

# DelVal® Triple Offset Butterfly Valves

## SERIES 4

The Ultimate in High Performance Butterfly Valves

Wafer, Lug, Double Flange and Butt Weld Ends

Sizes 3" to 48" ASME Class 150, Class 300 & Class 600



**Delivering Value..... always!**

DelVal Flow Controls is pleased to offer top-of-the-line products in pipeline flow control. The DelVal® Series 4 Triple Offset Butterfly Valve has been developed with extensive application, design and manufacturing expertise. These products are produced by employing modern manufacturing practices under a robust quality assurance system. These practices ensure consistent product quality and dependable performance. The DelVal® Series 4 has been designed to include state-of-the-art features that are described in this bulletin.

## Features

### 1. Top Flange

The top flange is drilled as per ISO 5211 to accommodate direct mounting of a wide range of actuators.

### 2. Stem

Robust single piece stem, located in stem bearings at drive and non-drive end of body, supports the disc against the pressure exerted by the fluid and minimizes disc and stem deflection. This facilitates bi-directional sealing of the valve. An anti-blow-out retainer ring makes the stem blow-out proof.

### 3. Stem Seal

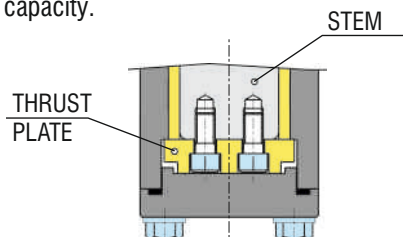
Stem seal assembly is live loaded with two Belleville Springs. This ensures continuous compression of packing and sealing. Rocker shaped gland bridge compensates for uneven adjustment of gland bolts. Adjustable stem packing with multiple graphite rings seal on high surface finish of the stem and ensures tight sealing, suitable for fugitive emission control.

### 4. Bearings

SS316+Nitriding bearings with graphite rings for bearing ingress protection are installed in the drive and non-drive end stem bores of the body. Bearings are designed to take high radial and axial stem loads due to pressures.

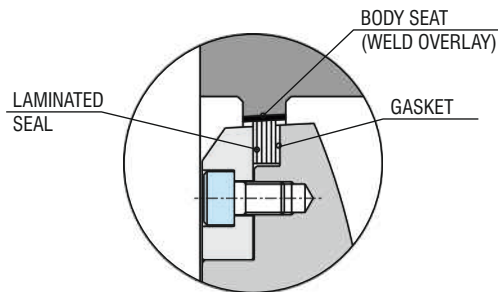
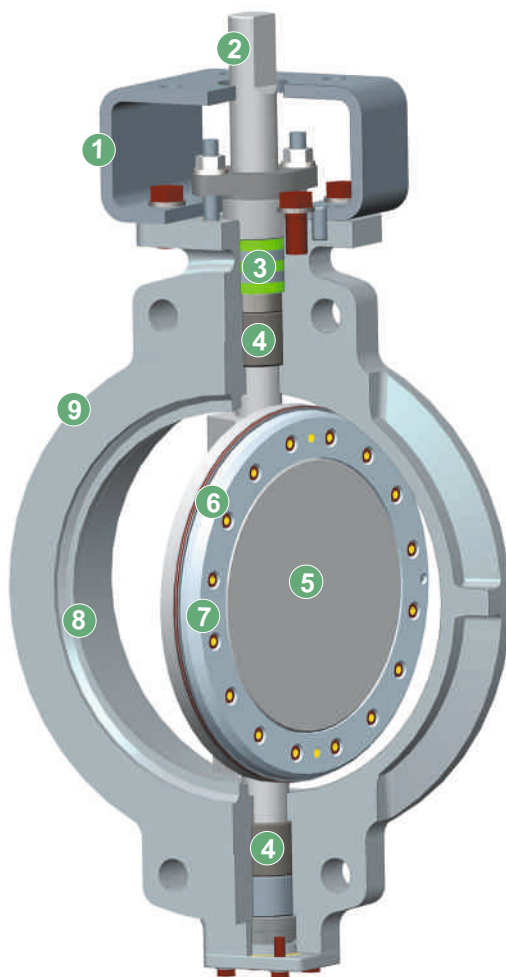
### 5. Disc

Disc is designed with a profile to minimize resistance to flow and pressure drop across the valve and maximize the flow capacity.

