



INCOVAL SERIES 144/145 and 147/148

Double Eccentric High Performance Butterfly Valves

Wafer and Lug

Sizes 2 1/2" to 24"

ASME Class 150 & Class 300



Leading the Industry with Innovation by Design

INCOVAL is pleased to offer top-of-the-line products in pipeline flow control. INCOVAL Series 144/145, 147/148 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. INCOVAL Series 144/145, 147/148 has been designed to include state-of-the-art features that are described in this bulletin.

Features

Top Flange

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

Body

One-piece wafer body style or full lug style for dead end service. Both body styles offer bidirectional sealing as standard in conformance with full ASME class 150 and class 300 rating.

Pin

Pins are offset from the center of the stem which places them in compression rather than shear thus eliminating potential for failure. The pins are precision fit and wedge types which provide positive mechanical attachment of disc to stem.

Disc Stop

The disc stop is a machined position stop on the body that locates the disc in the seat to achieve maximum seat and seal life. The disc stop is designed to prevent disc from rotating in to the wrong direction and minimizing possible seat damage.

Seat Retainer

Retains seat in the body and is supplied in the same material as the body.

Stem Seal

Stem assembly is "live loaded" with two Bellville Spring Washers. This ensures continuous compression of packing and sealing contact at the stem and body. Rocker shaped gland bridge compensates for uneven adjustment of gland bolts.

Blow-out proof stem

Retainer circlip provides blow-out proof stem.

Stem

The high-strength stem is SS 316 or 17-4 ph stainless steel that provides maximum strength for high torque applications.

Extended Neck

Extended neck allows for 2" of pipeline insulation and easy access to stem packing adjustment and actuator mounting.

Bearings

Top and bottom bearings, consisting of a 316 stainless steel / TFE glass fabric liner bearing surface, securely support the stem.

Disc

The disc has been engineered to maximize flow and minimize resistance to provide a high flow coefficient (Cv). The standard disc material is 316 stainless steel.

Seat

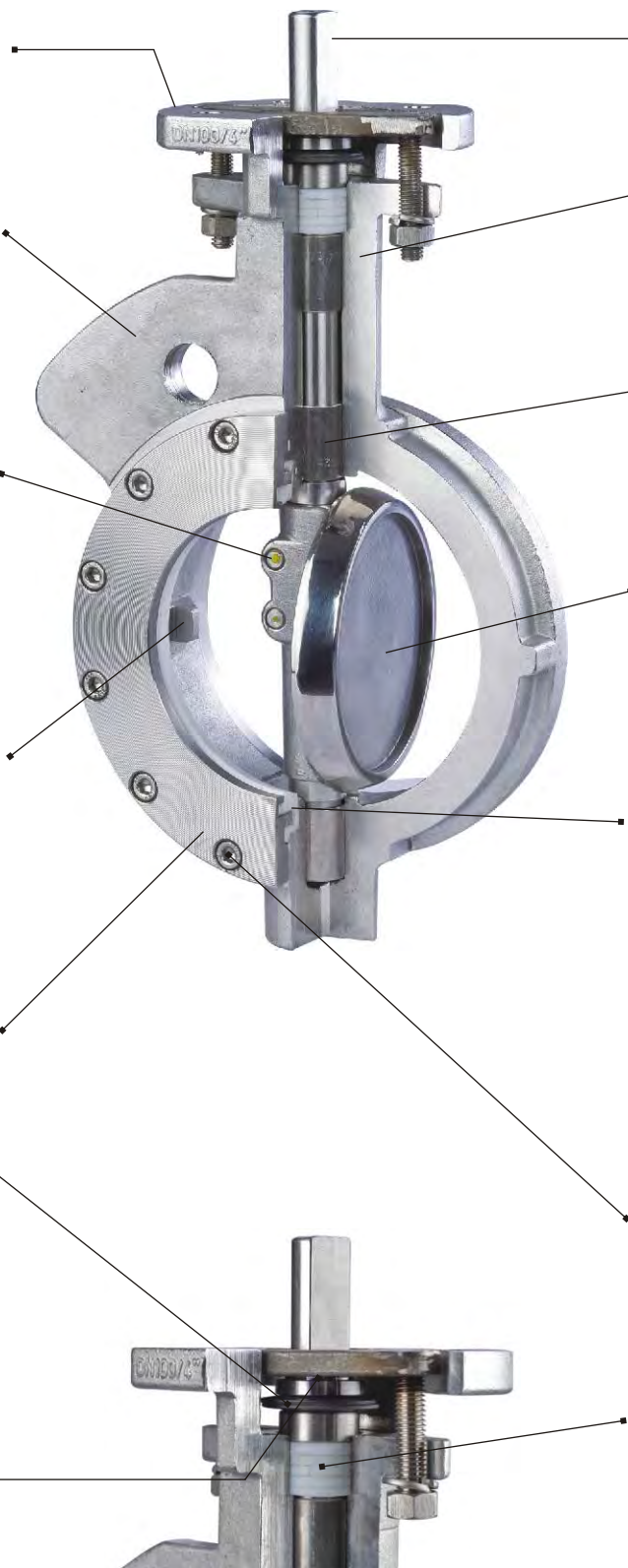
The unique seat design utilizes a flexible lip seal concept. When the disc closes, this action causes a slight deflection in the seat, energizing the seat. During this energized position, the seat has a stored energy force constantly pushing against the disc. In addition to this "energized" force, when pressure is on the insert side, the pressure pushes under the lip which further amplifies the sealing force between the disc and the seat.

