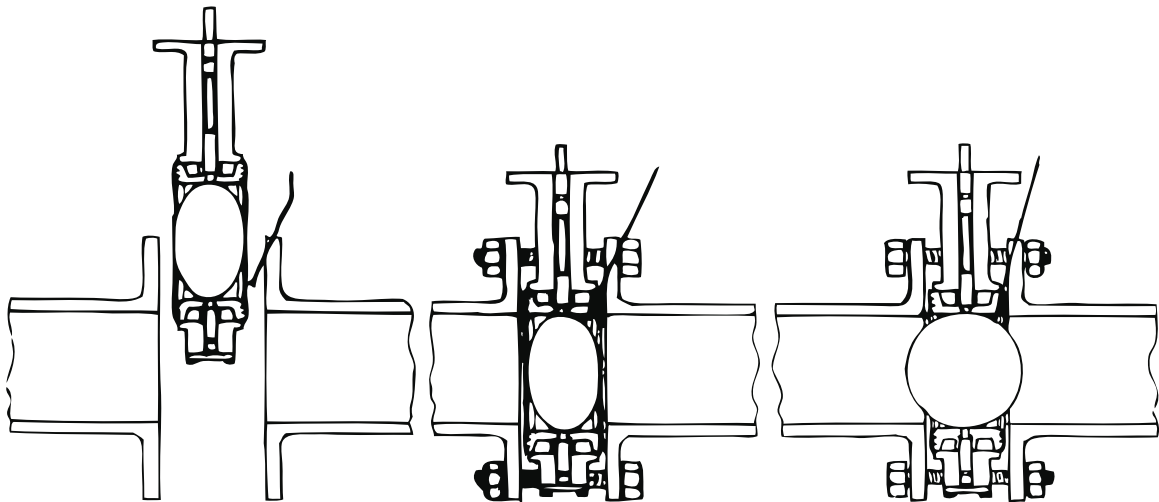


- Check that the specifications on the identification plate meet the requirements regarding pressure, temperature and media.
- The piping must have a straight line and the flanges have to be parallel. Furthermore there must be a distance between the flanges, corresponding to the face-to-face dimensions of the butterfly valve.
- The butterfly valve can be mounted in any direction. However if there are a lot of dirt particles on the bottom of the pipe, it will be suitable to mount the stem of the butterfly valve horizontally. This will protect the pivot point of the disc.
- Before commissioning, the pipework has to be rinsed out to remove dirt and remnants of welding material, to avoid damage on the liner. During the rinsing procedure, the butterfly valve has to be positioned as open and may not be operated before the rinsing has been completed.
- Welding operations may not be performed nearby the butterfly valve, as welding drops can damage the liner.
- Do not use gaskets. The liner works as sealing to the atmosphere.
- Where vacuum, high flow rate or water hammering can occur, flanges without a loose collar should be used, to obtain the best conditions.

Carefully place the butterfly valve between the flanges, with the disc in closed position.

Check that the flange covers the area of the liner. Afterwards tighten the bolt on the flange by hand.

Carefully open and close the valve to check that the disc centralizes and the disc does not touch the flange. With the disc in the open position, tighten crosswise with a wrench.

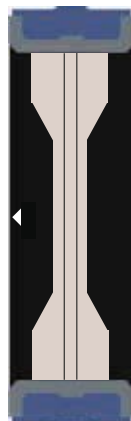


As the butterfly valves are equipped with the unique wave shaped liner, the operation of the valves, either free stem, handle or gear operated, has to follow the guidelines as shown below.

A small triangular shaped figure is placed on the liner - this triangle indicates which way the disc opening.

The disc has to rotate clockwise(CW) when closing - in order to have the lowest possible torque - and thus the longest possible life time.

Turn disc CW towards arrow to open



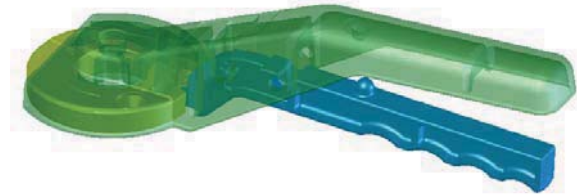
Turn 88° CW to close

Construction - Handlever

- Lever, locker and plate are made from Aluminium alloy.
- Convenient installation and usage.
- Excellent surface design and comfortable operating.
- Position can be locked by fixing one bolt and nut in the lever hole.
- Standard powder epoxy coating.