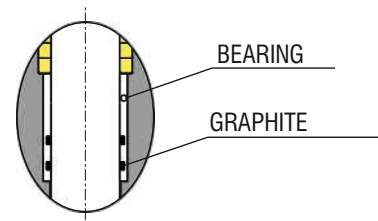


#### STEM BLOW-OUT PROOF DESIGN

Thrust plate is fixed to the bottom of shaft with two screws that retain the shaft against blowout.



#### LAMINATED SEAL



#### BEARING DESIGN

Reinforced flexible graphite bearing protectors provide the highest level of protection to the bearings from dirty service while extending service life.

### 9. Body

Body is single-piece cast construction, with options of wafer, lug, double flanged or butt-welded ends and face to face dimensions and pressure rating conforming to international standards.

### 8. Seat

Seat is integral on body and is hard faced with Stellite or suitable alloy. Seat is precision machined to ensure perfect match with the seal ring. This (a) provides bubble tight seal, (b) prevents galling and friction during seating and unseating, (c) provides resistance to erosion during high velocity fluid flow and (d) prevents corrosion due to media.

### 7. Seal Ring Retainer

Seal ring is clamped rigidly on the disc face by the seal ring retainer. The retainer is made of identical metal as the disc and combines the disc, seal ring and retainer into a robust, composite unit for bubble tight, bi-directional sealing.

### 6. Seal Ring

Conical, laminated seal ring is located on the disc. It is precision machined for bi-directional, bubble tight sealing. Alternating layers of metal and graphite flex generate a circumferential compressive force on the precision machined hard face seat on body. Metal laminations in stainless steel or Inconel provide a rigid back up for the soft graphite laminations. This combination makes the seat suitable for bubble tight sealing at high and low temperatures alike. Seal ring is replaceable.

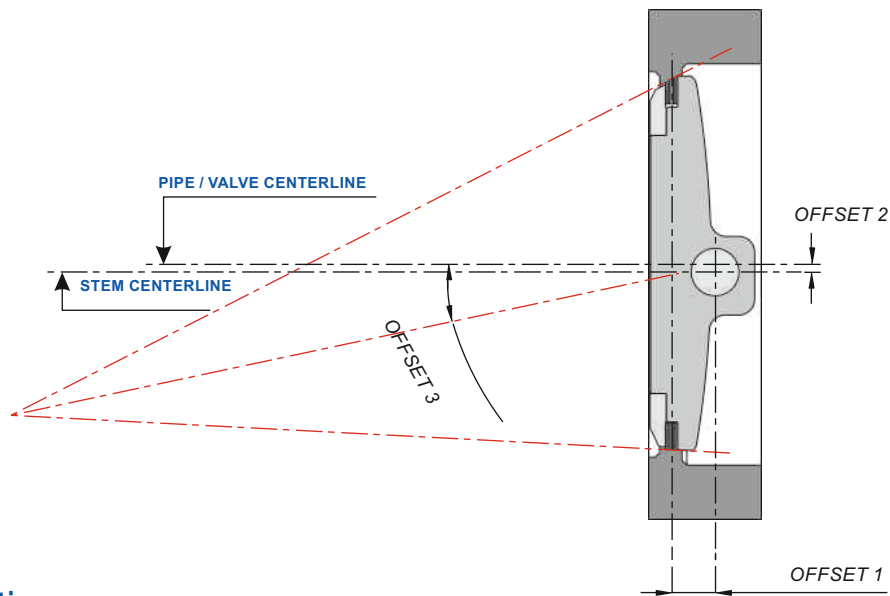
## Principle of Operation

The DelVal® Triple-Offset Butterfly Valves provide bi-directional bubble tight shut-off. This geometry ensures that the disc seal contacts the body seal only at the final shut-off position without rubbing or galling, providing a torque generated resilient seal with sufficient “wedging” to ensure a uniform seal contact.

**Offset 1:** The shaft is located with an offset behind the sealing plane allowing complete sealing contact around the entire seat periphery.

**Offset 2 :** The shaft axis is offset with respect to the pipe and disc centerline providing interference free opening and closing of the valve.

**Offset 3 :** The seat cone axis is offset from the disc centerline to eliminate friction during opening and closing and to achieve uniform compressive sealing around the entire seat.



## Valve Configuration and Options

### Cryogenic

Extended stem and bonnets can be offered for low temperature and cryogenic applications. The design of the bonnet separates the cryogenic fluid flowing through the valve from the stem packing. A small amount of fluid enters into the bonnet and forms vapor at a higher temperature for effective gland sealing. The design for extended stem and bonnet conforms to BS 6364.

### Extended Stem

Valves are available with stem extensions for buried service applications.

