

TRUNNION MOUNTED BALL VALVES



TRUNNION MOUNTED BALL VALVES

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TRUNNION MOUNTED BALL VALVES

Design Features

PMSS Seat

PMSS Ball Valve (Primary Metal Seated and Secondary Soft Seated) is designed to engage the metal seat at all times, with the soft seat as a back-up to provide bubble-tight shut off for both gas and liquid service.

In the PMSS system, a resilient material is inserted into the metal seat holder to provide a soft seating action in addition to the metal to metal seating between the ball and the seat rings. The flexible soft sealing in the seating rings is first effective at low pressure ranges.

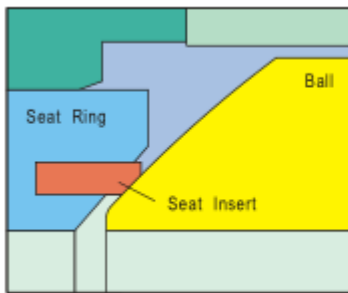


Fig.1

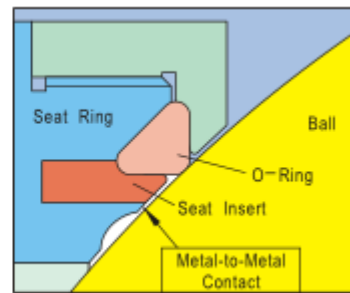
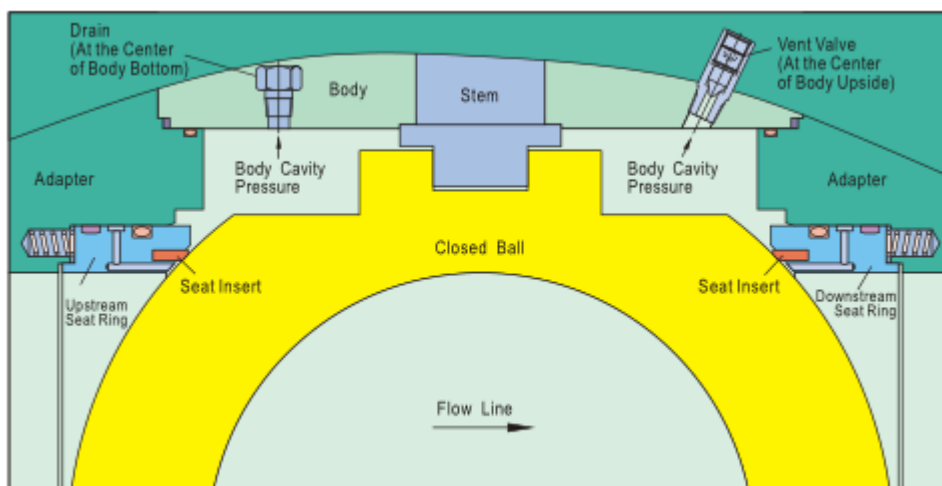


Fig.2

Double Block and Bleed (Self Relieving Seats)

When the ball is in the closed position, each seat seals off the process medium independently at the same time between the up/down stream and body cavity; it allows bleeding of the trapped cavity pressure (DBB) through drain or vent valve. The double block and bleed function makes it possible to flush the valve under pressure and verify that the seats are sealing properly. (Fig. 7)



TRUNNION MOUNTED BALL VALVES

Design Features

Fire Safe Design

The Valve is Fire Safe tested and approved according to common standards like API 607, API 6 FA, ISO 10497, etc.

a) External leakage prevention

All the possible external leakage point Betweenstem and gland flange, gland flange and body, body and adapter are sealed with primary O-ring then secondary graphite gasket. When fire Burnedout the primary O-ring seal, the secondary graphite gasket seal still can prevent the processmedium from external leakage.

