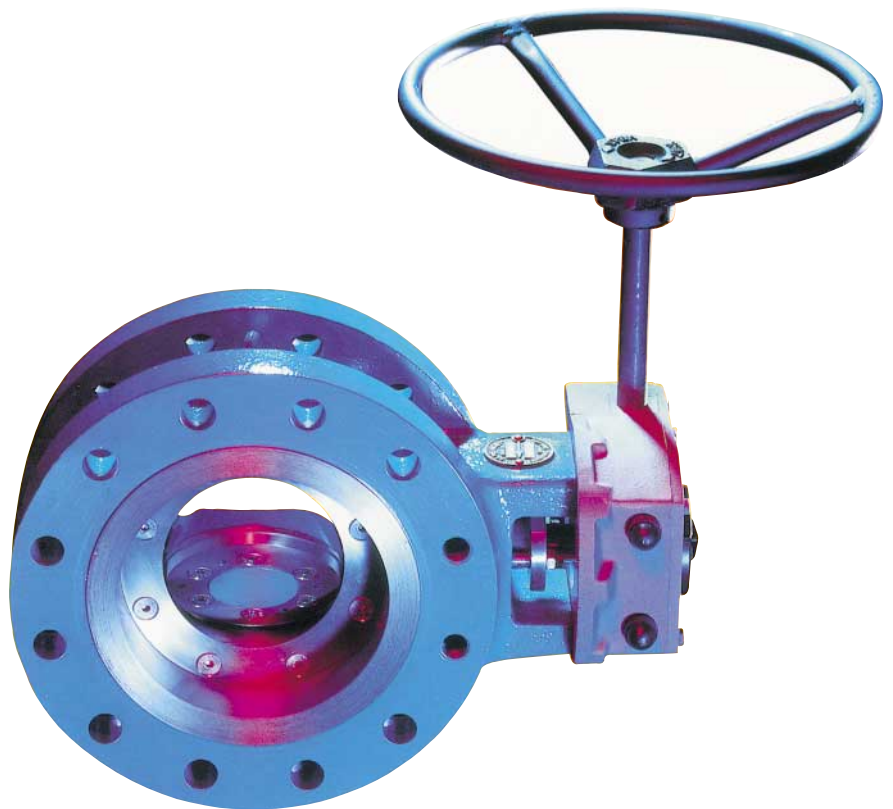


Solent & Pratt

Quarter Turn - TOSV™

Triple Offset Segment Valves - Metal Sealing with Zero Leakage



**CURTISS
WRIGHT**
Flow Control (UK) Ltd

For over 40 years Solent & Pratt has been at the forefront of the design, development and manufacture of high quality butterfly valves for engineering projects around the world. An absolute commitment to outstanding quality and reliability is the key of our success, particularly in environments such as the oil and gas, chemical, petro-chemical and power generation industries.

- **Firesafe**

Certified to API 607 4th edition
BS6755 Part 2 and API 6FA

- **Sizes**

3" (750mm) to 84" (2100mm)

- **Body styles available**

Wafer flangeless, Wafer lugged, Double Flanged (short and long patterns), and Butt Weld.

- **Anti-blowout stem**

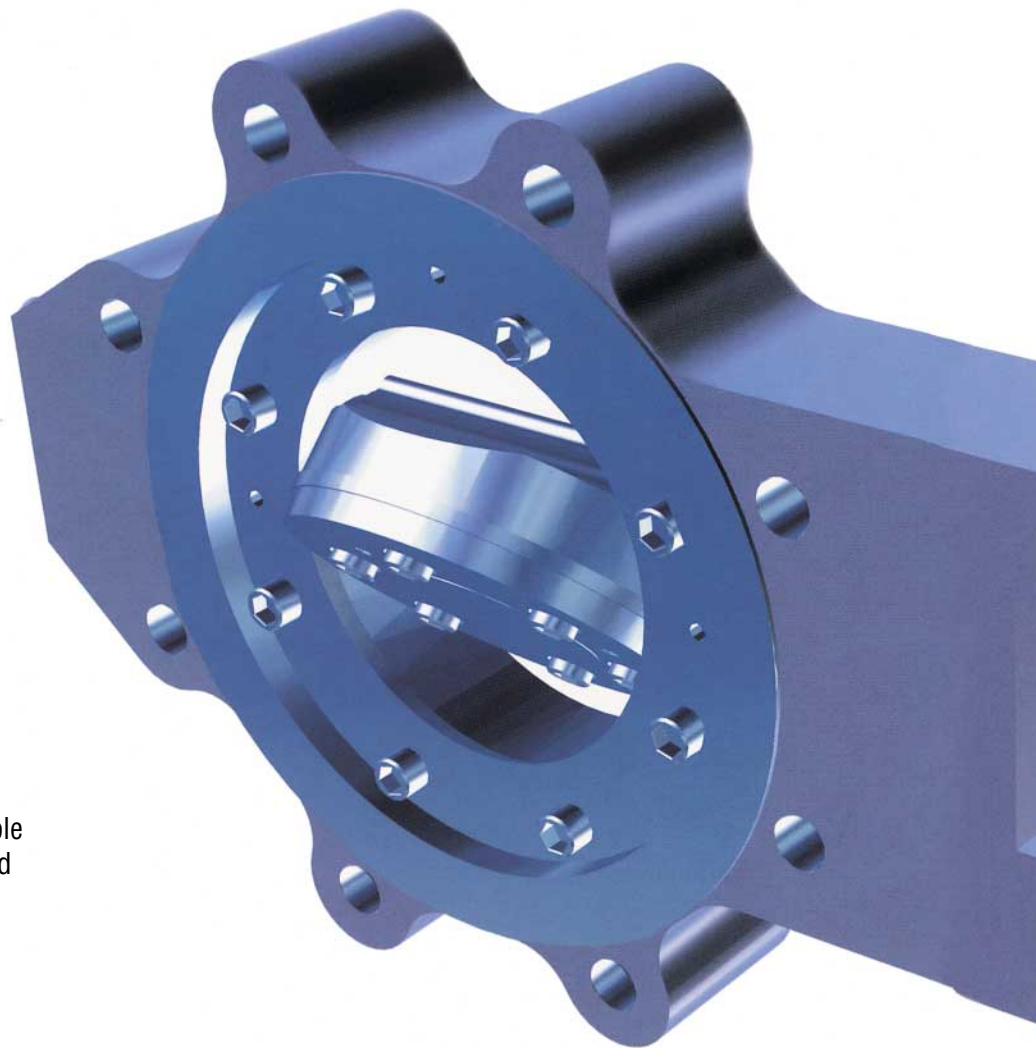
Internal is standard.
External to API 609 optional

- **Triple Offset Geometry**

Provides non-rubbing motion throughout full 90° rotation elimination unnecessary wear and prolongs life of seat and seal.

- **Pressure ratings**

ANSI 150 through 2500 lb.