Handlever

For DN40 to DN250



Dimensions (mm) and Materials

■ For DN40 to DN150

For DN200

For DN50 to DN80 valve	For DN125 to DN150 valve
For DN100 valve	For DN200 to

## Construction - Gear Operators - DN 40 to DN 300

Gearboxes

- Aluminium alloy housing

Type 5595  
(DN50 - DN300)

- Steel input shaft

- Steel worm gear

- Ductile iron output gear segment

- Waterproof enclosure

- Units provided with handwheel

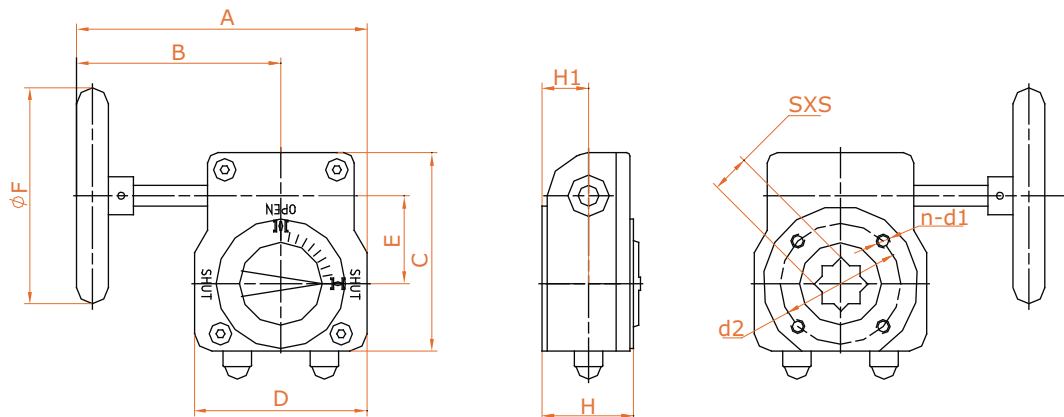
- Adjustable travel stops are standard and factory set

- AISI 304 standard bolts and nuts

- Dimensions are valid for type 2230 and 2240



## Dimensions (mm)



Type	Valve dim.	S x S	D2	n-d1	Ratio	Output torque (Nm)	Input torque (Nm)	A	B	C	D	E	øF	H	H1	Weight (Kg)
5595-10-11	DN 40	11 x 11											100			1.0
5595-10-11	DN 50	11 x 11	50	4 - M6 x 20	40:1	150	5	148	108	98	80	43	100	48	26	1.0
5595-10-11	DN 65	11 x 11											100			1.0
5595-15-11	DN 80	11 x 11											120			1.2
5595-20-14	DN 100	14 x 14											120			1.9
5595-20-14	DN 125	14 x 14	70	4 - M8 x 25	37:1	250	12	169	119	115	100	50	120	55	27	1.9
5595-20-17	DN 150	17 x 17											200			1.9
5595-30-22	DN 200	22 x 22	102										300	71	38	5.6
5595-30-22	DN 250	22 x 22	102	4 - M10 x 30	45:1	750	30	296	223	155	146	60	300			5.6
5595-30-27	DN 300	27 x 27	125										300			5.5