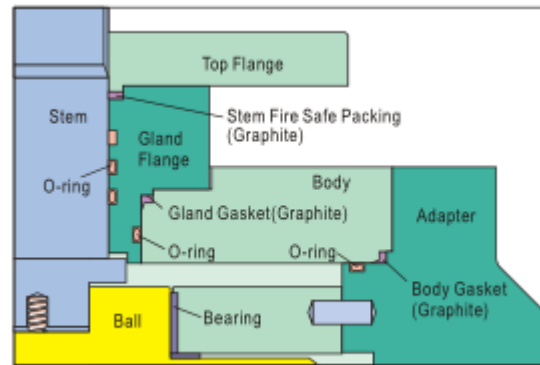


Fig.9

b) Internal leakage prevention

When fire burned out the primary O-ring seal between the floating seat ring and adapter, also the seat insert between seat ring and ball, the secondary graphite seal between seat ring and adapter, and seat ring & ball metal to metal contact preloaded by spring will minimize the internal process medium leakage. (Fig. 10, 11)

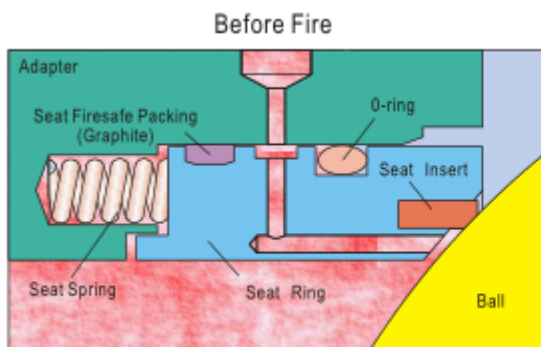


Fig.10

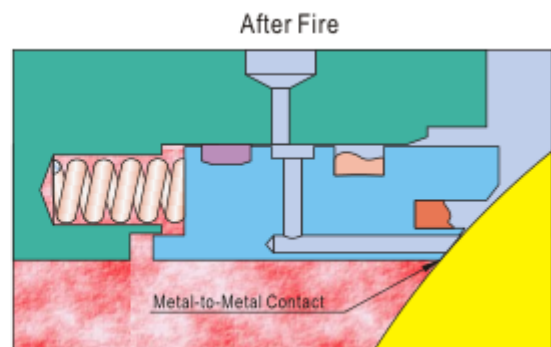


Fig.11

Blow-out Proof Stem

The stem is made separately from the ball with integral T-type round shoulder, retained by gland. (other designs are available on request)

TRUNNION MOUNTED BALL VALVES

Design Features

Anti-static Device

Spring plus graphite type anti-static device are applied between the ball, stem, gland flange and body, to keep the electrical continuity between all the metallic components, and ensure the resistance lower than the most severe service requirement. (Fig. 8) Blow-out Proof Stem

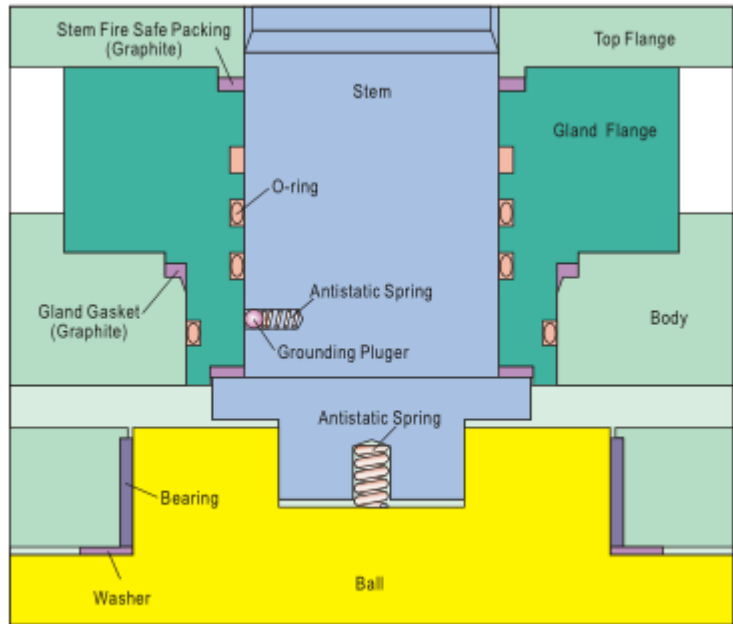


Fig.8

Emergency Sealant Injection System

Each valve of size 6" and larger (or smaller size on request), is equipped with sealant injection located at stem and seats area. The injection is integrated with check valve to provide backup sealing, also a check valve is equipped at front of seat sealant injection to avoid blowing out in case wrong operation. When the soft sealing materials (seat inserts and o-rings) are damaged and leakage happened by fire or other accident, the sealant can be injected through the injection fittings. (Fig. 12)