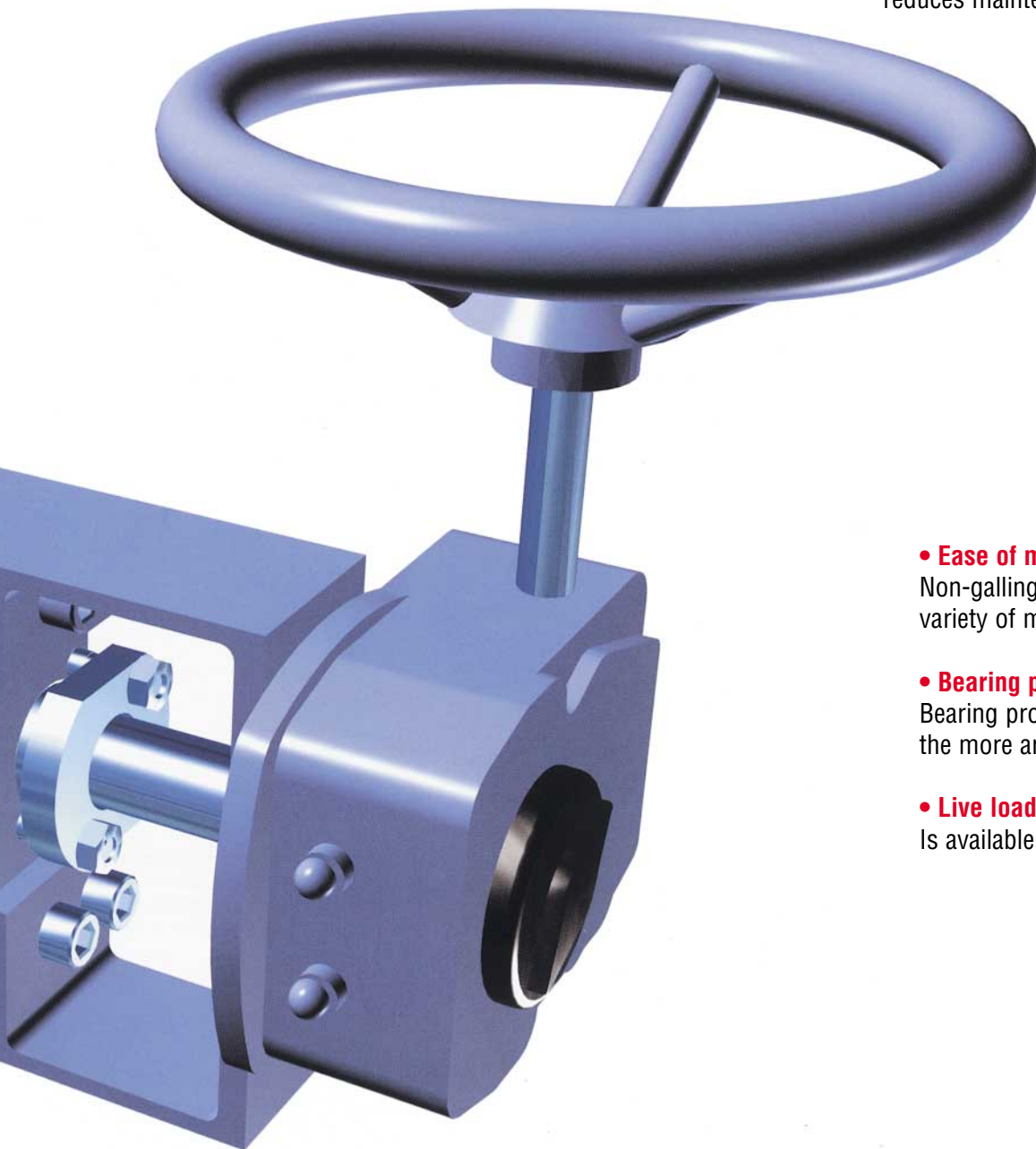


- **Zero leakage**

Bi-directional shut-off to API 598, Zero Leakage Capability.

- **Ease of maintenance**

Field replaceable seat and seal ring reduces maintenance costs.



- **Ease of material selection**

Non-galling design enables a wide variety of material options.

- **Bearing protectors**

Bearing protectors are available for the more arduous duties.

- **Live loaded packing**

Is available as an option.

- **Quality assurance system**

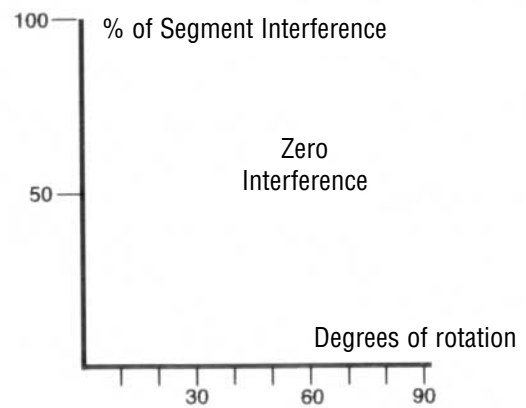
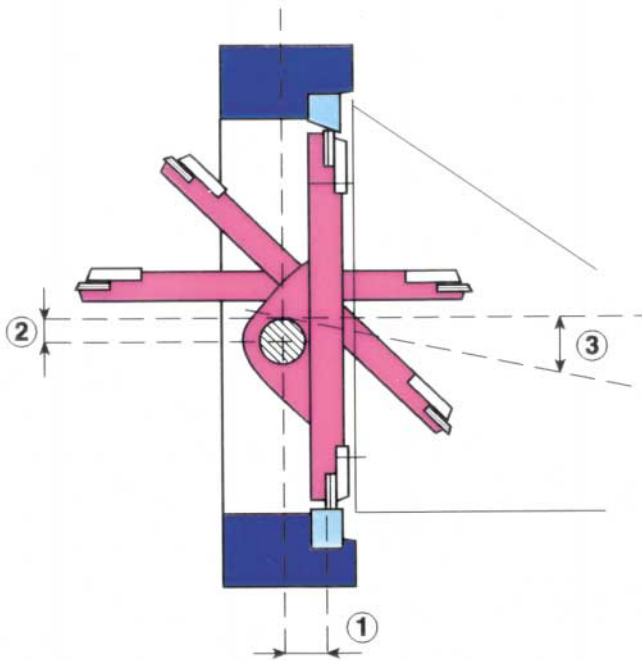
Approved by Lloyds to ISO 9001.

- **Operators**

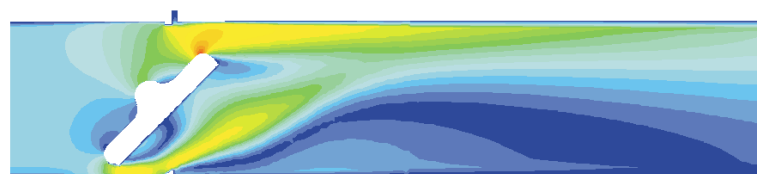
Valves can be supplied with manual, electric, pneumatic or hydraulic operator. Fail-safe systems for emergency operation are also available.

The Solent & Pratt Triple Offset Segment Valve utilises the well established patented valve geometry where the shaft is offset from the body in two directions (1) and (2), whilst the disc is a segment taken from a cone where the apex is offset from the centre line of the valve (3).

The disc (segment) of the valve houses a field replaceable metal laminate seal whilst the field replaceable seat ring is housed in the body of the valve.

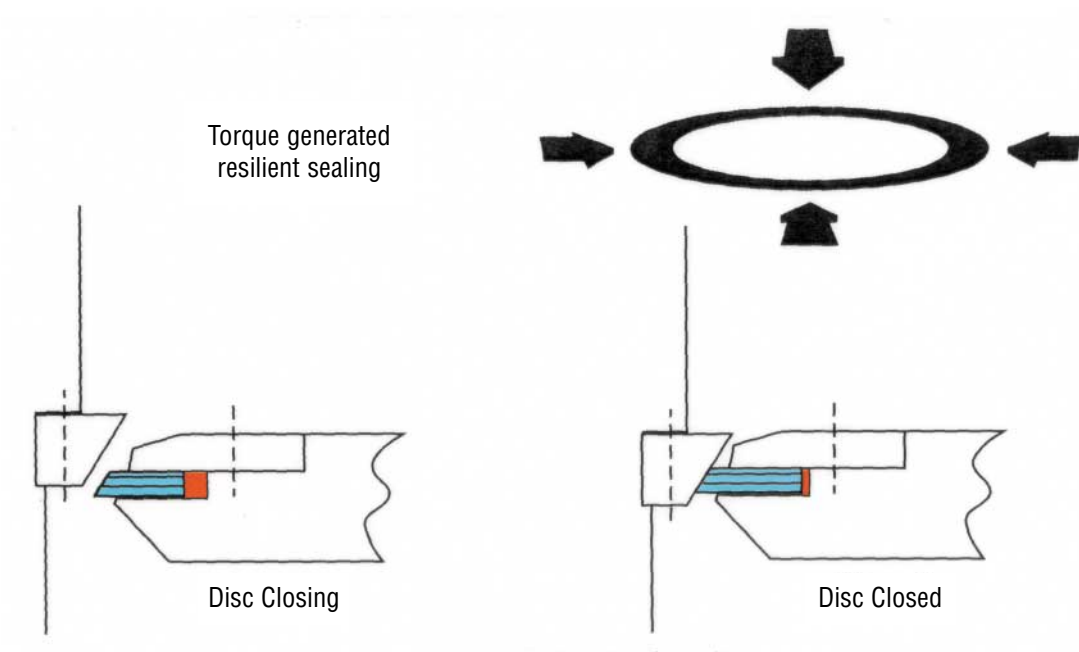


Due to the valve geometry there is no interference or rubbing between seat and seal as the valve strokes through it's full 90°.