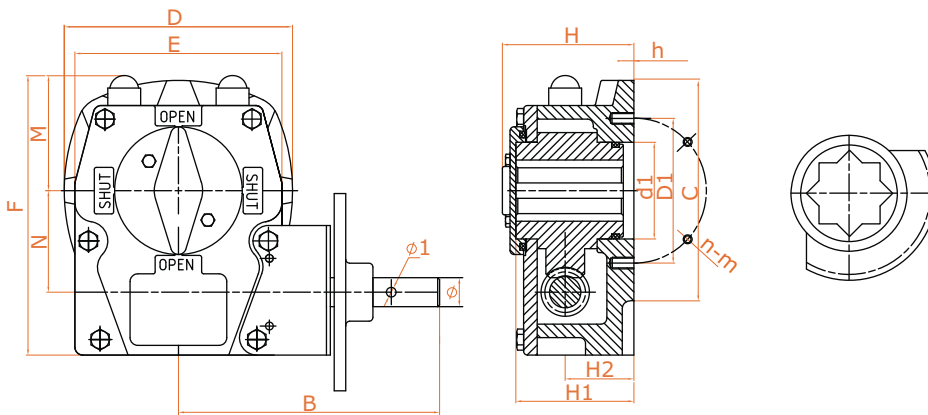
## Construction - Gear Boxes - DN 350 to DN 600

Gearboxes

Type 5595  
(DN350 - DN600)

- Ductile iron housing
- One piece steel input shaft and worm gear
- Ductile iron output gear segment
- Waterproof enclosure
- Units provided with handwheel
- Adjustable travel stops are standard and factory set
- AISI 304 standard bolts and nuts
- Dimensions are valid for type 2230 and 2240

## General Parameters



## ■ General Information

Type	Valve dim.	Ratio	Output torque (Nm)	Input torque (Nm)	Handwheel $\phi$ (mm)	Turns from open to closed	Stem hole size	Bolt size n-m	Weight (Kg)
5595-40-27	DN 350	42:1	994	88	300	10	27 x 27	4 - M16 x 40	17.1
5595-50-27	DN 400	60:1	1789	110	300	15	27 x 27	4 - M16 x 40	32.0
5595-60-36	DN 450	68:1	3381	165	400	17	36 x 36	4 - M16 x 45	32.0
5595-60-46	DN 500	68:1	3381	165	400	17	46 x 46	4 - M20 x 45	32.0
5595-70-46	DN 600	88:1	4474	169	500	22	46 x 46	8 - M16 x 55	46.1

## ■ Dimensions

Type	Mounting flange	D1	d1	$\phi$	$\phi 1$	B	C	D	H	H1	H2	h	E	F	M	N
5595-40	F14 / F10	140	65	20	6	168	147	150	81	73	42	7.5	136	157	52	67
5595-50	F16 / F12	140	90	20	6	185	192	198	98	80	50	5.2	184	217	86	90
5595-60	F16 / F14	165	115	30	8	250	235	252	105	92	50	9.5	248	292	114	123
5595-70	F25 / F16	254	120	30	8	275	290	315	127	113	50	9.5	313	326	117	153

## Construction -

## Actuators

### Actuators

- Body is hard anodized (40μ) as standard but can be supplied PTFE coated or all stainless.

### Spring Return Double Acting

- Twin rack pistons made from die-cast aluminium - hard anodized or from galvanized cast steel.

- End caps are made from die-cast aluminium powder polyester painted, PTFE or nickel plated.

- The pinion is high-precision and integrative, made from nickel-alloy steel.

- Pre-loaded, coated high performance springs are made from corrosion resistance material (only type 5051 - Spring Return Actuators).

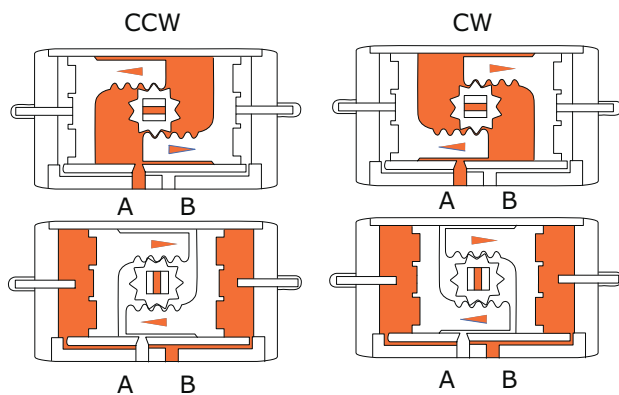
- Two independent external travel stop adjustment bolts can easily and precisely be adjusted +/- 5% at both open and close directions.

- Bearings and guides made from low friction, long life compound material to avoid direct contact between metals.

- NBR o-rings provide trouble-free operation at standard temperature ranges. For low and high temperatures FPM and Silicone are used.