### Steam Jackets

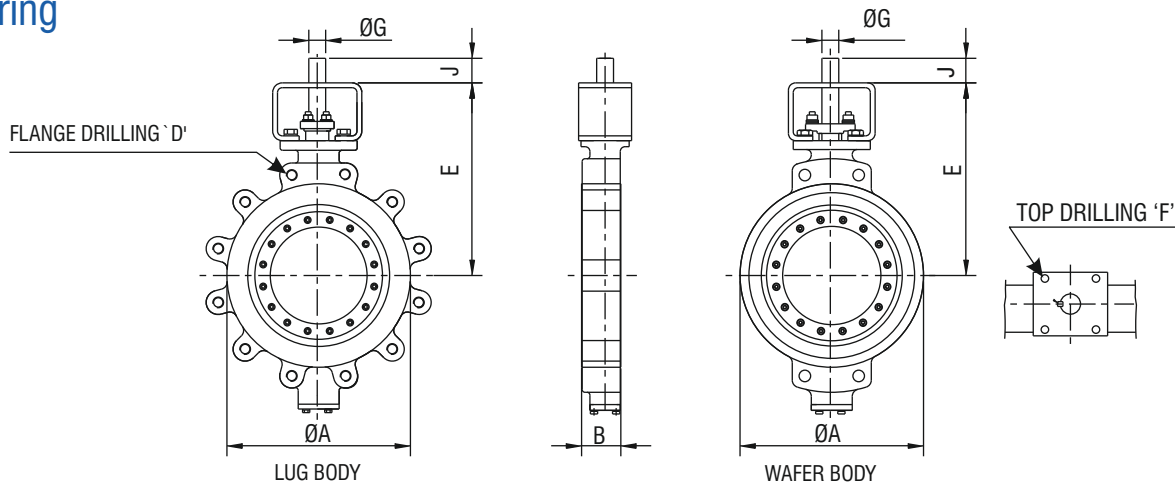
Steam jacketed valves are available for applications where the media tends to crystallize when cooled down.



## Specification and Codes

<b>Design:</b>	API 609, ASME B16.34, BS EN 593, BS EN12516
<b>Face to Face:</b>	API 609, ASME B16.10, ISO 5752, BS EN 558
<b>Testing:</b>	API 598, BS EN 12266-1 Rate 'A', ANSI-FCI 70-2 Class VI, ISO 5208 Rate 'A'
<b>Pressure/Temperature:</b>	ASME B16.34
<b>Flange Accommodation:</b>	ASME B16.5, ASME B16.47 series 'B' Optional - BS EN 1092, ASME B16.47 series 'A'

<b>Fire Safe:</b>	API 607
<b>Butt Weld Ends:</b>	ASME B16.25
<b>Compliance With:</b>	Pressure Equipment Directive PED/97/23/EC
<b>Body Style:</b>	Wafer, Lug, Double Flange and Butt Weld End
<b>Pressure Rating:</b>	ASME Class 150, Class 300 and Class 600
<b>Temperature Range:</b>	-29 °C to 538 °C -196 °C to 700 °C (optional)



## DIMENSIONS (mm)

ASME CLASS 150

Size		ØA	*B	E	F			ØG	J	Key	D			Apx.Weight in Kg.	
Inch	DN				PCD	No.	Dia.				PCD	No.	TAPPING UNC/UN-2B	Wafer	Lug
3	80	127	48	190	70/102	4	10/12	16	32	5x5	152.4	4	5/8-11	9	10
4	100	157	54	225	70/102	4	10/12	20	32	6x6	190.5	8	5/8-11	12	14
6	150	216	57	230	70/102	4	10/12	22	32	6x6	241.3	8	3/4-10	17	20
8	200	270	64	280	102/125	4	12/14	25	32	8x7	298.5	8	3/4-10	26	32
10	250	324	71	327.5	125	4	14	30	51	8x7	362	12	7/8-9	45	52
12	300	381	81	380	125	4	14	35	51	10x8	431.8	12	7/8-9	70	80
14	350	413	92	405	125/140	4	14/18	40	51	12x8	476.3	12	1-8	90	110
16	400	470	102	525	165	4	22	50	64	14x9	539.8	16	1-8	164	190
18	450	534	114	525	165	4	22	55	64	16x10	577.9	16	1 1/8-8	190	230
20	500	584	127	580	165/254	4/8	22/18	60	102	18x11	635	20	1 1/8-8	240	270
24	600	692	154	645	254	8	18	70	102	20x12	749.3	20	1-1/4-8	450	490
28	700	800	165	720	298	8	22	88.9	102	22.23x15.88	-	-	-	660	-
30	750	857	190	750	298	8	22	88.9	102	22.23x15.88	-	-	-	772	-
32	800	914	190	870	298	8	22	101.6	134	25.4x19.05	-	-	-	945	-
36	900	1022	203	890	298	8	22	101.6	134	25.4x19.05	-	-	-	1300	-
40	1000	1124	216	980	356	8	33	120	150	32x18	-	-	-	1540	-
48	1200	1359	254	1150	483	12	40	120	150	32x18	-	-	-	2450	-