Results of Computational Fluid Dynamics (CFD) analysis showing velocity contours.

Bi-directional zero leakage is achieved by a unique principle in which the torque generated by the actuating mechanism is allowed to flex the metal seal within its elastic limits, compressing the seal, thus ensuring that both seal and seat are perfectly matched. This seal resiliency results in zero leakage.



The resiliency of the seal ring and its ability to flex makes the valve ideal for Hot, Cold or Thermal Cycle applications where the body is able to expand or contract without the risk of the valve jamming.

The Triple Offset Segment valve's camming action of the disc as the valve strokes ensures that the metal seat and metal laminate seal are never in contact with each other whilst the valve is stroking. Contact is made between seat and seal only as final shut off position is reached. The tilted cone angle of seat and seal combined with the ellipsoidal geometry allows the seal to touch the seat with a uniform contact angle around its circumference with a slight wedging action being achievable.

This camming motion obtained by the Triple Offset Geometry extends the life of the valve by designing out the continual rubbing of seat and seal as is inherent in conventional rotary valve designs. This geometry makes the TOSV ideal for either control or isolation applications.



Solent & Pratt utilises the latest computer aided design systems and software enabling special design requirements, dimensions and specification to be accommodated.

Our standard valve range however is built and tested to the following standards:

- **Quality assurance**
Certified by Lloyds to ISO 9001
- **Valve design**
ANSI B16.34
- **Fire test**
API 607 4th edition, BS 6755 Part 2 and API 6FA
- **Face to face**
API 609, BS 5155, ISO 5752, ANSI B16.10
- **Flange**
ANSI B16.5 (3" to 24"), ANSI B16.47 (28" and larger).
- **Testing**
BS 6755 Rate A, API 598, API 6D



Double Flanged TOSV

Our flexibility in design enables us to consider any special requirements, please consult our sales office with your needs.

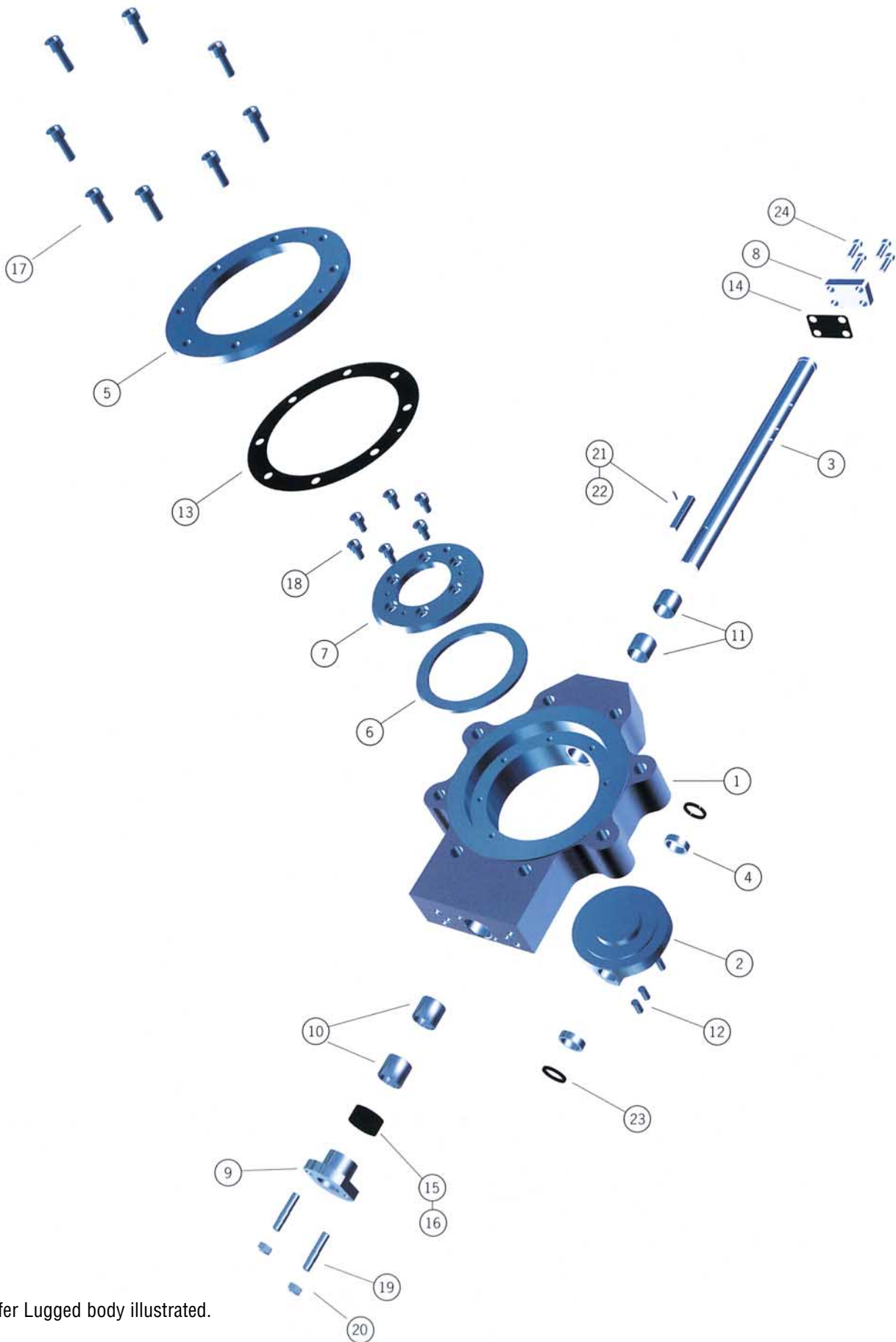
Options Available

- **Bearing protector** - recommended for arduous duty applications where solids may be present in the flow media.
- **Live loaded packing** - a set of Belleville spring washers fitted to the gland follower provides automatic adjustment to packing.
- **Lantern ring** - available for the packing box.
- **Steam jacket** - integral steam jackets are available on the double flanged body design.



Features	Gate Valve	Ball Valve	Gate Valve	Solent & Pratt	Description
• Replaceable seat and seal		•		•	Triple Offset Geometry with field replaceable seat and seal rings (patent design).
• Zero Leakage				•	Solent & Pratt TOSV Range is able to meet shut off Standards API 598 and API 6D. Zero Leakage Capability.
• Bi-Directional	•	•		•	The TOSV range can provide zero leakage bi-directional shut off with metal sealing.
• Resilient metal seat				•	Torque generated resilient metal sealing provides repeatable long term sealing performance.
• Inherently fire safe	•			•	Tested and certified firesafe to BS 6755 Pt.2, API 607 4th edition and API 6FA, the TOSV range is an all metal construction it's performance is not affected by fire, it is inherently fire safe.
• Non-rubbing design				•	The Triple Offset Geometry of the TOSV range eliminates all rubbing between seat and seal thus extending the performance and life expectancy of the valve.
• Wafer body designs				•	Wafer and lugged body design available to API 609.
• Double Flanged body designs	•			•	Double Flanged designs available to BS5155 (ISO 5752).
• Flanged body designs	•	•	•	•	TOSV is available with face to face to ANSI B16.10 enabling easy replacement of ball, plug and gate valves.
• Lightweight construction				•	Lower piping stresses and construction costs are associated with this design.
• Ease of material selection				•	No galling is possible with this design making material selection simple.
• Cryogenic design	•	•	•	•	Full Cryogenic designs down to -320°F (-196°C) are available.
• Double Block and Bleed design		•	•	•	Double Block and Bleed design available within single valve body.
• Sizes 3" (80mm) to 84" (2100mm)	•			•	Non-standard sizes are available on request.
• Wide pressure rating available	•	•		•	ANSI 150, 300, 600, 900 and 1500 with full rated trims. ANSI 2500lb rating available on request.
• Low torque				•	Lower operating torques compared to comparable designs.
• High temperature available	•	•	•	•	Temperature applications up to 1292°F (700°C) are with this all metal design.
• Ease of actuation		•		•	Rotary action of the valve enables ease of actuation and suitability for either control or isolation.
• Superior gland performance		•	•	•	Rotary motion valves greatly reduce fugitive emissions from gland packing. In addition gland packing life is considerably improved.