## Actuator Principle and Torque

### ■ Double Acting Actuator



CCW: Air to Port A forces the pistons outwards, causing the pinion to turn counter clockwise while the air is being exhausted from Port B.

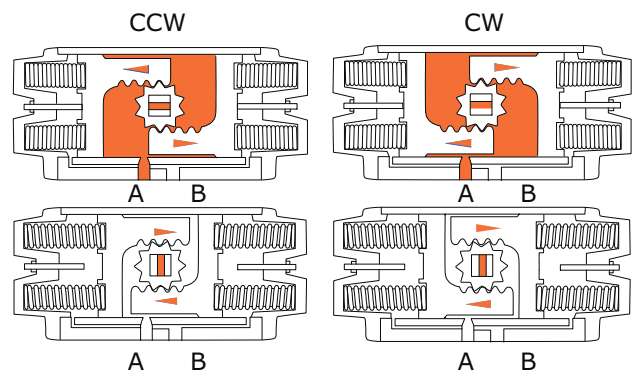
Air to Port B forces the pistons inwards, causing the pinion to turn clockwise while the air is being exhausted from Port A.

CCW is standard at DVC International

CW: Air to Port A forces the pistons outwards, causing the pinion to turn clockwise while the air is being exhausted from Port B.

Air to Port B forces the pistons inwards causing the pinion to turn counter clockwise while the air is being exhausted from Port A.

### ■ Spring Return Actuator



CCW: Air to Port A forces the pistons outwards, causing the springs to compress. The pinion turns counter clockwise while the air is being exhausted from Port B.

Loss of air pressure on Port A, the stored energy in the springs forces the pistons inwards. The pinion turns clockwise while air is being exhausted from Port A.

CCW is standard at DVC International

CW: Air to Port A forces the pistons outwards, causing the springs to compress. The pinion turns clockwise while the air is being exhausted from Port B.

Loss of air pressure on Port A, the stored energy in the springs forces the pistons inwards. The pinion turns counter clockwise while air is being exhausted from Port A.

## Sizing - Actuators

### ■ Double Acting Actuators for Butterfly Valves

Actuator size	Air Supply Pressure Nm at 6 bar	ISO 5211 / mm	Product no.	BV Dimensions	Sizing Torque Nm	ISO 5211 / mm
				DN40	14	F05/11
52	23.9	F03 - F05/11	5050052351	DN50	15	F05/11
				DN65	23	F05/11
63	43.8	F05 - F07/14	5050063574	DN80	32	F05/11
75	60.2	F05 - F07/14	5050075574	DN100	48	F05 - F07/14
83	94.1	F05 - F07/14	5050083577	DN125	77	F07/14
92	135.4	F05 - F07/17	5050092572	DN150	110	F07/17
105	198.4	F07 - F10/22	5050105702	DN200	195	F10/22
125	301.0	F07 - F10/22	5050125702	DN250	290	F10/22
140	513.0	F10 - F12/27	5050140028	DN300	402	F10 - F12/27
160	798.0	F10 - F12/27	5050160028	DN350	793	F12 - F14/27
190	1276.0	F14/27	5050190888	DN400	1094	F12 - F14/27
210	1596.0	F14/36	5050210883	DN450	1497	F14 - F16/36
240	2388.5	F16/46	5050240665	DN500	2100	F14 - F16/46
270	3508.9	F16/46	5050270665	DN600	3500	F16 - F25/46

Please remember that the actuator torque is based on an air supply of 6 bar at the actuator position.