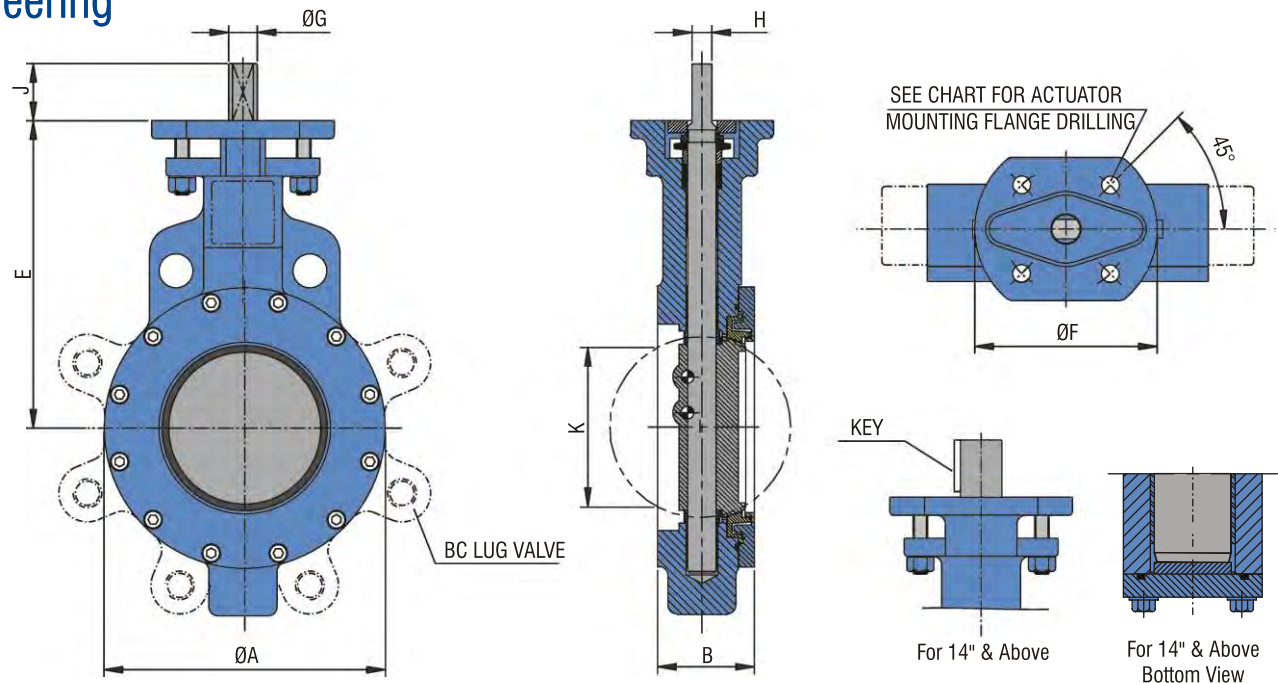
Bi-Directional Dead End Service

All lug valves are suitable for dead-end service to pull ANSI pressure rating, bi-directionally.

Adjustable Stem Packing

The stem packing system features a pull down gland with easy access to the adjusting hex head nuts without removal of the actuator.