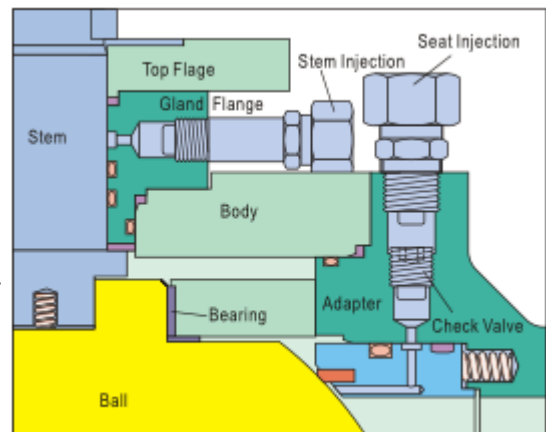
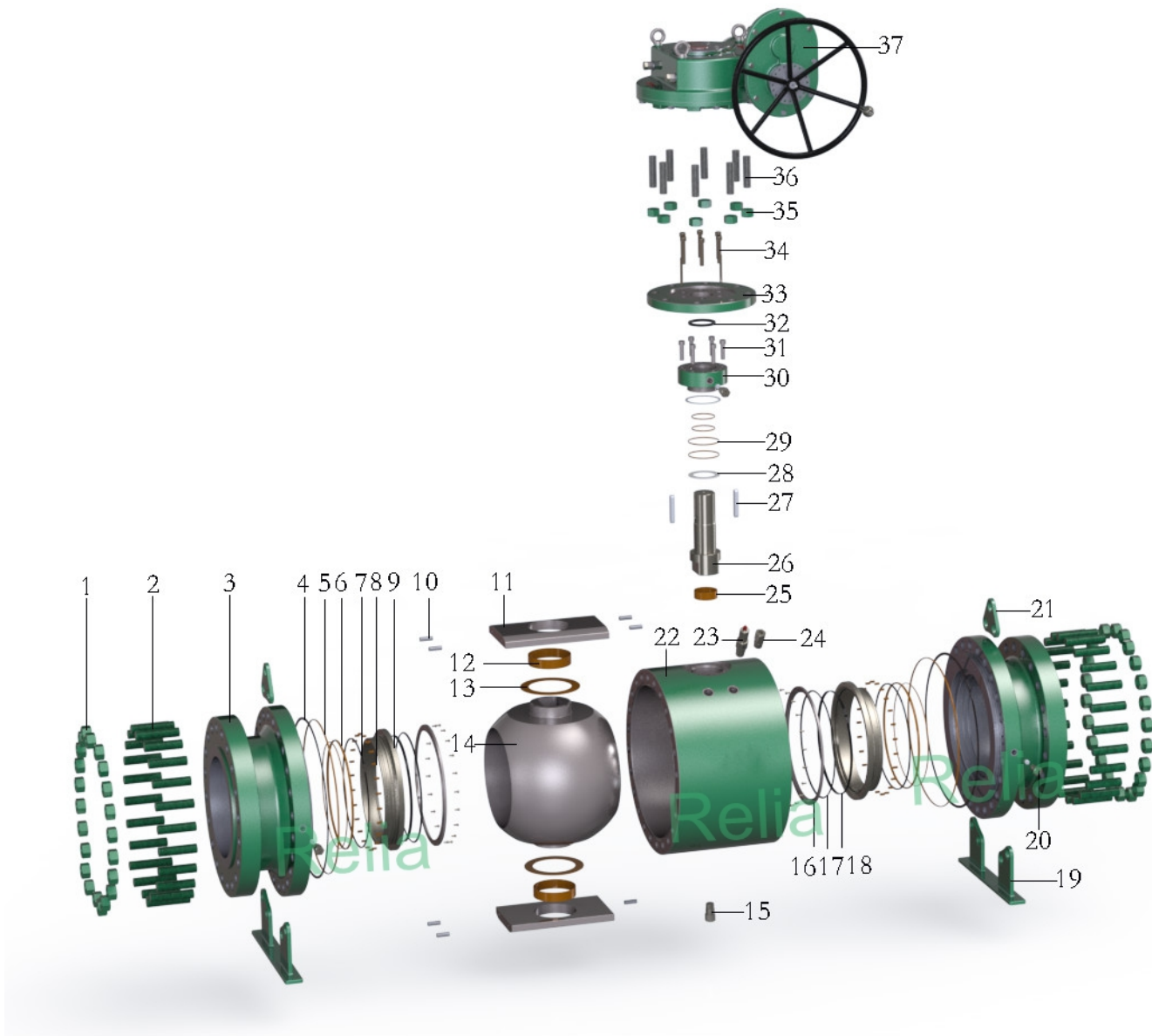