### ■ Spring Return Actuators for Butterfly Valves

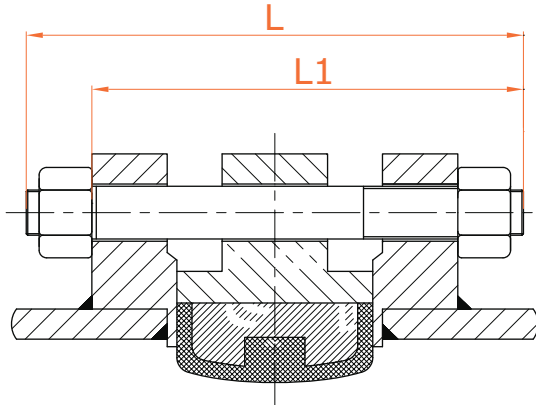
Actuator size	Spring Output Nm Start - End	ISO 5211 / mm	Product no.	BV Dimensions	Sizing Torque Nm	ISO 5211 / mm
63	27.3 - 18.6	F05 - F07/11	5051063351	DN40	14	F05/11
	25.0 - 16.4			DN50	15	F05/11
75	34.9 - 25.4	F05 - F07/11	5051075351	DN65	23	F05/11
	34.7 - 25.3					
83	56.1 - 38.9	F05 - F07/11	5051083574	DN80	32	F05/11
	55.2 - 38.0					
92	79.4 - 53.0	F07 - F07/14	5051092577	DN100	48	F05 - F07/14
	82.5 - 56.0					
105	112.5 - 80.6	F07 - F10/17	5051105707	DN125	77	F07/14
	118.1 - 75.9					
125	176.0 - 113.0	F07 - F10/22	5051125702	DN150	110	F07/17
	188.0 - 125.0					
140	307.0 - 203.0	F10 - F12/22	5051140022	DN200	195	F10/22
	310.0 - 206.0					
160	463.0 - 298.0	F10 - F12/22	5051160022	DN250	290	F10/22
	500.0 - 335.0					
190	797.0 - 535.0	F12/27	5051190228	DN300	402	F10 - F12/27
	742.0 - 480.0					
210	936.0 - 684.0	F14/27	5051210888			
	912.0 - 660.0					
240	1323.0 - 979.0	F14/27	5051240883	DN350	793	F12 - F14/27
	1330.0 - 985.0					
270	2167.0 - 1623.0	F14/27	5051270883	DN400	1094	F12 - F14/27
	1887.0 - 1342.0					

Please remember that the actuator torque is based on an air supply of 6 bar at the actuator position.

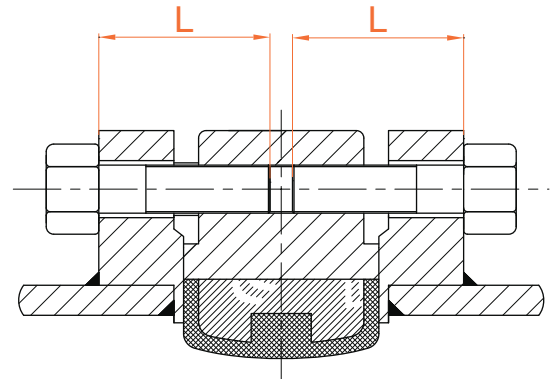


## Size & quantity of bolts for valve installation

Bolt Connection of Fig.2230 Wafer Type Butterfly Valve



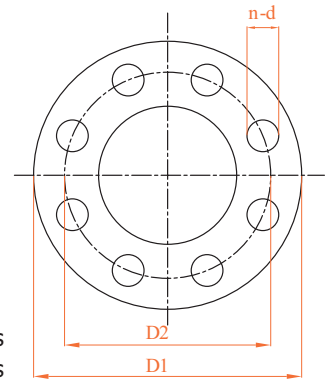
Bolt Connection of Fig.2240 Lug Type Butterfly Valve