ASME CLASS 300

3	80	127	48	190	70/102	4	10/12	16	32	5x5	168.3	8	3/4-10	10	12
4	100	157	54	225	125	4	14	20	32	6x6	200	8	3/4-10	20	25
6	150	216	59	250	125	4	14	22	32	6x6	269.9	12	3/4-10	34	45
8	200	270	73	310	125	4	14	35	51	10x8	330.2	12	7/8-9	50	56
10	250	324	83	382	165	4	22	35	51	10x8	387.4	16	1-8	80	104
12	300	381	92	425	165	4	22	40	51	12x8	450.8	16	1 1/8-8	130	160
14	350	413	117	470	254	8	18	55	64	16x10	514.4	20	1 1/8-8	165	235
16	400	470	133	505	254	8	18	55	64	16x10	571.5	20	1 1/4-8	225	360
18	450	534	149	545	254	8	18	70	102	20x12	628.6	24	1 1/4-8	342	494
20	500	584	159	580	298	8	22	88.9	134	22.23x15.88	685.8	24	1 1/4-8	390	556
24	600	692	181	610	298	8	22	101.6	134	25.4x19.05	812.8	24	1 1/2-8	665	800

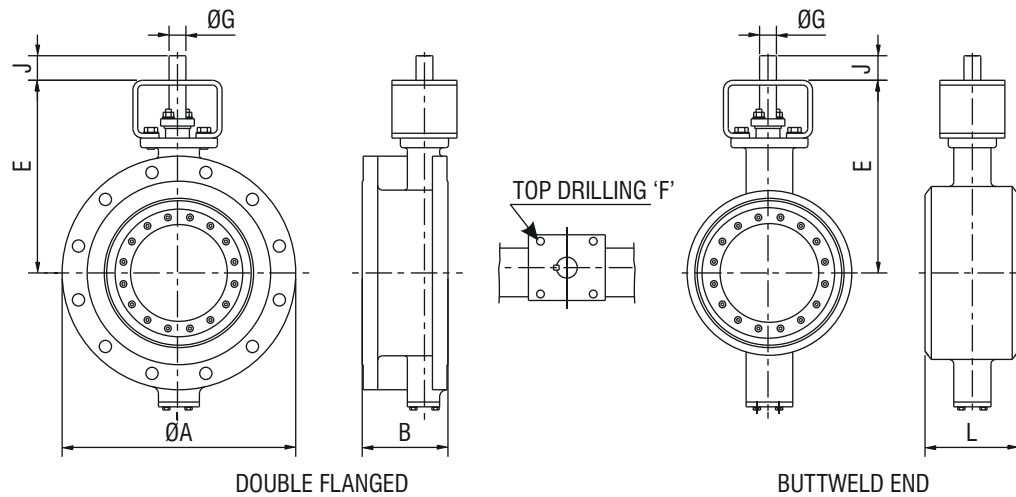
ASME CLASS 600

3	80	146	54	235	125	4	14	30	51	8x7	168.3	8	3/4-10	14	15
4	100	175	64	300	125	4	14	30	51	8x7	215.9	8	7/8-10	26	30
6	150	241	78	360	165	4	22	35	51	10x8	292.1	12	1-8	62	70
8	200	302	102	405	165	4	22	40	51	12x8	349.2	12	1 1/8-8	90	100
10	250	350	117	485	165	4	22	50	51	14x9	431.8	16	1 1/4-8	132	185
12	300	413	140	535	165	4	22	55	64	16x10	489	20	1 1/4-8	220	254
14	350	457	155	610	254	8	18	63.5	102	15.88x15.88	527	20	1 3/8-8	282	324
16	400	508	178	680	254	8	18	76.2	102	19.05x19.05	603.2	20	1 1/2-8	450	514
18	450	575	200	690	298	8	22	88.9	102	22.23x15.88	654	20	1 5/8-8	550	630
20	500	635	216	795	298	8	22	101.6	134	25.4x19.05	723.9	24	1 5/8-8	690	800
24	600	749	232	885	356	8	33	120	150	32x18	838.2	24	1 7/8-8	1086	1240

DelVal reserves rights to change the contents without notice.