Fig.12

TRUNNION MOUNTED BALL VALVES

Exploded View Drawing



TRUNNION MOUNTED BALL VALVES

Material Specifications

No.	Name of Part	A105/ENP	LF2/F316	F316/F316
1	Nut	A194 2H	ASTM A194 7	ASTM A193 B8
2	Bolt	A193 B7	ASTM A320 L7	ASTM A182 F316
3	Bonnet	ASTM A105	ASTM A320 LF2	ASTM A182 F316
4	Gasket	304+Graphite	304+Graphite	304+Graphite
5	O-Ring	Vion AED	Vion AED	Vion AED
6	O-Ring	Vion AED	Vion AED	Vion AED
7	Graphite	304+Graphite	304+Graphite	304+Graphite
8	Spring	Inconel X-750	Inconel X-750	Inconel X-750
9	Seat Ring	ASTM A105	A182 F316	A182 F316
10	Pin	Carbon Steel	Stainless Steel	Stainless Steel
11	Trunnion	ASTM A105	A182 F316	A182 F316
12	Bearing	Carbon Steel+Graphite	Carbon Steel+Graphite	Carbon Steel+Graphite
13	Gasket	304+Graphite	304+Graphite	304+Graphite
14	Ball	ASTM A105+ENP	A182 F316	A182 F316
15	Drain Plug	Carbon Steel	Stainless Steel	Stainless Steel
16	Ring	A105+ENP	Stainless Steel	Stainless Steel
17	Seal Ring	Viton AED	Stainless Steel	Stainless Steel
18	Seat Ring	PTFE, Nylon, PEEK	PTFE, Nylon, PEEK	PTFE, Nylon, PEEK
19	Feet	Carbon Steel	Carbon Steel	Carbon Steel
20	Injection Valve	Carbon Steel	Stainless Steel	Stainless Steel
21	Lifting Lug	Carbon Steel	Stainless Steel	Stainless Steel
22	Body	ASTM A105	A182 F316	A182 F316
23	Safety Valve	Carbon Steel	Carbon Steel	Carbon Steel
24	Relief Valve	Carbon Steel	Stainless Steel	Stainless Steel
25	Trunnion Bearing	Carbon Steel+Graphite	Carbon Steel+Graphite	Carbon Steel+Graphite
26	Stem	A182 F6A	A182 F316	A182 F316
27	Key	Carbon Steel	Carbon Steel	Carbon Steel
28	Thrust Washer	PTFE	PTFE	PTFE
29	O-Ring	Vion AED	Vion AED	Vion AED
30	Stuffing Box	ASTM A105	ASTM A350 LF2	ASTM A193 B8
31	Bolt	A193 B7	ASTM A320 L7	ASTM A193 B8
32	Packing	304+Graphite	304+Graphite	304+Graphite
33	Adapter	ASTM A105	ASTM A105	A182 F316
34	Bolt	A193 B7	ASTM A320 L7	ASTM A193 B8
35,36	Nut/Bolt	A194 2H/A193 B7	ASTM A194 7/ A320 L7	ASTM A194 8/A193 B8
37	Worm Gear	Ductile Iron	Ductile Iron	Ductile Iron

TRUNNION MOUNTED BALL VALVES

Dimensions & Weight Chart

ANSI Class 150 (Dimensions & Weight)