SIZE		1.0MPa					1.6MPa					ANSI 125/150, MSS-SP44				
		Stud Bolt (for Fig.223 Valve)			Hexagon Head Bolt (for Fig.224 Valve)		Stud Bolt (for Fig.223 Valve)			Hexagon Head Bolt (for Fig.224 Valve)		Stud Bolt (for Fig.223 Valve)			Hexagon Head Bolt (for Fig.224 Valve)	
(mm)	(inch)	Qty	Dia	Length	Qty	Dia × L	Qty	Dia	Length	Qty	Dia	Qty	UNC	Length	Qty	UNC × L
50	2"	4	M16	130	4×2	M16×40	4	M16	130	4×2	M16×40	4	5/8"	120	4×2	5/8"×35
65	2.5"	4	M16	140	4×2	M16×45	4	M16	140	4×2	M16×45	4	5/8"	130	4×2	5/8"×40
80	3"	8	M16	140	8×2	M16×45	8	M16	140	8×2	M16×45	4	5/8"	133	4×2	5/8"×40
100	4"	8	M16	150	8×2	M16×50	8	M16	150	8×2	M16×50	8	5/8"	139	8×2	5/8"×45
125	5"	8	M16	150	8×2	M16×50	8	M16	150	8×2	M16×50	8	3/4"	152	8×2	3/4"×45
150	6"	8	M20	165	8×2	M20×50	8	M20	165	8×2	M20×50	8	3/4"	155	8×2	3/4"×45
200	8"	8	M20	175	8×2	M20×55	12	M20	175	12×2	M20×55	8	3/4"	165	8×2	3/4"×50
250	10"	12	M20	185	12×2	M20×60	12	M24	185	12×2	M24×60	12	7/8"	183	12×2	7/8"×60
300	12"	12	M20	195	12×2	M20×65	12	M24	200	12×2	M24×65	12	7/8"	196	12×2	7/8"×65
350	14"	16	M20	195	16×2	M20×65	16	M24	200	16×2	M24×65	12	1"	214	12×2	1"×70
400	16"	16	M24	220	16×2	M24×75	16	M27	230	16×2	M27×75	16	1"	241	16×2	1"×85
450	18"	20	M24	250	20×2	M24×80	20	M27	254	20×2	M27×80	16	1 1/8"	265	16×2	1 1/8"×90
500	20"	20	M24	290	20×2	M24×90	20	M30	294	20×2	M30×99	20	1 1/8"	284	20×2	1 1/8"×100
600	24"	20	M27	324	20×2	M27×100	20	M33	334	20×2	M33×100	20	1 1/4"	305	20×2	1 1/4"×110
700	28"	24	M27	334	24×2	M27×100	24	M33	341	24×2	M33×100	28	1 1/4"	350	28×2	1 1/4"×110
750	30"											28	1 1/4"	355	28×2	1 1/4"×110
800	32"	24	M30	364	24×2	M30×100	24	M36	375	24×2	M36×100	28	1 1/2"	410	28×2	1 1/2"×110
900	36"	28	M30	388								32	1 1/2"	450		
1000	40"	28	M33	411								36	1 1/2"	490		

## MATING FLANGE DIMENSIONS

- PN6,10,16,20 ISO 7005/1/2/3 Metallic Flanges
- PN6,10,16 DIN2501 Flanges, Mating Dimensions)
- PN6,10,16 BS4504 Flanges and Bolting, Metric Series
- ANSI CLASS150 ANSI B16.5 Pipe Flanges and Flanged Fittings
- MSS/BS, Class150, MSSSP44 Steel Pipeline Flanges
- BS 3293 Carbon Steel Pipe Flanges
- BS Table D/Table BS10 Flanges and Bolting for Pipes, Valves and Fittings
- API CLASS150 API605 Large Diameter Carbon Steel Flanges
- JIS 5K JISB2211 Basic Dimensions of 5bar Ferrous Materials Pipe Flanges
- JIS 10K JISB2212 Basic dimensions of 10bar Ferrous Materials Pipe Flanges
- JIS 16K JISB2213 Basic dimensions of 16bar Ferrous Materials Pipe Flanges