\* Face to Face dimension `B` generally conforming to API 609 category B/ BSEN 558-1 / ISO 5752 / ASME B16.10





DIMENSIONS (mm)

ASME CLASS 150

Size		ØA	*B	*L	E	F			ØG	J	Key	Apx. Weight in Kg.	
Inch	DN					PCD	No.	Dia.				DF	BW
3	80	190	114	180	190	70/102	4	10/12	16	32	5X5	14	10
4	100	230	127	190	225	70/102	4	10/12	20	32	6X6	22	14
6	150	280	140	210	230	70/102	4	10/12	22	32	6x6	38	25
8	200	345	152	230	280	102/125	4	10/12	25	32	8x7	55	52
10	250	405	165	250	327	125	4	14	30	51	8X7	90	76
12	300	485	178	270	380	125	4	14	35	51	10x8	152	100
14	350	535	190	290	405	125/140	4	14/18	40	51	12x8	195	138
16	400	595	216	310	525	165	4	22	50	64	14x9	270	228
18	450	635	222	330	525	165	4	22	55	64	16x10	295	258
20	500	700	229	350	580	165/254	4/8	22/18	60	102	18x11	425	295
24	600	815	267	390	645	254	8	18	70	102	20x12	670	442
28	700	925	292	430	720	298	8	22	88.9	102	22.23X15.88	872	660
30	750	985	318	470	750	298	8	22	88.9	102	22.23X15.88	1120	870
32	800	1060	318	470	870	298	8	22	101.6	134	25.4X19.05	1240	995
36	900	1170	330	510	890	298	8	22	101.6	134	25.4X19.05	1722	1090
40	1000	1290	410	550	980	356	8	33	120	150	32x18	2290	1100
48	1200	1510	470	630	1150	483	12	40	120	150	32x18	3450	1250

ASME CLASS 300

3	80	210	114	180	190	70/102	4	10/12	16	32	5x5	18	10
4	100	255	127	190	225	125	4	14	20	32	6x6	32	14
6	150	320	140	210	250	125	4	14	22	32	6x6	84	28
8	200	380	152	230	310	125	4	14	35	51	10x8	100	54
10	250	445	165	250	382	165	4	22	35	51	10x8	130	84
12	300	520	178	270	425	165	4	22	40	51	12x8	225	108
14	350	585	190	290	470	254	8	18	55	64	16x10	310	140
16	400	650	216	310	505	254	8	18	55	64	16x10	406	232
18	450	710	222	330	545	254	8	18	70	102	20x12	525	262
20	500	775	229	350	580	298	8	22	88.9	134	22.23x15.88	664	312
24	600	915	267	390	610	298	8	22	101.6	134	25.4x19.05	955	445

ASME CLASS 600

3	80	210	180	-	235	125	4	14	30	51	8X7	40	-
4	100	275	190	-	300	125	4	14	30	51	8X7	65	-
6	150	355	210	210	360	165	4	22	35	51	10X8	132	65
8	200	420	230	230	405	165	4	22	40	51	12x8	160	95
10	250	510	250	250	485	165	4	22	50	51	14x9	266	170
12	300	560	270	270	535	165	4	22	55	64	16x10	365	220
14	350	605	290	290	610	254	8	18	63.5	102	15.88x15.88	370	310
16	400	685	310	310	680	254	8	18	76.2	102	19.05x19.05	630	480
18	450	745	330	330	690	298	8	22	88.9	102	22.23x15.88	735	570
20	500	815	350	350	795	298	8	22	101.6	134	25.4x19.05	870	800
24	600	940	390	390	885	356	8	33	120	150	32x18	1420	1180

DeVal reserves rights to change the contents without notice.