ASME CLASS 150 (Series 144/ 145)

DIMENSIONS (Inch)

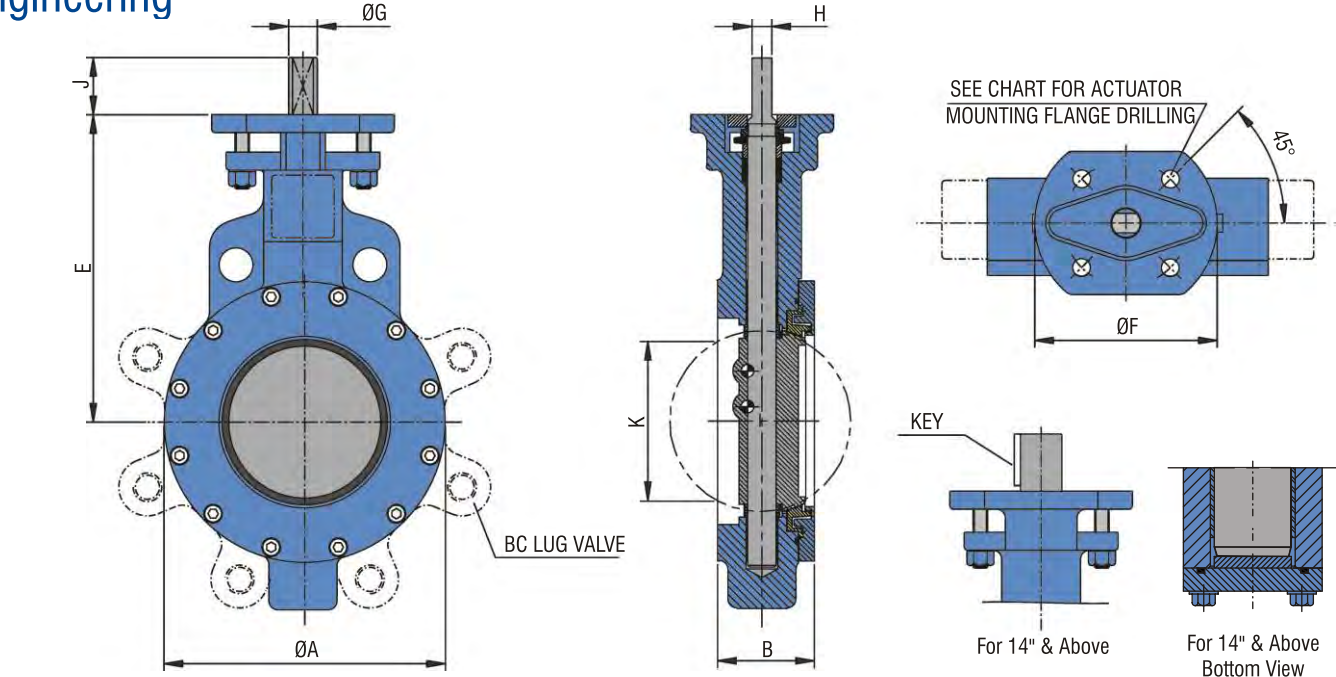
Valve Size	$\varnothing A$	$\star B$	E	$\varnothing F$	Top Flange Drilling			$\varnothing G$	H	J	Key Size	K	Lug Bolting Data			Weights In Lbs	
					BC	No. of holes	Hole Dia.						BC	No. of holes	Threads UNC/UN-2B	Wafer (Series 44)	Lug (Series 45)
2 1/2	4.13	1.81	5.75	4.00	2.76	4	0.39	0.63	0.43	1.25	-	2.1	5.50	4	5/8-11	8.8	10.8
3	5.00	1.88	5.94	4.00	2.76	4	0.39	0.63	0.43	1.25	-	2.6	6.00	4	5/8-11	10.8	13.2
4	6.18	2.12	6.77	4.00	2.76	4	0.39	0.63	0.43	1.25	-	3.4	7.50	8	5/8-11	15.8	24.5
5	7.32	2.25	7.40	4.92	2.76/4.01	4	0.39/0.47	0.75	0.51	1.25	-	4.5	8.50	8	3/4-10	19.6	29.5
6	8.50	2.25	8.23	4.92	2.76/4.01	4	0.39/0.47	0.75	0.51	1.25	-	5.5	9.50	8	3/4-10	24.8	35.5
8	10.63	2.50	9.41	6.00	4.92	4	0.55	0.87	0.63	1.25	-	7.3	11.75	8	3/4-10	25.6	47.0
10	12.76	2.81	11.02	6.00	4.92	4	0.55	1.18	0.87	2.00	-	9.2	14.25	12	7/8-9	61.0	89.9
12	15.00	3.19	12.20	6.00	4.92	4	0.55	1.38	0.94	2.00	-	11.7	17.00	12	7/8-9	111.1	126.1
14	16.65	3.62	13.19	8.27	4.92/6.50	4	0.55/0.83	1.57	-	2.00	0.47x0.31	12.7	18.75	12	1-8	136.7	182.3
16	18.50	4.00	16.02	8.27	6.50	4	0.83	1.97	-	2.50	0.47x0.39	14.6	21.25	16	1-8	205.0	248.0
18	21.02	4.50	16.81	8.27	6.50	4	0.83	2.16	-	2.50	0.63x0.39	16.4	22.75	16	1 1/8-8	233.2	306.4
20	23.00	5.00	17.71	8.27	6.50	4	0.83	2.36	-	4.00	0.71x0.43	18.35	25.00	20	1 1/8-8	252.0	412.9
24	27.24	6.06	20.87	11.81	10.00	8	0.71	2.75	-	4.00	0.79x0.47	21.8	29.50	20	1 1/4-8	507.1	701.5