Size	PN6 (cast iron)					PN 10 (castiron)					PN 16 (castiron)					PN 20					ANSI Class150					MSS/BS. Class150				
DN NPS	D1	D2	d	Bolt	n	D1	D2	d	Bolt	n	D1	D2	d	Bolt	n	D1	D2	d	Bolt	n	D1	D2	d	Bolt	n	D1	D2	d	Bolt	n
40 1 1/2"	130	110	14	M12	4	150	110	18	M16	4	150	110	18	M16	4	130	98.5	16	M14	4	127	98.5	15.9	1/2	4					
50 2"	140	110	14	M12	4	165	125	19	M16	4	165	125	19	M16	4	150	120.5	18	M16	4	152	120.6	19.1	5/8	4					
65 2.5"	160	130	14	M12	4	185	145	19	M16	8	185	145	19	M16	8	180	139.5	18	M16	4	178	139.7	19.1	5/8	4					
80 3"	190	150	19	M16	4	200	160	19	M16	8	200	160	19	M16	8	190	152.5	18	M16	4	191	152.4	19.1	5/8	4					
100 4"	210	170	19	M16	4	220	180	19	M16	8	220	180	19	M16	8	230	190.5	18	M16	8	229	190.5	19.1	5/8	8					
125 5"	240	200	19	M16	8	250	210	19	M16	8	250	210	19	M16	8	255	216.0	22	M20	8	254	215.9	22.4	3/4	8					
150 6"	265	225	19	M16	8	285	240	23	M20	8	285	240	23	M20	8	280	241.5	22	M20	8	279	241.3	22.4	3/4	8					
200 8"	320	280	19	M16	8	340	295	23	M20	8	340	295	23	M20	12	345	298.5	22	M20	8	343	298.5	22.4	3/4	8					
250 10"	375	335	19	M16	12	395	350	23	M20	12	400	355	28	M24	12	405	362.0	26	M24	12	406	362.0	25.4	7/8	12					
300 12"	440	395	23	M20	12	445	400	23	M20	12	455	410	28	M24	12	485	432.0	26	M24	12	483	431.8	25.4	7/8	12	483	432	25	7/8	12
350 14"	490	445	23	M20	12	505	460	23	M20	16	520	470	28	M24	16	535	476.0	29.5	M27	12	533	476.3	28.5	1	12	535	476	29	1	12
400 16"	540	495	23	M20	16	565	515	28	M24	16	580	525	31	M27	16	600	540.0	29.5	M27	16	597	539.8	28.5	1	16	595	540	29	1	16
450 18"	595	550	23	M20	16	615	565	28	M24	20	640	585	31	M27	20	635	578.0	32.5	M30	16	635	577.9	31.8	1 1/8	16	635	578	32	1 1/8	16
500 20"	645	600	23	M20	20	670	620	28	M24	20	715	650	34	M30	20	700	635.0	32.5	M30	20	699	635.0	31.8	1 1/8	20	700	635	32	1 1/8	20
600 24"	755	705	26	M24	20	780	725	31	M27	20	840	770	37	M33	20	815	749.5	32.5	M33	20	813	749.3	35.1	1 1/4	20	815	749	35	1 1/4	20
700 28"	860	810	26	M24	24	895	840	31	M27	24	910	840	37	M33	24											925	863	35	1 1/4	28
750 30"	920	865	31	M27	24	965	900	34	M30	24	970	900	37	M33	24											985	914	35	1 1/4	28
800 32"	975	920	31	M27	24	1015	950	34	M30	24	1025	950	40	M36	24											1060	978	41	1 1/2	28
900 36"	1075	1020	31	M27	24	1115	1050	34	M30	28	1125	1050	40	M36	28											1170	1086	41	1 1/2	32
1000 40"	1175	1120	31	M27	28	1230	1160	37	M33	28	1230	1160	43	M39	28											1290	1200	41	1 1/2	36
1100 44"	1305	1240	34	M30	32	1340	1270	37	M33	32	1355	1270	43	M39	32											1405	1314	41	1 1/2	40
1200 48"	1405	1340	34	M30	32	1455	1380	40	M36	32	1485	1390	49	M45	32											1510	1422	41	1 1/2	44