Wafer Lugged body illustrated.

Materials tabulated are for standard firesafe applications up to 842°F (450°C)
All materials can be certified to NACE requirements.



Item	Description	Qty	Material (Carbon steel valve)
1	Body	1	Steel ASTM A216 WCB
2	Disc (Segment)	1	Steel ASTM A216 WCB
3	Through shaft	1	Stainless steel ASTM A564 type 630 H1100 (17 - 4ph)
4	Thrust ring	2	Stainless steel type 316/chrome plated
5	Seat ring	1	Stainless steel type 316
6	Laminated seal	1	Stainless steel type 316/Supagraph sheet
7	Clamp ring	1	Stainless steel UNS S32760 Super Duplex
8	End cover	1	Stainless steel type 316
9	Gland plate	1	Stainless steel type 316
10	Drive end bearings	2	Stainless steel type 316/chrome plated
11	Non drive end bearing	2	Stainless steel type 316/chrome plated
12	Shaft pin	3	Stainless steel ASTM A564 type 630 H110 (17-4ph)
13	Seat ring gasket	1	Supagraph laminated
14	End cover gasket	1	Supagraph laminated
15	Gland packing	3	Supagraph passivated P6
16	Gland packing (braided)	2	Supagraph Grafpack
17	Seat ring screw	4-24	Stainless steel grade 304 A2 class 70
18	Clamp ring screw	4-24	Stainless steel grade 304 A2 class 70
19	Gland plate stud	2	Stainless steel type 316
20	Gland plate retaining nut	2	Stainless steel grade 304
21	Key	1	Stainless steel ASTM A564 type 630 H1100
22	Rollpin	1	Stainless steel grade 304
23	Bearing protectors	2	Graphoil
24	End plate screw	4	Stainless steel grade 304 A2 class 70

Special applications

Valve design range is available in most other materials including:

- 316 stainless steel
- Duplex stainless steels
- 6 Mo stainless steel
- Bronze
- Monel
- Incoloy
- Hastelloy B and C
- Titanium
- Zirconium

Firesafe test certification

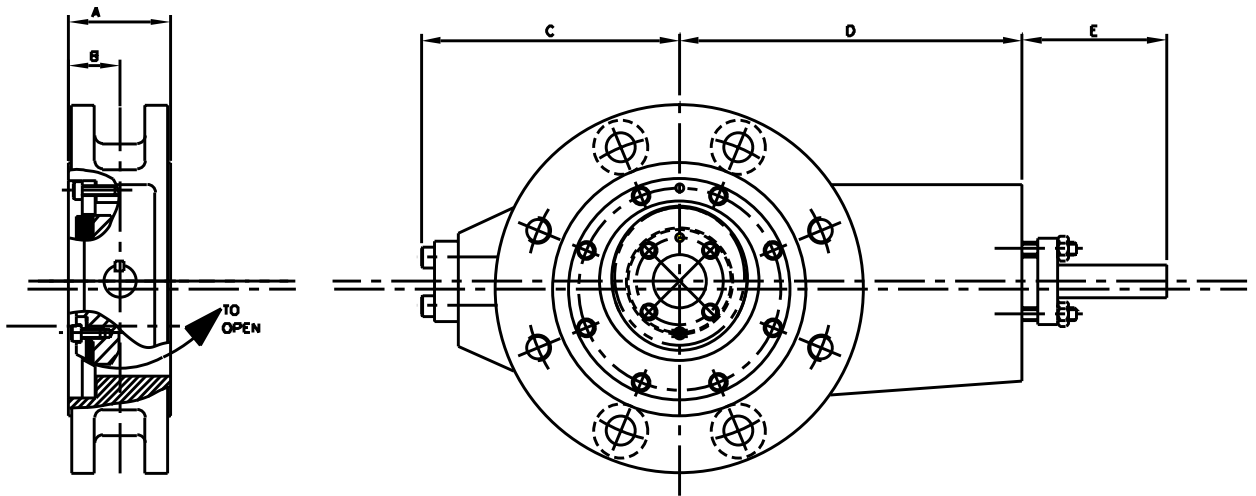
The valve design range is certified firesafe to BS 6755 : Part 2 and API 6FA : API 607 4th editions.

Summary from SGS Yarsley Fire Test Report FT/92197/2 for a Solent & Pratt 14 inch class 150 valve for fire testing to BS 6755 : Part 2 : 1987. The leakage rates were as follows:

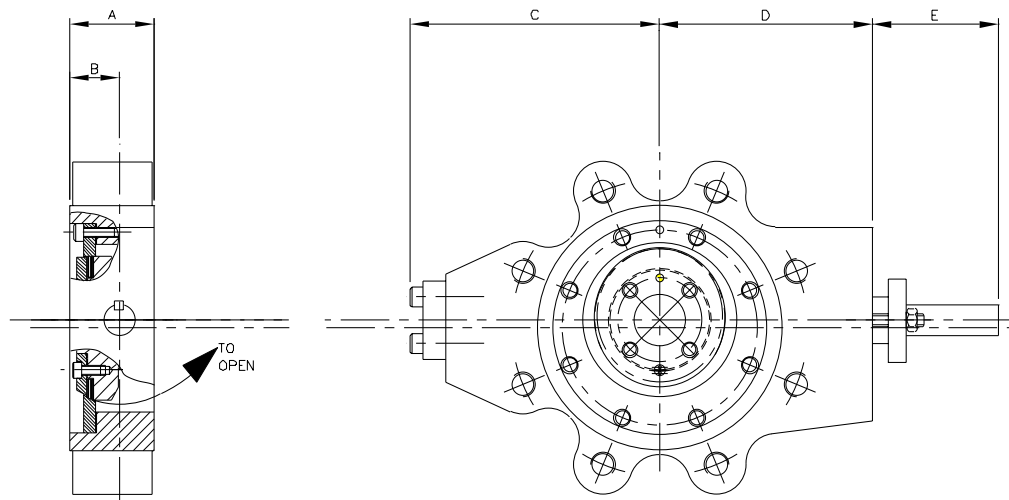
1. Valve in the non-preferred direction

Leakage rate in ml/min	Through leakage rate	Maximum allowed	External leakage rate	Maximum allowed
Burn period	Zero	5600	Zero	1400
Cool down			Zero	1400
Low hydrostatic pressure test	Zero	560	Zero	280
High hydrostatic pressure test			Zero	2800

Under high pressure (14.5Bar/210psi) the torque required to operate the valve was 160 N.M. These results show that even during the fire test burn period, where temperatures reached 1652°F (900°C) the high integrity metal/metal seal still ensured tight shut off.