* Face to Face dimension "B", generally conforming to MSS SP 68 TABLE 1 / API 609 Category B / BS EN 558-1 / ISO 5752 / ASME B 16.10
All bolt holes 1 1/8" and larger have an 8-UN thread series as per MSS SP 68 & API 609.

Cv VALUES - VALVE SIZING COEFFICIENT

Disc Position (degrees)	Valve Size												
	2.5"	3"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	24"
10	2.6	4.1	8.4	13	26	48	76	114	133	181	171	204	278
20	9	14	29	42	74	145	231	340	421	556	592	734	1090
30	19	32	63	89	147	285	471	689	862	1125	1388	1731	2570
40	34	57	115	163	248	488	793	1150	1448	1880	3047	3149	4586
50	53	87	173	285	375	735	1193	1734	2186	2891	3926	4872	7265
60	79	124	249	376	559	1098	1782	2595	3246	4283	5685	7045	10560
70	105	163	327	518	789	1587	2534	3689	4599	6072	7755	8575	14275
80	139	200	401	684	1070	2116	3431	5010	6315	8353	10185	12750	19050
90	153	207	413	752	1227	2432	3909	5744	7254	9544	10950	13960	21025

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



ASME CLASS 300 (Series 147/ 148)

DIMENSIONS (Inch)

Valve Size	$\varnothing A$	$\star B$	E	$\varnothing F$	Top Flange Drilling			$\varnothing G$	H	J	Key Size	K	Lug Bolting Data			Weights In Lbs	
					BC	No. of holes	Hole Dia.						BC	No. of holes	Threads UNC/UN-2B	Wafer (Series 47)	Lug (Series 48)
2 1/2	4.13	1.81	5.75	4.00	2.76	4	0.39	0.63	0.43	1.25	-	2.1	5.88	8	3/4-10	8.8	15.0
3	5.00	1.88	5.94	4.00	2.76	4	0.39	0.63	0.43	1.25	-	2.6	6.63	8	3/4-10	10.8	18.1
4	6.18	2.12	6.77	4.00	2.76	4	0.39	0.63	0.43	1.25	-	3.4	7.88	8	3/4-10	15.8	24.9
5	7.32	2.31	7.60	4.92	2.76/4.01	4	0.39/0.47	0.75	0.51	1.25	-	4.5	9.25	8	3/4-10	20.2	31.3
6	8.50	2.31	8.66	6.00	4.92	4	0.55	0.87	0.63	1.25	-	5.5	10.63	12	3/4-10	31.3	68.8
8	11.02	2.88	10.43	6.00	4.92	4	0.55	1.18	0.87	1.25	-	7.1	13.00	12	7/8-9	53.1	79.1
10	13.22	3.25	11.80	6.00	4.92	4	0.55	1.38	0.94	2.00	-	9.0	15.25	16	1-8	88.6	116.4
12	15.35	3.62	13.39	8.27	4.92/6.50	4	0.55/0.83	1.57	1.14	2.00	-	10.7	17.75	16	1 1/8-8	151.7	201.1
14	16.26	4.62	14.76	8.27	6.50	4	0.83	2.17	-	2.50	0.63x0.39	12.1	20.25	20	1 1/8-8	285.9	326.3
16	18.50	5.25	16.73	8.27	6.50	4	0.83	2.17	-	2.50	0.63x0.39	13.7	22.50	20	1 1/4-8	337.5	403.0
18	21.46	5.88	18.70	11.81	10.00	8	0.71	2.75	-	4.00	0.79x0.47	15.6	24.75	24	1 1/4-8	391.3	515.4
20	23.00	6.25	19.88	11.81	10.00	8	0.71	3.50	-	5.25	0.88x0.62	17.2	27.00	24	1 1/4-8	508.8	737.4
24	27.24	7.12	22.83	13.78	11.73	8	0.82	4.00	-	5.25	1.00x0.75	20.6	32.00	24	1 1/2-8	735.0	1015.9

* Face to Face dimension "B", generally conforming to MSS SP 68 TABLE 1 / API 609 Category B / BS EN 558-1 / ISO 5752 / ASME B 16.10
All bolt holes 1 1/8" and larger have an 8-UN thread series as per MSS SP 68 & API 609.