Size		Minimum Bore	Face to face & end to end dimensions (mm)			Weight (Kg)
Inch	DN		RF	BW	RTJ	
2"	50	49	178	216	191	45
3"	80	74	203	283	216	80
4"	100	100	229	305	241	150
6"	150	150	394	457	406	248
8"	200	201	457	521	470	438
10"	250	252	533	559	546	701
12"	300	303	610	635	622	855
14"	350	334	686	762	699	1230
16"	400	385	762	838	775	1535
18"	450	436	864	914	876	2135
20"	500	487	914	991	927	2640
24"	600	589	1067	1143	1080	3980
26"	650	633	1143	1245	-	3200
28"	700	684	1245	1346	-	4045
30"	750	735	1295	1397	-	4820
32"	800	779	1372	1524	-	5490
34"	850	830	1473	1626	-	6704
36"	900	874	1524	1727	-	7615

ANSI Class 300 (Dimensions & Weight)

Size		Minimum Bore (mm)	Face to face & end to end dimensions (mm)			Weight (Kg)
Inch	DN		RF	BW	RTJ	
2"	50	49	216	216	232	31
3"	80	74	283	283	298	69
4"	100	100	305	305	321	110
6"	150	150	403	457	419	211
8"	200	201	502	521	518	376
10"	250	252	568	559	584	540
12"	300	303	648	635	664	763
14"	350	334	762	762	778	900
16"	400	385	838	838	854	1300
18"	450	436	914	914	930	1715
20"	500	487	991	991	1010	2090

TRUNNION MOUNTED BALL VALVES

Dimensions & Weight Chart

24"	600	589	1143	1143	1165	2890
26	650	633	1245	1245	1270	3600
28	700	684	1346	1346	1372	4575
30	750	735	1397	1397	1422	5590
32	800	779	1524	1524	1553	6240
34	850	830	1626	1626	1654	7370
36	900	874	1727	1727	1756	8435

ANSI Class 400 (Dimensions & Weight)

Size		Minimum Bore (mm)	Face to face & end to end dimensions (mm)			Weight (Kg)
Inch	DN		RF	BW	RTJ	
4"	100	100	406	406	410	125
6"	150	150	495	495	498	232
8"	200	201	597	597	600	419
10"	250	252	673	673	676	594
12"	300	303	762	762	765	833
14"	350	334	826	826	829	990
16"	400	385	902	902	905	1430
18"	450	436	978	978	981	1890
20"	500	487	1054	1054	1060	2208
22"	550	589	1143	1143	1153	2420
24	600	633	1232	1232	1241	3150
26	650	684	1308	1308	1321	3810
28	700	735	1397	1397	1410	5010
30	750	779	1524	1524	1537	6190
32	800	830	1651	1651	1667	6820
34	850	874	1778	1778	1794	8010
36	900	874	1880	1880	1895	9250

ANSI Class 600 (Dimensions & Weight)

Size		Minimum Bore (mm)	Face to face & end to end dimensions (mm)			Weight (Kg)
Inch	DN		RF	BW	RTJ	
2"	50	49	292	292	295	45
3"	80	74	356	356	359	80
4"	100	100	432	432	435	150

TRUNNION MOUNTED BALL VALVES

Dimensions & Weight Chart

6"	150	150	559	559	562	248
8"	200	201	660	660	664	438
10"	250	252	787	787	791	701
12"	300	303	838	838	841	855
14"	350	334	889	889	892	1230
16"	400	385	991	991	994	1535
18"	450	436	1092	1092	1095	2135
20"	500	487	1194	1194	1200	2640
24"	600	589	1397	1397	1407	3960
26"	650	633	1448	1448	1461	
28"	700	684	1549	1549	1562	6060
30"	750	735	1651	1651	1664	6690
32"	800	779	1778	1778	1794	7825
34"	850	830	1930	1930	1946	8460
36"	900	874	2083	2083	2099	10650

ANSI Class 900 (Dimensions & Weight)