DF - Double Flange design



WL - Wafer Lugged body design



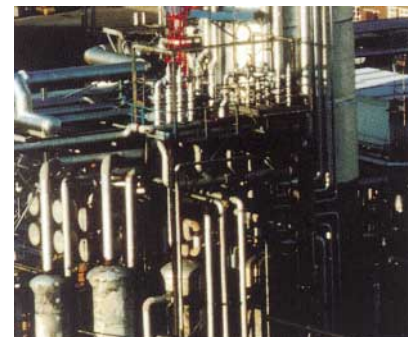
TOSV ANSI Class 150# range (dimensions in mm)

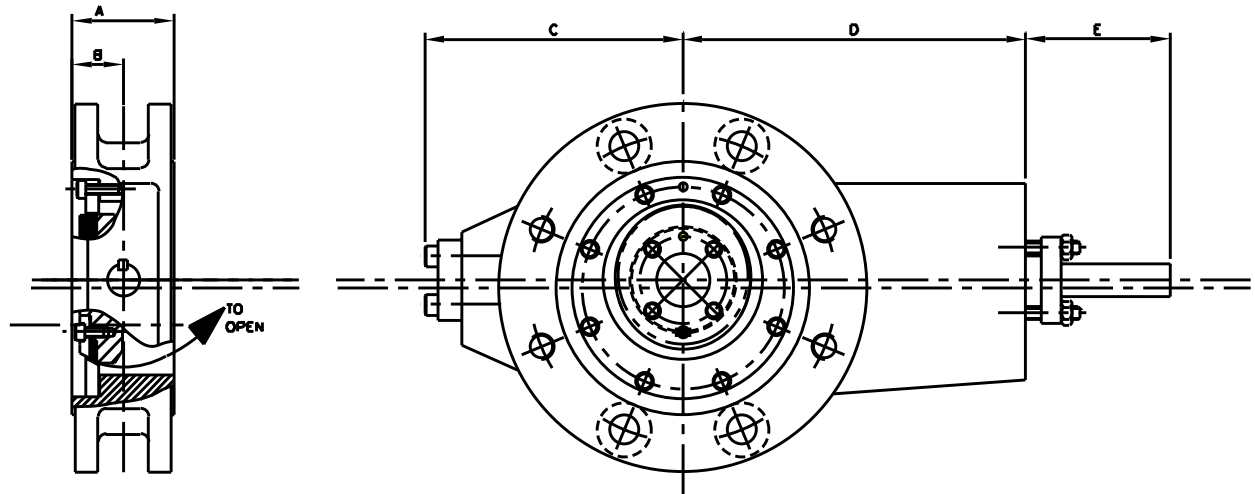
Double Flange Design

Wafer Lugged Design

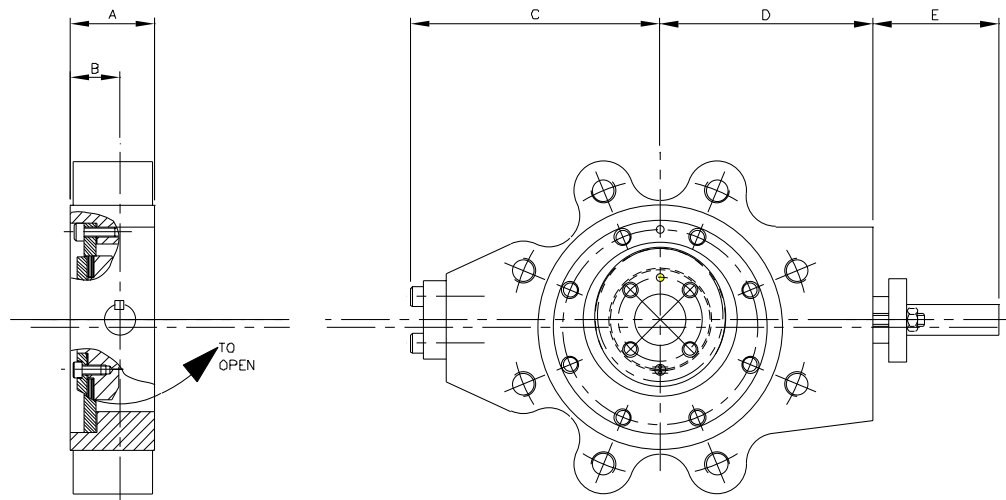
Valve size Inches mm	Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Wt. Kg.	Wt. Lbs.	Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Wt. Kg.	Wt. Lbs.	
3	80	114	57	125	125	120	22	49	48	29	125	125	120	20	44
4	100	127	63.5	161	152	120	30	66	54	31.5	161	152	120	28	62
6	150	140	70	167.5	177	120	38	84	57	36.5	168	177	120	33	73
8	200	152	76	202	191	150	62	137	64	41.5	202	191	150	47	104
10	250	165	82.5	235	230	160	84	185	71	47.5	235	230	160	80	176
12	300	178	89	285	270	180	122	269	81	50	285	270	180	105	231
14	350	190	95	287	297	195	160	352	92	58.5	315	297	195	147	234
16	400	216	108	360	235	195	200	440	102	62.5	380	325	195	185	407
18	450	222	111	386	356	225	225	495	114	72	386	356	225	242	533
20	500	229	114.5	402	383	225	290	638	127	75.5	402	383	225	312	687
24	600	267	133.5	489	466	275	465	1023	154	88.5	489	466	275	425	935
26	650	292	146	485	505	275	585	1287	229	146	485	505	275	525	115
28	700	292	146	515	535	275	700	1540	229	146	515	535	275	630	1260
30	750	318	159	545	564	295	810	1782	229	114.5	597	620	310	725	1595
32	800	318	159	580	610	295	870	1914	229	114.5	636	620	310	783	1723
34	850	330	165	610	640	310	1115	2453	241	120.5	610	640	310	1000	2200
36	900	330	165	635	665	310	1205	2651	241	120.5	635	665	310	1085	2387
38	950	410	205	670	700	325	1390	3058	300	150	670	700	325	1250	2750
40	1000	410	205	695	725	325	1550	3410	300	150	695	725	325	1390	3058
42	1050	410	205	725	755	325	1660	3652	300	150	725	755	325	1490	3278
44	1100	410	205	750	780	325	1830	4026	300	150	750	780	325	1645	3619
46	1150	470	235	780	810	340	2020	4444	350	175	780	810	340	1815	3993
48	1200	470	235	815	855	340	2265	4983	350	175	815	855	350	2035	4477
50	1250	470	235	845	885	340	2550	5610	350	175	845	885	340	2295	5049
52	1300	530	265	465	505	350	2805	6171	350	175	465	505	350	2520	5544
54	1350	530	265	900	940	350	3180	6996	390	195	900	940	350	2860	6292
56	1400	530	265	935	975	360	3540	7788	390	195	935	975	360	3185	7007
58	1450	600	300	695	1005	360	3750	8250	390	195	965	1005	360	3375	7425
60	1500	600	300	990	1050	370	4030	8866	440	220	990	1050	370	3625	7975
64	1600	600	300	1035	1125	370	5125	11275	440	220	1035	1125	370	4600	10120
72	1800	670	335	1170	1230	370	5975	13145	490	245	1170	1230	370	5375	11825
80	2000	760	380	1245	1250	390	8200	18040	540	270	1245	1325	390	7380	16236
84	2200	760	380	1340	1420	390	11050	24310	540	270	1340	1420	390	9945	21879

All dimensions are approximate and subject to change. Consult sales offices for other size requirements.





DF - Double Flange design



WL - Wafer Lugged body design

TOSV ANSI Class 300# range (dimensions in mm)