Size	BS TABLE D					BS TABLE E					JIS 5K					JIS 10K					JIS 16K									
DN NPS	D1	D2	d	Bolt	n	D1	D2	d	Bolt	n	D1	D2	d	Bolt	n	D1	D2	d	Bolt	n	D1	D2	d	Bolt	n	D1	D2	d	Bolt	n
40 1 1/2"	133.4	98.4	15.9	1/2	4	133.4	98.4	15.9	1/2	4	120	95	15	M12	4	140	105	19	M16	4	140	105	19	M16	4	140	105	19	M16	4
50 2"	152.4	114.3	19.1	5/8	4	152.4	114.3	19.1	5/8	4	130	105	15	M12	4	155	120	19	M16	4	155	120	19	M16	4	155	120	19	M16	8
65 2.5"	165.1	127.0	19.1	5/8	4	165.1	127.0	19.1	5/8	4	155	130	15	M12	4	175	140	19	M16	4	175	140	19	M16	8	175	140	19	M16	8
80 3"	184.2	146.1	19.1	5/8	4	184.2	146.1	19.1	5/8	4	180	145	19	M16	4	185	150	19	M16	8	200	160	23	M20	8	200	160	23	M20	8
100 4"	215.9	177.8	19.1	5/8	4	215.9	177.8	19.1	5/8	8	200	165	19	M16	8	210	175	19	M16	8	225	185	23	M20	8	225	185	23	M20	8
125 5"	254.0	209.6	19.1	5/8	8	254.0	209.6	19.1	5/8	8	235	200	19	M16	8	250	210	23	M20	8	270	225	25	M22	8	270	225	25	M22	8
150 6"	279.4	235.0	19.1	5/8	8	279.4	235.0	22.2	3/4	8	265	230	19	M16	8	280	240	23	M20	8	305	260	25	M22	12	305	260	25	M22	12
200 8"	336.6	292.1	19.1	5/8	8	336.6	292.1	22.2	3/4	8	320	280	23	M20	8	330	290	23	M20	12	350	305	25	M22	12	350	305	25	M22	12
250 10"	406.4	355.6	22.2	3/4	8	406.4	355.6	22.2	3/4	12	385	345	23	M20	12	400	355	25	M22	12	430	380	27	M24	12	430	380	27	M24	12
300 12"	457.2	406.4	25.4	7/8	12	457.2	406.4	25.4	7/8	12	430	390	23	M20	12	445	400	25	M22	16	480	430	27	M24	16	480	430	27	M24	16
350 14"	527.1	469.9	25.4	7/8	12	527.1	469.9	25.4	7/8	12	480	435	25	M22	12	490	445	25	M22	16	540	480	33	M30	16	540	480	33	M30	16
400 16"	577.9	520.7	25.4	7/8	12	577.9	520.7	25.4	7/8	12	540	495	25	M22	16	560	510	27	M24	16	605	540	33	M30	16	605	540	33	M30	16
450 18"	641.4	584.2	25.4	7/8	12	641.4	584.2	25.4	7/8	16	605	555	25	M22	16	620	565	27	M24	20	675	605	33	M30	20	675	605	33	M30	20
500 20"	704.9	641.4	25.4	7/8	16	704.9	641.4	25.4	7/8	16	655	605	25	M22	20	675	620	27	M24	20	730	660	33	M30	20	730	660	33	M30	20
600 24"	825.5	755.7	28.5	1	16	825.5	755.7	31.7	1 1/8	16	770	715	27	M24	20	795	730	33	M30	24	845	770	39	M36	24	845	770	39	M36	24
700 28"											875	820	27	M24	24	905	840	33	M30	24	960	875	42	M39	24	960	875	42	M39	24
750 30"	997.0	927.1	31.7	1 1/8	20	997.0	927.1	34.9	1 1/4	20	945	880	33	M30	24	970	900	33	M30	24	1020	935	42	M39	24	1020	935	42	M39	24
800 32"											995	930	33	M30	24	1020	950	33	M30	28	1085	990	48	M45	24	1085	990	48	M45	24
900 36"	1174.8	1092.2	34.9	1 1/4	24	1174.8	1092.2	34.9	1 1/4	24	1095	1030	33	M30	28	1120	1050	33	M30	28	1185	1090	48	M45	28	1185	1090	48	M45	28
1000 40"											1195	1130	33	M30	28	1235	1160	39	M36	28	1320	1210	56	M52	28	1320	1210	56	M52	28
1100 44"											1305	1240	33	M30	28	1345	1270	39	M36	28	1420	1310	56	M52	32	1420	1310	56	M52	32
1200 48"	1492.3	1409.7	34.9	1 1/4	32	1492.3	1409.7	38.1	1 3/8	32	1420	1350	33	M30	32	1465	1380	39	M36	32	1530	1420	56	M52	32	1530	1420	56	M52	32



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