Size		Minimum Bore (mm)	Face to face & end to end dimensions (mm)			Weight (Kg)
Inch	DN		RF	BW	RTJ	
2"	50	49	368	368	371	52
3"	80	74	381	381	384	87
4"	100	100	457	457	460	160
6"	150	150	610	610	613	385
8"	200	201	737	737	740	560
10"	250	252	838	838	841	820
12"	300	303	965	965	968	1125
14"	350	322	1029	1029	1038	1610
16"	400	373	1130	1130	1140	2010
18"	450	423	1219	1219	1232	2810
20"	500	471	1321	1321	1334	3460
24"	600	570	1549	1549	1568	5497
26"	650	617	1651	-	1673	7500
30"	750	712	1880	-	1902	11442
36"	900	855	2286	-	2315	20154

TRUNNION MOUNTED BALL VALVES

Dimensions & Weight Chart

ANSI Class 1500 (Dimensions & Weight)

Size		Minimum Bore (mm)	Face to face & end to end dimensions (mm)			Weight (Kg)
Inch	DN		RF	BW	RTJ	
2"	50	49	368	368	371	60
3"	80	74	419	419	422	115
4"	100	100	546	546	549	194
6"	150	144	705	705	711	580
8"	200	192	832	832	841	752
10"	250	239	991	991	1000	1195
12"	300	287	1130	1130	1146	1970
14"	350	315	1257	1257	1276	2250
16"	400	360	1384	1384	1407	2760
18"	450	406	1537	-	1559	3646
20"	500	454	1664	-	1686	4497
24"	600	546	-	-	1972	7151

ANSI Class 2500 (Dimensions & Weight)

Size		Minimum Bore (mm)	Face to face & end to end dimensions (mm)			Weight (Kg)
Inch	DN		RF	BW	RTJ	
2"	50	42	451	451	454	90
3"	80	62	578	578	584	200
4"	100	87	673	673	683	385
6"	150	131	914	914	927	778
8"	200	179	1022	1022	1038	1352
10"	250	223	1270	1270	1292	2137
12"	300	265	1422	1422	1445	3267

TRUNNION MOUNTED BALL VALVES

Torque Value

Torque Value Class 150-600

Size		Class 150		Class 300		Class 600	
Inch	mm	N.m	ISO 5211	N.m	ISO 5211	N.m	ISO 5211
2"	50	40	F07	75	F07	115	F07
2 1/2"	65	60	F07	105	F07	290	F10
3"	80	85	F07	150	F07	450	F10
4"	100	160	F10	400	F10	850	F12
6"	150	450	F12	780	F12	1300	F14
8"	200	720	F12	1250	F14	3200	F16
10"	250	1200	F14	2020	F16	5200	F25
12"	300	2000	F16	3300	F16	7200	F25
14"	350	2800	F16	5000	F25	9500	F30
16"	400	4000	F25	7200	F25	15000	F30
18"	450	6200	F25	11000	F30	19500	F35
20"	500	7500	F25	13500	F30	29000	F35
22"	550	9000	F30	16000	F30	-	-
24"	600	13000	F30	19600	F35	42500	F40
26"	650	13500	F30	24500	F35	48000	F40
28"	700	14500	F30	28200	F35	55000	F40
30"	750	18000	F35	29000	F35	60000	F40
32"	800	24000	F35	32000	F35	82000	F48
34"	850	26000	F35	43000	F40	-	-
36"	900	28000	F35	54500	F40	111000	F48
40"	1000	35000	F40	65800	F40	125000	F48
42"	1050	39000	F40	75000	F48	148000	F60
44"	1100	47000	F40	-	-	-	-
46"	1150	-	-	-	F48	16000	F60
48"	1200	65000	F48	120000	F48	185000	F60
50"	1250	71500	F48	-	-	-	-
56"	1400	-	-	189000	F60	-	F60

TRUNNION MOUNTED BALL VALVES

Torque Value

Torque Value Class 900-2500

Size		Class 900		Class 1500		Class 2500	
Inch	mm	N.m	ISO 5211	N.m	ISO 5211	N.m	ISO 5211
2"	50	150	F10	470	F10	700	F12
2 1/2"	65	400	F10	700	F12	-	-
3"	80	550	F12	810	F12	1400	F14
4"	100	1200	F14	1500	F14	2500	F16
5"	125	2150	F16	3150	-	-	-
6"	150	2400	F16	3450	F16	6200	F25
8"	200	4680	F25	7200	F25	14000	F30
10"	250	6840	F25	9850	F30	19500	F35
12"	300	9595	F30	12750	F30	25000	F35
14"	350	11500	F30	21000	F35	36000	F40
16"	400	16500	F35	34500	F40	52000	F40
18"	450	24000	F35	45500	F40	75000	F48
20"	500	33800	F40	58350	F40	98000	F48
22"	550	45000	F40	-	-	-	-
24"	600	55500	F40	82500	F48	-	-
26"	650	65000	F40	100000	F48	-	-
28"	700	75000	F48	116000	F48	-	-
30"	750	85000	F48	-	-	-	-
32"	800	98000	F48	-	-	-	-