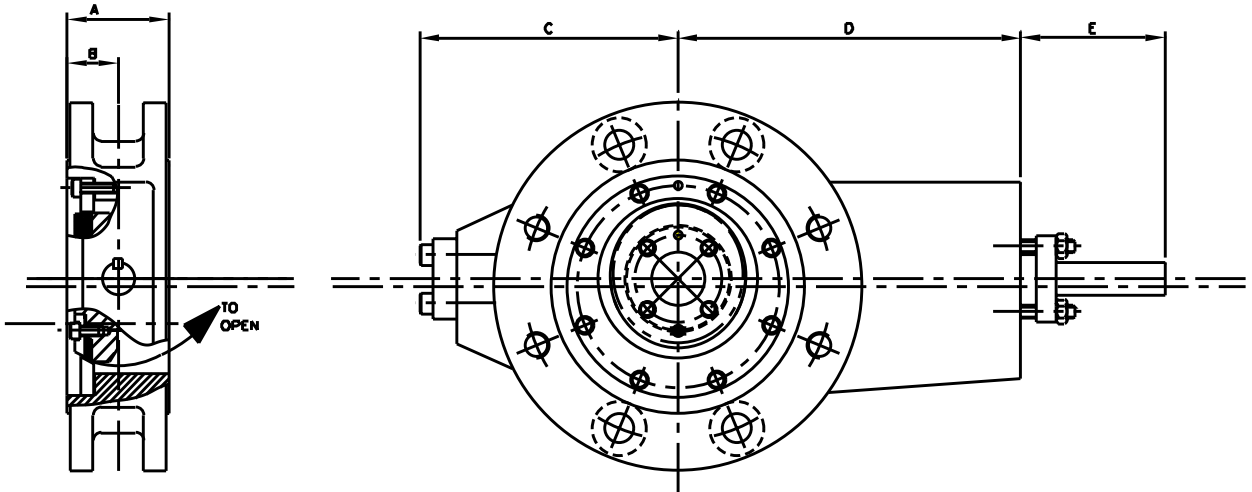
Double Flange Design

Wafer Lugged Design

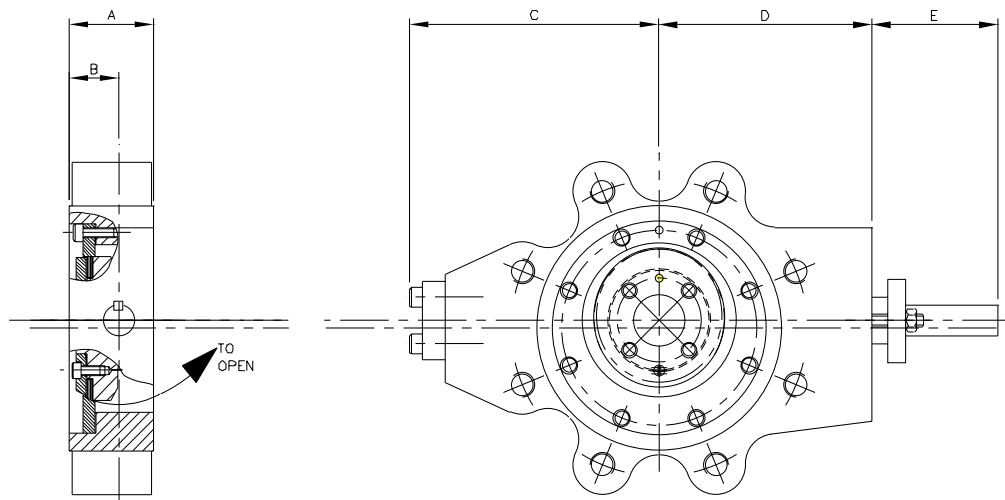
Valve size Inches mm	Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Wt. Kg.	Wt. Lbs.	Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Wt. Kg.	Wt. Lbs.
30 80	114	57	130	125	120	25	55	48	29	130	125	120	23	51
4 100	127	63.5	158	152	120	41	91	54	31.5	158	152	120	33	73
6 150	140	70	194	177	150	58	128	59	36.5	193.5	177	150	54	119
8 200	152	76	230	205	180	85	187	73	41.5	230	205	180	84	185
10 250	165	82.5	260	249	195	118	260	83	47.5	282	249	195	125	275
12 300	178	89	305	295	195	175	385	92	50	312	295	195	158	348
14 350	190	95	332	337	225	250	550	117	58.5	332	337	225	278	612
16 400	216	108	365	360	260	300	600	133	66.5	387	360	260	367	808
18 450	222	111	408	407	325	395	869	149	73	431	407	325	490	1078
20 500	229	114.5	453	443	325	435	957	159	79.5	464	443	325	467	1028
24 600	267	133.5	520	540	375	860	1892	181	90.5	557	540	375	695	1529
26 650	292	146	535	575	375	1050	2310	229	146	535	575	373	945	945
28 700	292	146	580	610	375	1215	2673	229	146	580	610	375	1090	2310
30 750	318	159	605	635	395	1550	3410	229	114.5	651	645	95	1395	2992
32 800	318	159	635	665	395	1660	3652	241	114.5	695	670	395	1490	3641
34 850	330	165	665	695	395	1805	3971	241	120.5	665	695	365	1620	3971
36 900	330	165	695	725	395	2070	4554	241	120.5	695	725	395	1863	4356
38 950	410	205	670	700	395	2115	4653	300	150	670	700	395	1900	5060
40 1000	410	205	695	725	410	2375	5225	300	150	695	725	410	2135	5654
42 1050	410	205	725	755	410	2850	6270	300	150	725	755	410	2565	6160
44 1100	410	205	750	780	410	3170	6974	300	150	750	780	410	2850	6600
46 1150	470	235	780	810	420	3500	7700	350	175	780	810	420	3150	7150
48 1200	470	235	815	855	420	3990	8778	350	175	815	855	420	3590	7832
50 1250	470	235	845	885	430	4250	9350	350	175	845	885	430	3825	8470
52 1300	530	265	465	505	430	4700	10340	350	175	465	505	430	4230	9570
54 1350	530	265	900	940	430	5200	11440	390	195	900	940	430	4680	11000
56 1400	530	265	935	975	450	5800	12760	390	195	935	975	450	5800	12540
58 1450	600	300	965	1005	450	6500	14300	390	195	965	1005	450	5850	13662
60 1500	600	300	990	1050	470	8500	18700	440	220	990	1050	470	6800	14960
64 1600	600	300	1285	1380	470	10200	22440	440	220	1285	1380	470	8650	19030

All dimensions are approximate and subject to change. Consult sales offices for other size requirements.





DF - Double Flange design



WL - Wafer Lugged body design

TOSV ANSI Class 600# range (dimensions in mm)

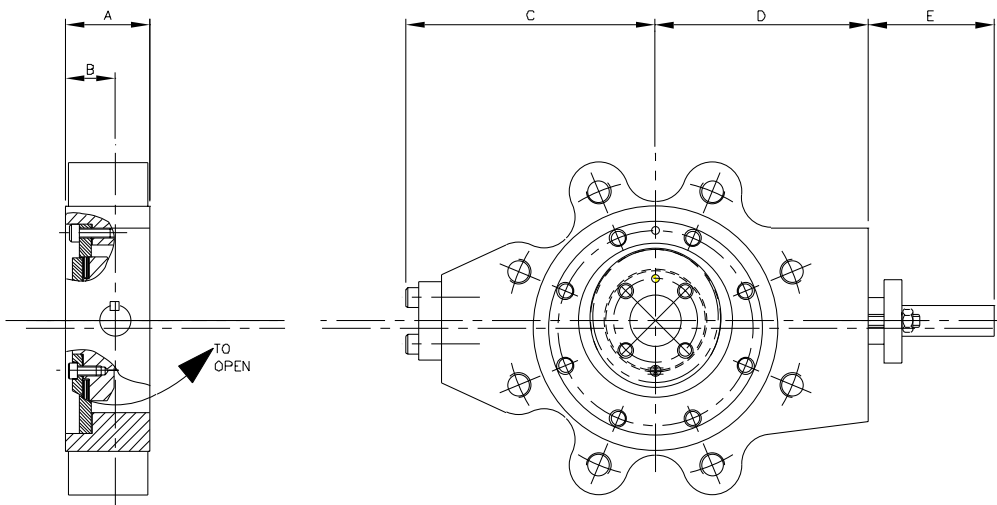
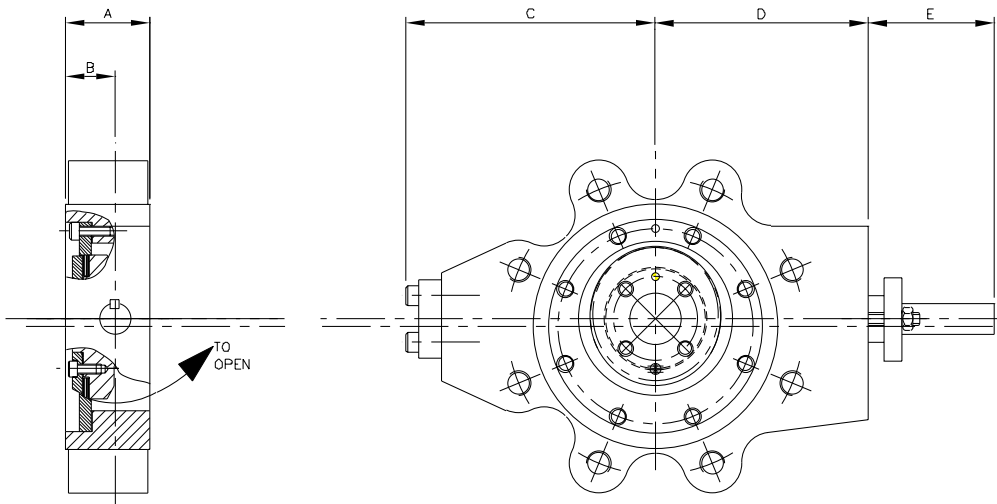
Double Flange Design