Cv VALUES - VALVE SIZING COEFFICIENT

Disc Position (degrees)	Valve Size												
	2.5"	3"	4"	5"	6"	8"	10"	12"	14"	16"	18"	20"	24"
10	2.6	4.1	8.4	13	20	37	53	77	91	145	117	134	211
20	9	14	29	42	70	115	167	237	283	428	498	580	898
30	19	32	63	89	139	248	361	510	625	873	1188	1360	2127
40	34	57	115	163	245	432	639	887	1099	1494	2151	2488	3879
50	53	87	173	285	374	661	968	1351	1632	2298	3313	3855	6019
60	79	124	249	376	538	976	1437	2005	2378	3479	4809	5588	8713
70	105	163	327	518	727	1363	2011	2832	3336	4994	6554	7588	11738
80	139	200	401	684	934	1770	2646	3809	4465	7195	8625	9860	15600
90	153	207	413	752	1021	1956	2922	4214	4901	8022	9606	10829	17103

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

Torque

Maximum Seating and Unseating Torques for ASME class 150

Soft Seat Design

Maximum Torques Lbs - Inch						
Valve Size		Differential Pressure (Psi)				
Inch	DN	50	100	150	230	285
2.5	65	243	249	260	270	284
3	80	284	295	304	327	358
4	100	384	409	434	472	601
5	125	518	571	616	690	734
6	150	778	842	920	1025	1094
8	200	1313	1431	1548	1765	1893
10	250	1705	1941	2158	2509	2785
12	300	2080	2526	2977	3659	4117
14	350	3442	4262	5125	6505	7398
16	400	4391	5473	6588	8285	9523
18	450	5715	7152	8546	10835	12471
20	500	7624	9623	11467	14720	16791
24	600	11548	14587	17773	22639	26178

Maximum Seating and Unseating Torques for ASME class 300

Soft Seat Design

Maximum Torques Lbs - Inch						
Valve Size		Differential Pressure (Psi)				
Inch	DN	150	285	360	585	740
2.5	65	260	284	302	373	420
3	80	304	358	389	476	534
4	100	434	601	656	839	956
5	125	781	982	1087	1427	1649
6	150	1062	1363	1551	2075	2436
8	200	2015	2658	3015	4066	4825
10	250	2992	4081	4686	6468	7752
12	300	4186	5653	6456	8866	10526
14	350	6407	9359	11130	15992	19419
16	400	7776	11238	13205	19301	23407
18	450	10049	14617	17126	24652	29838
20	500	13280	19389	23053	33283	40615
24	600	18112	26366	30846	45141	54495

Fire Safe Seat Design

Maximum Torques Lbs - Inch						
Valve Size		Differential Pressure (Psi)				
Inch	DN	50	100	150	230	285
2.5	65	482	501	515	541	555
3	80	607	630	646	677	706
4	100	751	796	835	895	948
5	125	849	917	999	1127	1209
6	150	1424	1548	1681	1881	1998
8	200	2340	2590	2787	3145	3425
10	250	3523	3916	4368	5058	5561
12	300	5248	6035	6796	7931	8826
14	350	6229	7140	8009	9554	10534
16	400	7188	8350	9683	11620	13051
18	450	9148	11408	13900	17523	20223
20	500	12944	16447	19817	25626	29348
24	600	20391	24109	28074	34394	38251

Fire Safe Seat Design

Maximum Torques Lbs - Inch						
Valve Size		Differential Pressure (Psi)				
Inch	DN	150	285	360	585	740
2.5	65	515	555	587	624	653
3	80	646	706	727	771	812
4	100	835	948	1071	1278	1433
5	125	1093	1284	1389	1713	1920
6	150	1817	2182	2398	3009	3439
8	200	2980	3646	4011	5099	5832
10	250	4479	5396	5917	7420	8527
12	300	7302	9537	10639	14300	16816
14	350	8197	10679	12052	16168	21993
16	400	9934	13406	15312	21296	25401
18	450	15287	22589	26735	38803	47426
20	500	21287	32025	37587	55613	67082
24	600	34193	50493	59313	85917	104127

Metal Seat Design

Maximum Torques Lbs - Inch						
Valve Size		Differential Pressure (Psi)				
Inch	DN	50	100	150	230	285
2.5	65	603	616	649	676	700
3	80	747	788	808	833	875
4	100	946	1003	1036	1110	1190
5	125	1053	1137	1269	1407	1516
6	150	1780	1936	2085	2342	2477
8	200	2949	3263	3484	3948	4266
10	250	4333	4817	5525	6261	7032
12	300	6613	7484	8529	9894	11099
14	350	7787	9032	10017	11919	13141
16	400	8985	10479	12079	14641	16272
18	450	11527	14488	17202	22176	25037
20	500	16050	20395	24682	32192	36717
24	600	25488	30378	35022	43151	47680