\* Face to Face dimension 'B' &amp; 'L' generally conforming to API 609 category B/ BSEN 558-1 /ISO 5752 / ASME B16.10

## TORQUE (Nm)

### ASME Class 150

SIZE		Pre. Direction (Shaft Upstream)		Non Pre.Direction (Shaft Downstream)	
Inches	DN	Unseating	Seating	Unseating	Seating
3	80	88	82	51	118
4	100	117	108	68	153
6	150	155	142	92	264
8	200	357	265	102	400
10	250	590	506	306	918
12	300	933	788	392	1182
14	350	1372	1178	609	1568
16	400	1974	1782	867	2646
18	450	2845	1870	1071	3613
20	500	3728	2365	1624	4545
24	600	6420	3200	2788	7000
28	700	12000	6460	4500	14000
30	750	18500	7800	5500	20800
32	800	19600	8850	6750	21650
36	900	27674	14000	8900	32750
40	1000	36350	18050	11500	42850
42	1050	37740	20250	14640	43860
48	1200	60450	28765	21100	67940

## Cv VALUES

### ASME Class 150

SIZE		DISC OPENING ANGLE (IN DEGREE)								
Inches	DN	10	20	30	40	50	60	70	80	90
3	80	5	21	38	56	69	93	125	155	167
4	100	10	39	70	100	125	172	230	282	300
6	150	32	55	98	175	295	440	631	777	804
8	200	59	105	181	321	555	833	1152	1418	1438
10	250	102	185	312	577	928	1392	1989	2458	2522
12	300	150	275	469	867	1382	2099	2862	3546	3855
14	350	205	389	638	1138	1949	2933	4040	4939	5243
16	400	315	583	1005	1764	3050	4600	6303	7755	7940
18	450	420	767	1353	2347	3880	5881	8343	10302	10659
20	500	515	960	1674	2964	4788	7450	9999	12276	12805
24	600	752	1417	2345	4126	7105	10441	14717	18258	19176
28	700	1100	2090	3500	6810	10670	15575	21300	26200	27400
30	750	1250	2330	4000	7210	11450	17640	24000	29635	31000
32	800	1390	2620	4505	8760	13600	20000	27380	33540	35220
36	900	1720	3230	5560	10000	16420	24475	33565	41100	43310
40	1000	2360	4290	7330	13000	21350	32070	44450	54310	57150
42	1050	2370	4508	7775	13650	22700	33950	46820	57400	60225
48	1200	3180	6000	11050	18240	30000	45300	62200	76350	80175

### ASME Class 300

SIZE		Pre. Direction (Shaft Upstream)		Non Pre.Direction (Shaft Downstream)	
Inches	DN	Unseating	Seating	Unseating	Seating
3	80	153	132	73	255
4	100	202	172	103	312
6	150	382	344	196	564
8	200	970	714	403	1238
10	250	1478	1083	696	1764
12	300	2690	1632	1307	2856
14	350	3775	1871	1812	3712
16	400	5970	3655	2881	6844
18	450	8955	4554	4284	9326
20	500	11269	5783	5615	11484
24	600	18814	8372	9200	17868

### ASME Class 300

SIZE		DISC OPENING ANGLE (IN DEGREE)								
Inches	DN	10	20	30	40	50	60	70	80	90
3	80	5	21	38	56	69	93	125	155	167
4	100	10	39	70	100	125	172	230	282	300
6	150	27	50	95	165	270	400	573	703	732
8	200	42	95	160	300	504	760	1045	1277	1350
10	250	85	175	295	553	913	1330	1897	2313	2362
12	300	120	260	459	802	1363	2040	2739	3352	3690
14	350	165	372	603	1122	1846	2791	3742	4590	4851
16	400	245	528	900	1650	2730	4172	5526	6817	7389
18	450	334	720	1218	2196	3515	5460	7511	9246	9399
20	500	395	867	1510	2716	4467	6541	9312	11130	11977
24	600	591	1279	2172	3877	6404	9474	13296	16443	17442

### ASME Class 600

SIZE		Pre. Direction (Shaft Upstream)		Non Pre.Direction (Shaft Downstream)	
Inches	DN	Unseating	Seating	Unseating	Seating
3	80	240	180	65	395
4	100	400	365	100	670
6	150	910	760	290	1400
8	200	1850	1345	1185	2505
10	250	3400	2435	1568	4283
12	300	4690	3170	2272	5620
14	350	7350	4260	3580	8030
16	400	10265	7030	5000	12310
18	450	16455	10220	8725	17995
20	500	20575	13020	11875	21730
24	600	36300	20460	22600	36300