Wafer Lugged Design

Valve size Inches mm	Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Wt. Kg.	Wt. Lbs.	Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Wt. Kg.	Wt. Lbs.	
4	100	190	95	165	206	120	48	106	64	39	165	206	120	50	110
6	150	210	105	230	250	150	104	229	78	41	230	250	150	90	198
8	200	230	115	265	280	180	120	264	102	51	265	280	180	193	425
10	250	250	125	300	325	195	240	528	117	60.5	300	325	195	225	495
12	300	270	135	325	350	195	343	755	140	70	325	350	195	345	759
14	350	290	145	360	380	225	485	1067	155	77.5	360	380	225	385	847
16	400	310	155	400	420	260	780	1716	175	89	400	420	260	460	1012
18	450	330	165	420	445	325	830	1826	200	100	420	445	325	685	1507
20	500	350	175	465	485	325	1175	2585	216	108	465	485	325	935	2057
24	600	390	195	530	555	375	1530	3366	232	116	530	555	375	1200	2640
26	650	430	215	485	600	375	1615	3553	292	146	560	600	375	1325	2915
28	700	430	215	515	635	375	1800	3960	292	146	585	635	375	1400	3080
30	750	430	215	545	665	395	1950	4290	318	159	615	665	395	1490	3278
32	800	470	235	580	700	395	2435	5357	318	159	655	700	395	1880	4136
34	850	470	235	610	725	395	2605	5731	330	165	685	725	395	1900	4180
36	900	510	255	635	755	395	2710	5962	330	165	720	755	395	2045	4499
38	950	550	275	670	735	395	3350	7370	410	205	700	735	395	3200	7040
40	1000	550	275	695	765	410	4200	9240	410	205	725	765	410	3585	7887
42	1050	550	275	725	805	410	4852	10675	410	205	765	805	410	3615	7953
44	1100	550	275	750	830	410	5850	12870	410	205	795	830	410	4255	9361
46	1150	630	315	780	860	420	6500	14300	470	235	825	860	420	5020	11044
48	1200	630	315	815	900	420	7290	16038	470	235	865	900	420	5630	12386
50	1250	680	340	845	940	430	7870	17314	500	250	905	940	430	6080	13376
52	1300	680	340	465	965	430	8280	18216	500	250	930	965	430	6400	14080
54	1350	740	370	900	1000	430	9060	19932	530	265	959	1000	430	7000	15400
56	1400	740	370	935	1040	450	9970	21934	530	265	1000	1040	450	7700	16940
58	1450	760	380	965	1075	450	11240	24728	580	29	1025	1075	450	8680	19096
60	1500	780	390	990	1115	470	13070	28754	600	300	1075	1115	470	10100	22220

All dimensions are approximate and subject to change. Consult sales offices for other size requirements.





WL - Wafer Lugged body design

TOSV ANSI Class 900# range (dimensions in mm)

Wafer Lugged Design

Valve size Inches mm	Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Wt. Kg.	Wt. Lbs.	
6	150	102	51	145	165	150	83	183
8	200	140	70	285	310	180	151	333
10	250	155	78	320	350	195	240	528
12	300	178	89	355	380	195	400	880
14	350	290	145	370	395	225	606	1334
16	400	310	155	415	430	260	850	1870
18	450	330	165	450	470	325	1050	2310
20	500	350	175	490	505	325	1350	2970
24	600	350	175	580	620	375	2350	5170
26	650	350	175	550	570	375	2780	6116
28	700	350	175	580	600	375	3130	6886
30	750	410	205	615	645	395	4000	8800
32	800	410	205	645	680	395	4500	9900
34	850	470	235	675	705	395	5800	12760
36	900	470	235	705	735	395	6500	14300

All dimensions are approximate and subject to change.
Consult sales offices for other size requirements.

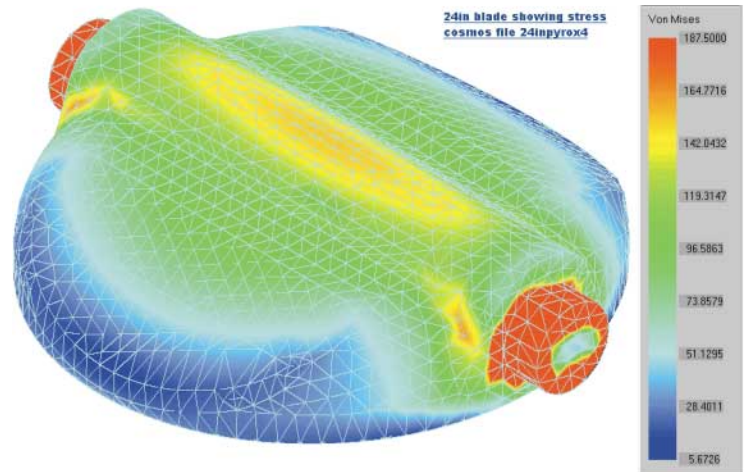


TOSV ANSI Class 1500# range (dimensions in mm)

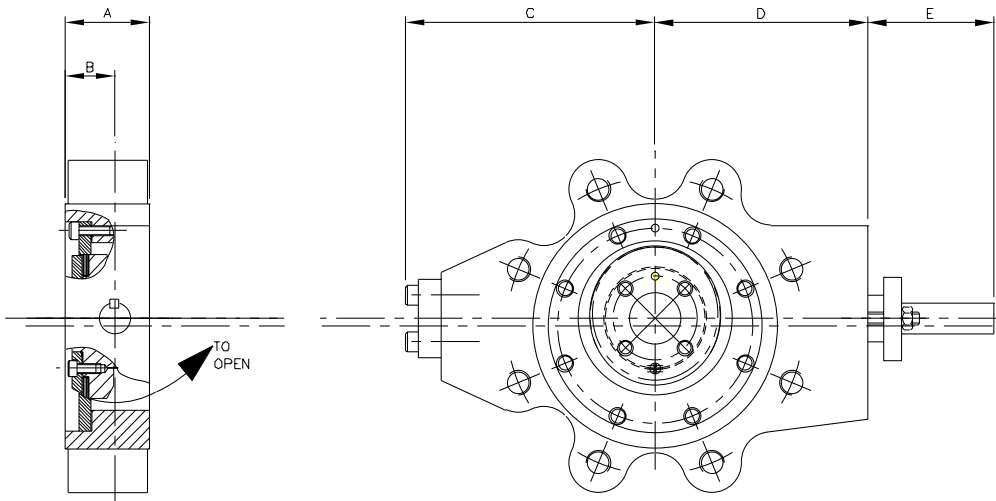
Wafer Lugged Design

Valve size Inches mm	Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Wt. Kg.	Wt. Lbs.	
8	200	230	115	300	320	180	350	770
10	250	250	126	350	375	195	601	1323
12	300	270	135	395	435	195	740	1628
14	350	290	145	435	475	225	1300	2860
16	400	310	155	480	515	260	1650	3630
18	450	330	165	295	330	325	2150	4730
20	500	350	175	545	580	323	2500	5500
24	600	390	195	655	685	375	3840	8448

All dimensions are approximate and subject to change.
Consult sales offices for other size requirements.



24" (600mm) Disc showing the results of a finite element stress analysis carried out by Solent & Pratt's Design Department.