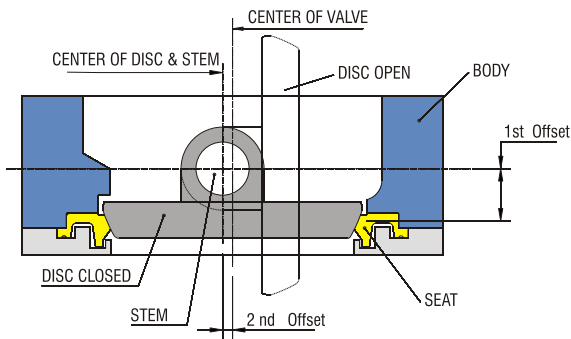
Metal Seat Design

Maximum Torques Lbs - Inch						
Valve Size		Differential Pressure (Psi)				
Inch	DN	150	285	360	585	740
2.5	65	649	700	734	786	810
3	80	808	875	905	956	1015
4	100	1036	1190	1326	1582	1787
5	125	1377	1590	1733	2133	2382
6	150	2253	2731	3006	3773	4323
8	200	3734	4520	5068	6380	7244
10	250	5552	6725	7331	9197	10622
12	300	9201	11802	13371	17803	21188
14	350	10145	13349	15075	20380	23770
16	400	12324	16724	19137	26630	31753
18	450	19109	28469	33146	48096	58836
20	500	26830	39922	47359	69850	83685
24	600	42587	63621	74195	107276	130200

Note :- Above torque values are indicative and defined for flow in preferred direction i.e. Seat retainer upstream.
Torque values for flow in non-preferred direction i.e. seat retainer downstream, multiply the above values by 1.25

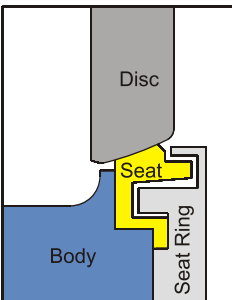
Feature and Selection

Double Offset Disc Design



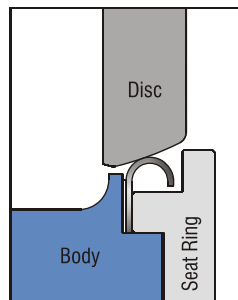
The offset disc produces a cam-like action, pulling the disc from the seat. This action reduces seat wear and eliminates seat deformation when the disc is in the open position. The disc does not contact the seat when the valve is in the open condition; therefore, seat service life is extended and torques are reduced. As the valve closes, the cam-like action converts the rotary motion of the disc to a linear type motion effectively pushing the disc onto the seat.

Seat Designs



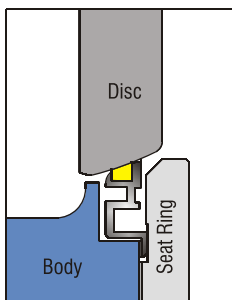
Teflon Seat

Teflon Seat : Flexible lip seat design retains its original shape and maintain a seal against the disc regardless of the flow direction



Metal Seat

Metal Seat : Flexible metal seat offers a very high sealing capability with low leakage rates. The mechanical properties and the shape of the metal seat allows it to flex and maintain a constant positive sealing against the disc.



Fire Safe Seat

◀ Fire Safe Seat : During and after fire, when the resilient material has been partially or completely destroyed, the metal seat ring provides a positive seal by remaining in constant contact with the disc in either direction of media flow.

CODES AND STANDARDS

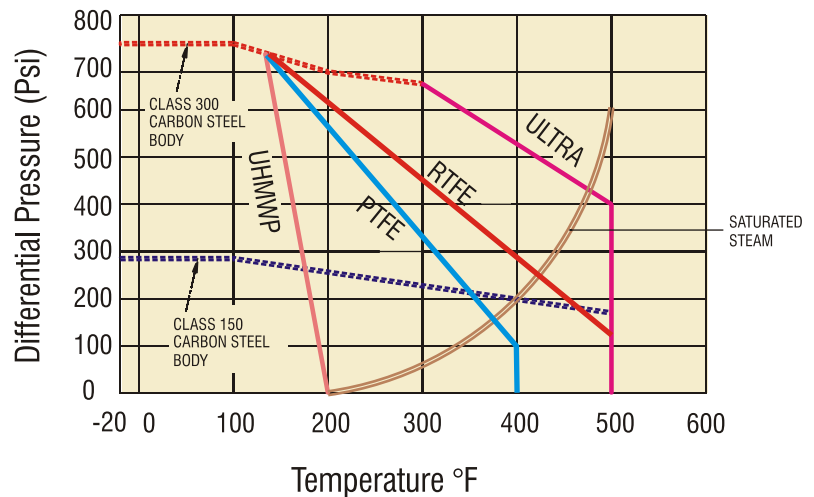
General design and manufacturing :- API 609 Category B / MSS-SP-68 / EN 593