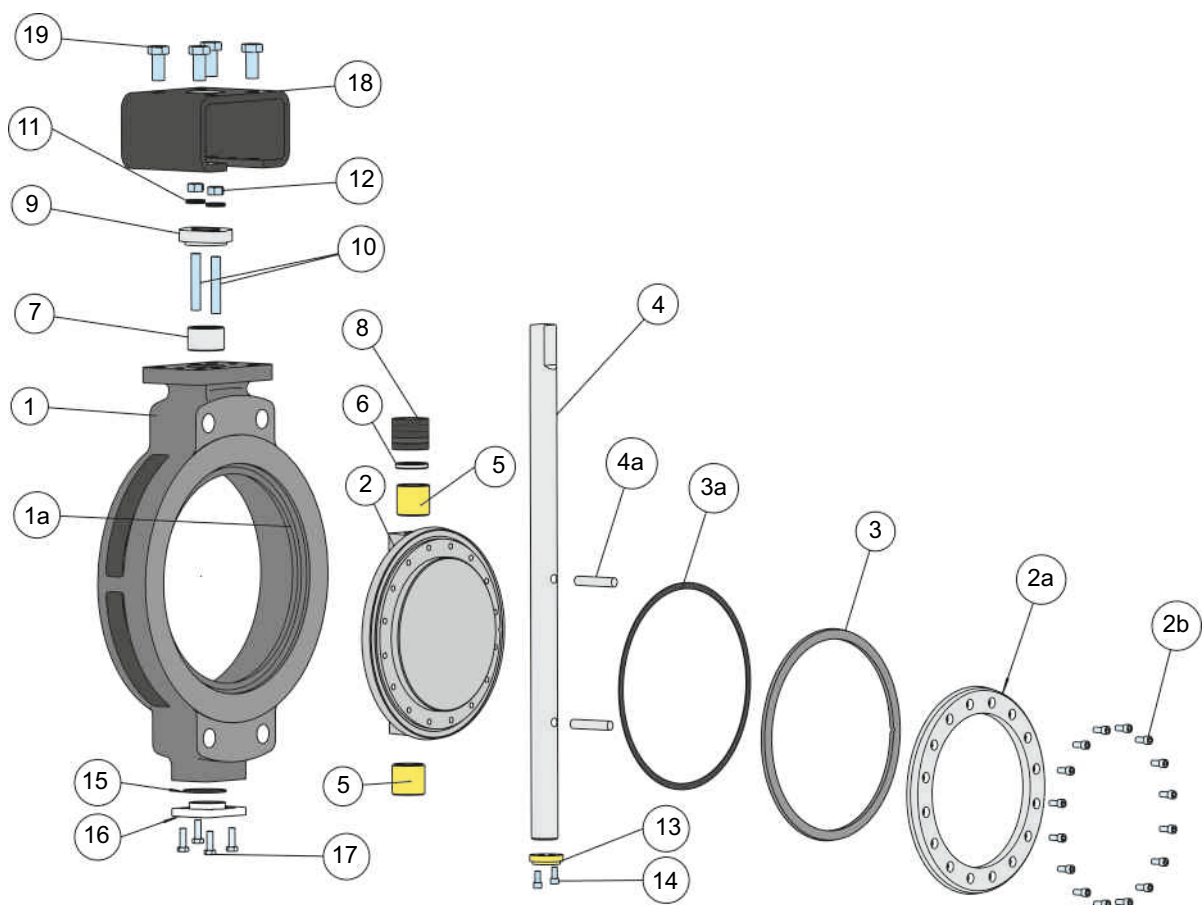
### ASME Class 600

SIZE		DISC OPENING ANGLE (IN DEGREE)								
Inches	DN	10	20	30	40	50	60	70	80	90
3	80	4	16	31	44	52	74	90	115	140
4	100	8	27	56	90	106	120	160	220	245
6	150	20	42	69	137	170	240	430	500	650
8	200	27	100	200	300	460	1020	1070	1200	1310
10	250	42	150	290	460	690	980	1630	1840	2090
12	300	59	200	410	650	970	1390	2300	2600	2950
14	350	73	260	510	800	1200	1710	2840	3200	3640
16	400	100	350	700	1100	1660	2360	3910	4410	5010
18	450	120	440	870	1360	2040	2900	4810	5430	6170
20	500	170	580	1160	1810	2720	3870	6440	7250	8250
24	600	260	900	1800	2830	4250	6050	10000	11300	12900

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Rated Cv=the volume of water in USgpm that will pass through a given valve opening at a pressure drop of 1 psi.