TRUNNION MOUNTED BALL VALVES

Flow Coefficient (Cv)

Size		Class 150	Class 300	Class 600	Class 900	Class 1500	Class 2500
Inch	DN						
2"	50	381	381	381	381	381	283
3"	80	845	845	845	845	845	600
4"	100	1523	1523	1523	1523	1523	1160
6"	150	3381	3381	3381	3381	3120	2590
8"	200	6031	6031	6031	6031	5508	4795
10"	250	9442	9442	9442	9442	8500	7410
12"	300	13614	13614	13614	13614	12223	10433
14"	350	16621	16621	16621	15363	14800	-
16"	400	21920	21920	21920	20581	19178	-
18"	450	28076	28076	28076	26435	24243	-
20"	500	34995	34995	34995	32743	30565	-
22"	550	42676	42676	42676	40184	35860	-
24"	600	51117	51117	51117	47884	41733	-
26"	650	59012	59012	59012	56076	-	-
28"	700	68872	68872	68872	65110	-	-
30"	750	79493	79493	79493	74610	-	-
32"	800	89268	89268	89268	84977	-	-
34"	850	101307	101307	101307	96020	-	-
36"	900	112306	112306	112306	107487	-	-
40"	1000	139982	139982	139982	-	-	-

TRUNNION MOUNTED BALL VALVES

Seat & Seal Material Selection Guid

	PTFE	RPTFE	Molon(Nylon+MoS2)	PEEK
Tensile Strength (MPa)	24.8	25.4	75-100	91
Compressive Strength (MPa)	35	52	100-140	137
Elongation (%)	250	120	10-30	50
Hardness (SH.A)	56	60	78	82
Water Absorption (%)	<0.01	<0.01	0.7	0.12
Specific Gravity (G/cm3)	2.2	2.2	1.2	1.35
Temperature Range (°F)	-300-400	-150-425	-40-300	-150-500
Pressure Rating (Class)	150-600	150-600	150-1500	150-2500
	Nylon 1010	Nylon 12	Devlon V	Delrin
Tensile Strength (MPa)	55	60	80	68
Compressive Strength (MPa)	70	79	140	110
Elongation (%)	150	200	5.37	220
Hardness (SH.A)	70	75	78	78
Water Absorption (%)	0.3	0.2	0.1	0.2
Specific Gravity (G/cm3)	1.04	1.01	1.14	1.41
Temperature Range (°F)	-40-200	-58-250	-150-300	-58-230
Pressure Rating (Class)	600-1500	600-1500	150-1500	150-1500

Specifications for Seal Material

	Viton A	NBR	Viton B	HNBR (HSN)	Viton AED
Temperature Range (°F)	-20-400	-50-250	-20-400	-20-320	-20-480
Hardness (SH.A)	70	70	70	80	90
Specific Gravity (G/cm3)	1.85	1.2	1.85	1.33	1.9
Service Application	Petroleum Oils, Gasoline, Transmission Fluid	Petroleum Oils, Water, Hydraulic Oils	Mineral Acid, Steam, MTBE	Petroleum Oils, H2S & CO2, Anti-Explosive Decompression	Petroleum Oils, H2S & CO2, Anti-Explosive Decompression

Specifications for Gasket Material

	Flexible Graphite	Spiral Wound 316+Graphite	PTFE	Spiral Wound Monel +PTFE
Temperature Range (°F)	-300-900	-300-900	-300-400	-300-400
PH	0-14	0-14	0-14	0-14
Service Application	Fire Safe	Fire Safe	Cryogenic, High Corrosive	High Corrosive