Inspection and Testing :- API 598 / MSS-SP-68 / EN 12266-1 / AISI / FCI 70-2

Fire safe testing :- API 607 / ISO 10497 / EN 12266-2

Pressure temperature rating :- ASME B 16.34 / BS EN 12516 -1

Seat Pressure / Temperature



Special Applications

ULTRA seat

An engineered fluorocarbon polymer that is rated for 500 °F. Excellent for handling aggressive fluids at high pressures. Ultra is recommended for extended service in hostile environments involving chemical, thermal, and mechanical stress. Ultra has excellent thermal stability and is ideal for steam, hot gases, and a variety of process chemicals where service can also be subject to pressure cycling.

NACE service

All valves conform to NACE MRO 103 standard. These valves are well suited for oil and gas industry applications requiring resistant materials to sulfide stress cracking.

Steam

Valves are available for saturated steam at 200 psi rating for series 144 /145 and 450 psi for series 147/ 148.

Vacuum

Standard valves are rated for tight shut-off of vacuum to 2×10^{-2} torr.

Oxygen

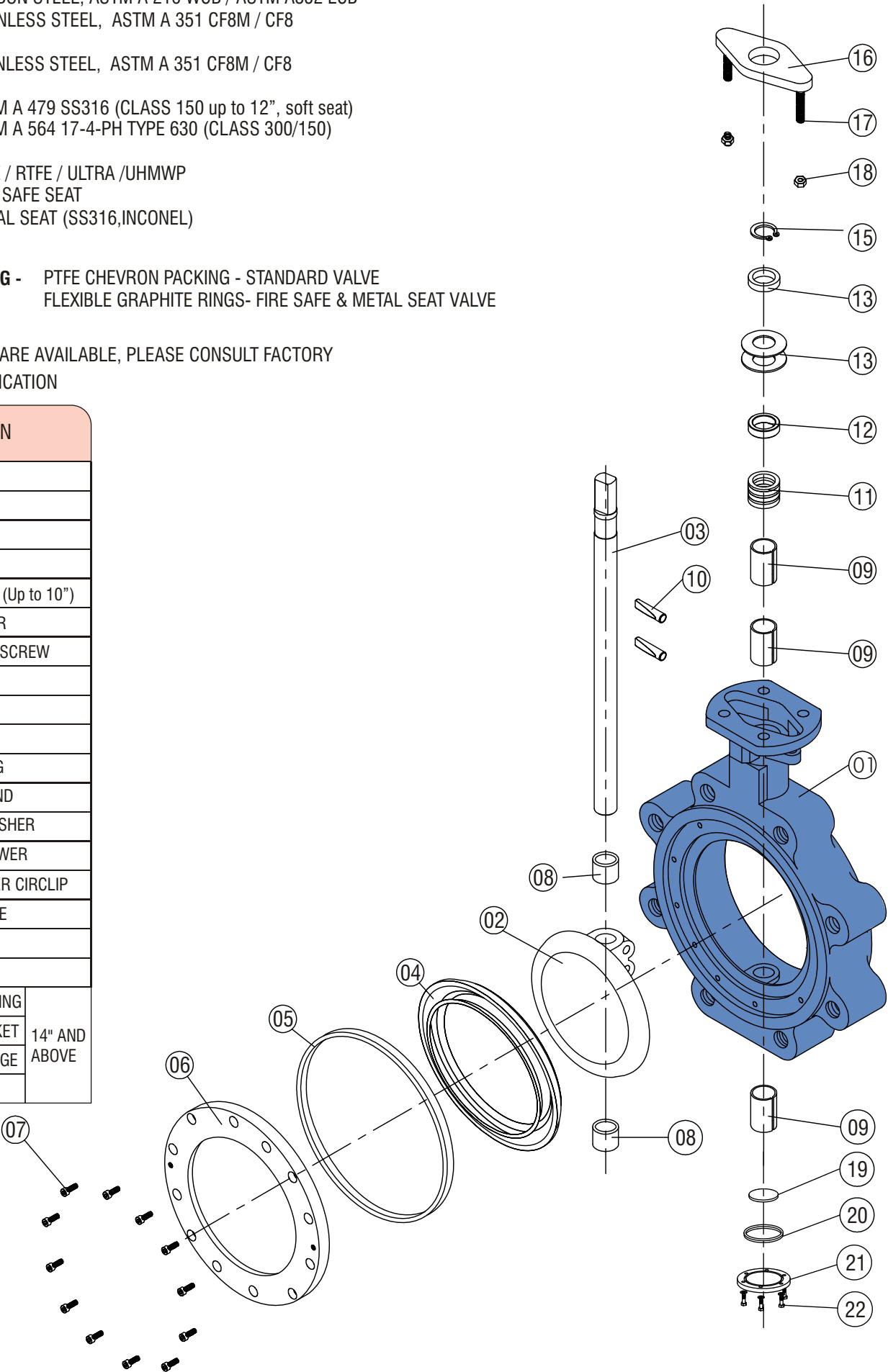
Valves for critical gaseous oxygen service are specially prepared, cleaned, inspected, assembled and tested to ensure removal of all burrs, sharp edges, dirt, hydrocarbon oil or grease and other contaminants.