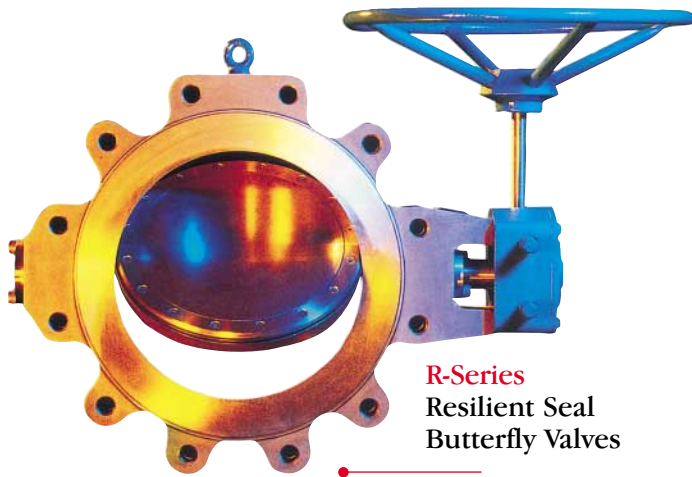
WL - Wafer Lugged body design

TOSV ANSI Class 2500# range (dimensions in mm)

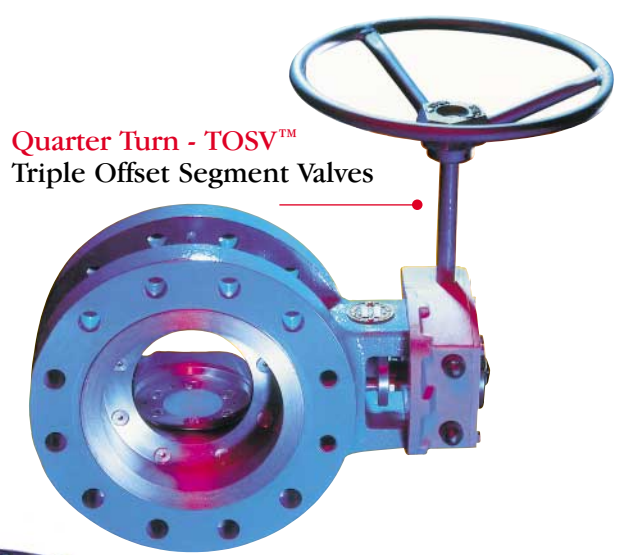
Wafer Lugged Design

Valve size Inches mm	Dim. A	Dim. B	Dim. C	Dim. D	Dim. E	Wt. Kg.	Wt. Lbs.	
8	200	230	115	340	375	200	610	1342
10	250	250	126	400	435	215	990	2178
12	300	270	135	375	480	220	1340	2948

All dimensions are approximate and subject to change.
Consult sales offices for other size requirements.

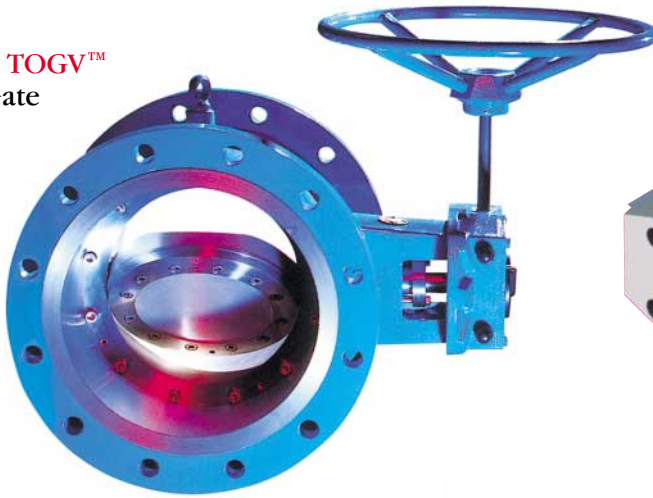


R-Series
Resilient Seal
Butterfly Valves

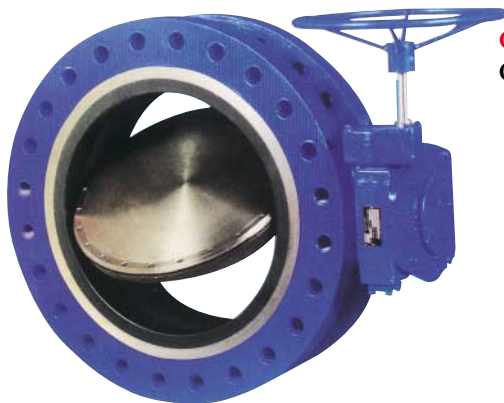


Quarter Turn - TOSV™
Triple Offset Segment Valves

Quarter Turn - TOGV™
Triple Offset Gate
Valves - Metal
Sealing with
Zero Leakage

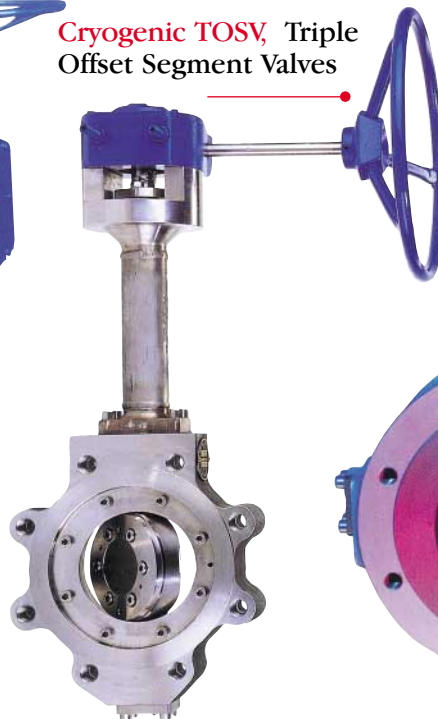


T-Series,
PTFE Sealed
Firesafe Valve

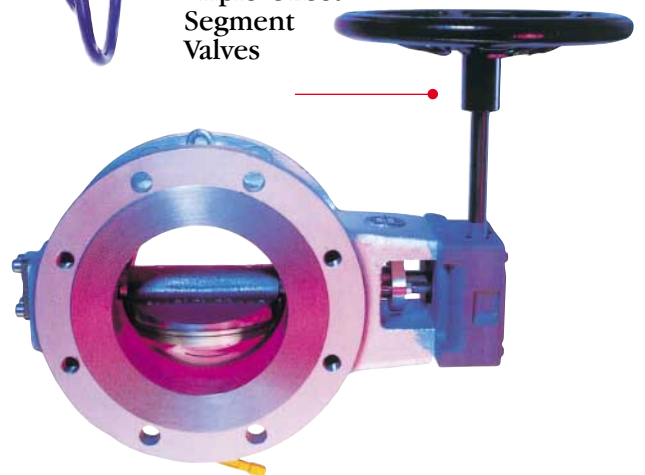


E-Series, Ebonite Lined
Butterfly Valves

Cryogenic TOSV, Triple
Offset Segment Valves



**Double Block
& Bleed TOSV,**
Triple Offset
Segment
Valves



Other product ranges available from Solent & Pratt include:

- R-Series Resilient Seal Butterfly valves. Sizes: 2" (50mm) to 84" (2100mm)
- E-Series Ebonite Lined Butterfly valves. Sizes : 3" (80mm) to 84" (2100mm)
- T-Series High Performance Butterfly valves, Teflon - sealed firesafe. Sizes: 3" (80mm) to 48" (1200mm)
- TOSV Quarter Turn series. Sizes: 3" (80mm) to 84" (2100mm). Temperature range up to 1292°F (700°C)
- TOGV Gate Valve Series. Sizes: 3" (80mm) to 24" (600mm). Temperature range to up to 1292°F (700°C)
- TOSV Double Block and Bleed series. Sizes: 6" (150mm) to 84" (2100mm). Temperature range up to 932°F (500°C)
- TOSV Cryogenic series. Sizes: 3" (80mm) to 84" (2100mm). Temperature range down to -320°F (-196°C)
- Control Butterfly Valves. Actuated for both isolation and control duty.

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