## Materials of Construction



Item	Component	Carbon Steel	Stainless Steel
1	Body	A216 WCB	A351 CF8M A351 CF8
1a	Body Seat	13% Chrome	Stellite Gr.21
2	Disc	A216 WCB A351 CF8 A351 CF8M	A351 CF8 A351 CF8M
2a	Retainer Ring	A240 SS304	A240 SS316 A240 SS304
2b	Retainer Screw	A4-70 (SS316)	
• 3	Seal Ring	SS316 + Graphite SS316 + PTFE Inconel 625 + Graphite SS316 (Solid)	
• 3a	Disc Gasket	Graphite / PTFE	
4	Stem	A564 17-4PH / A479 SS410 A479 XM-19 / A479 SS316	
• 4a	Pin	17-4PH	
• 5	Shaft Bearing	SS316 + Nitriding	
6	Packing Spacer	SS TYPE 316	
7	Gland	SS TYPE 316	

Item	Component	Carbon Steel	Stainless Steel
• 8	Gland Packing	Graphite / PTFE	
9	Gland Flange	Carbon Steel	SS TYPE 304
10	Stud	Gr. B8	
• 11	Belleville Spring	Stainless Steel	
12	Hex Nut	Gr. 8	
• 13	Thrust Bearing	SS316 + Nitriding	
• 14	Soc Hd Cap Screw	A4 -70 (SS316)	
• 15	Bottom Cover Gasket	Graphite / PTFE	
16	Bottom Cover	Carbon Steel	SS TYPE 316
17	Hex Hd bolt	Gr. B8	
18	Bracket	Carbon Steel / Stainless Steel	
19	Hex Hd Bolt	Gr. B8	

### Notes:-

The materials shown are representative, all other materials are available on request eg. LCB, Duplex SS, Super Duplex, Super Austenitic SS.

Material conforms to the requirement of NACE Mr0175 are available.

- Recommended Spares.

## Operators



Valves up to size 48" can be direct mounted with gear operators for manual operation. Gear operators can also be attached with chain-wheel operators for opening or closing valves located on pipelines at high elevations.



All valves can be direct mounted with pneumatic actuators or electric actuators and accessories for complete automation options such as fail open/close and positioner controlled. Valves can be mounted with manual overrides.

## Major Applications

### Refinery

- Fuel Oil Storage Isolation
- Steam Supply Stop and Control
- Sulphur Condenser Switch
- Flare Gas Control and Isolation
- FCC Stop and Control

### Petrochemicals

- Propane Gas
- Propylene Plant
- Ethylene Plant
- Coker Plant
- Steam Service

### Power Plant

- Pump Isolation
- Condenser Cooling
- Heat Exchanger, Suppression System
- Condensate Cooling Water Isolation
- District Heating and Cooling

### Cryogenics

- LNG Ships
- Oilfield Recovery
- Tank Farm Isolation
- Gasification Plant and Storage

### Others

- Water Pipeline
- Process Liquid
- Hydrocarbons
- Liquefied Natural Gas
- Hot Gas and Sour Gas (NACE)

## How to Order Series 4 DelVal Valves

SERIES □ □		SIZE □ □ □		TRIM / OTHER VARIABLES / SPECIAL						
VALVE DESCRIPTION		VALVE DESCRIPTION		BODY	DISC	STEM	SEAL	RATING	OPERATOR	SPECIAL
44 : Wafer Class 150		030 : 3"	280 : 28"	3- WCB	3- WCB	6- 17-4-PH	G-SS316+GRAPHITE	5 - Class 150	B-BARE	0-NO SPECIAL
45 : Lug Class 150		040 : 4"	300 : 30"	4- CF8M(SS316)	4-CF8M(SS316)	5-XM19	T-SS316+PTFE	6 - Class 300	G - GEAR	REQUIREMENT
46 : Flange Class 150		060 : 6"	320 : 32"	8- CF8(SS304)	8- CF8(SS304)	1-SS410	H-DUPLEX SS + GRAPHITE	9 - Class 600		S - SPECIAL
47 : Wafer Class 300		080 : 8"	360 : 36"			4-SS316	A-INCONEL+GRAPHITE			REQUIREMENT
48 : Lug Class 300		100 : 10"	400 : 40"				D-SS316 (Solid)			AS SPECIFIED
49 : Flange Class 300		120 : 12"	420 : 42"							BY CUSTOMER
		140 : 14"	480 : 48"							
		160 : 16"								
		180 : 18"								
		200 : 20"								
		240 : 24"								

Note : For class 600 please consult factory

For example: To order a 12" Wafer Body Valve, CF8M Body, CF8M Disc, SS316 Stem, SS316 + Graphite Seal, 150 Class, Gear Operated with no special requirements:

44 120 4 4 4 G 5 G 0

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