Materials of Construction

- BODY** - CARBON STEEL, ASTM A 216 WCB / ASTM A352 LCB
STAINLESS STEEL, ASTM A 351 CF8M / CF8
- DISC** - STAINLESS STEEL, ASTM A 351 CF8M / CF8
- STEM** - ASTM A 479 SS316 (CLASS 150 up to 12", soft seat)
ASTM A 564 17-4-PH TYPE 630 (CLASS 300/150)
- SEAT** - PTFE / RTFE / ULTRA /UHMWP
FIRE SAFE SEAT
METAL SEAT (SS316,INCONEL)
- STEM PACKING** - PTFE CHEVRON PACKING - STANDARD VALVE
FLEXIBLE GRAPHITE RINGS- FIRE SAFE & METAL SEAT VALVE

OTHER MATERIALS ARE AVAILABLE, PLEASE CONSULT FACTORY
FOR SPECIFIC APPLICATION

Sr. No.	DESCRIPTION	
01	BODY	
02	DISC	
03	STEM	
04	SEAT	
05	BODY GASKET (Up to 10")	
06	SEAT RETAINER	
07	SOC. HD. CAP SCREW	
08	DISC SPACER	
09	BEARING	
10	DISC PIN	
11	STEM PACKING	
12	PACKING GLAND	
13	BELLVILLE WASHER	
14	GLAND FOLLOWER	
15	STEM RETAINER CIRCLIP	
16	GLAND FLANGE	
17	STUD	
18	HEX NUT	
19	THRUST BEARING	14" AND ABOVE
20	BOTTOM GASKET	
21	BOTTOM FLANGE	
22	HEX BOLT	



Operators



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.



Valves up to size 24" 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.



Valves upto 6" for class 150 and upto 4" for class 300 can be supplied with lever handles for manual operation. Optional accessories for hand-lever operation can be provided for various flow control requirements. Pad locking can also be provided for preventing unauthorized operation.

How to order Incoval valves

Series □ □		Size □ □ □		Trim / Other Variables / Special □ □ □ □ □ □ □ □					
Valve Description	Valve Description	Body	Disc	Stem	Seat	Rating	Operator	Special	
144 : Wafer class 150 145 : Lug class 150 147 : Wafer class 300 148 : Lug class 300	025 : 2.5"	3- WCB 4- CF8M(SS316) 8- CF8(SS304)	4-CF8M(SS316) 8- CF8(SS304)	4-SS316 6- 17-4-PH	T-PTFE U-ULTRA G-UHMWP R-RTFE M-METAL (SS) N-METAL (INCONEL) F-FIRE SAFE	5 - Class 150 6 - Class 300	B-BARE L - LEVER G - GEAR	0-NO SPECIAL REQUIREMENT S - SPECIAL REQUIREMENT AS SPECIFIED BY CUSTOMER	
	140 : 14"								
	030 : 3"								
	160 : 16"								
	040 : 4"								
	180 : 18"								
	050 : 5"								
	200 : 20"								
060 : 6"									
240 : 24"									
080 : 8"									
100 : 10"									
120 : 12"									

FOR Example :- To order 300/12" , wafer body valve, Body-CF8M, Disc- CF8M, Stem-SS316, Seat-RTFE, Rating-Class 150, Gear operated, with no special requirements.

All statements, technical information and recommendations in the bulletin are for general use only. Incoval is not responsible for suitability or compatibility of these products in relation to system requirements. Consult Incoval distributors or factory for the specific requirements and material selection for your intended application. Incoval reserves the right to change or modify product design or product without prior notice. Incoval - Registered trademark of Incoval Controls.

Distributor