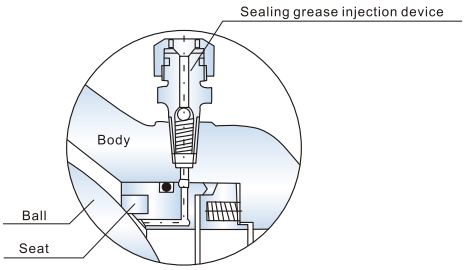
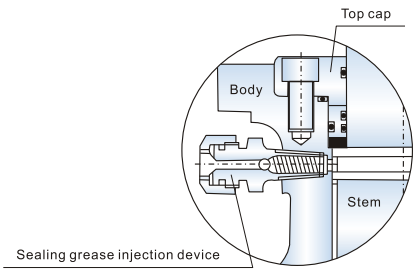
Design features of trunnion ball valve



Urgent grease injection device

According to customers' requirement, the trunnion ball valves made by 3D company are provided with devices for urgent grease injection, which are on both the stem and seat for the trunnion ball valves of DN>150mm(NPS6), and in the body cavity for the valve of DN<125mm. When the O ring of stem or the body seat ring is damaged due to accident, the medium leakage between body and stem can be prevented by injecting the sealing grease through the device.

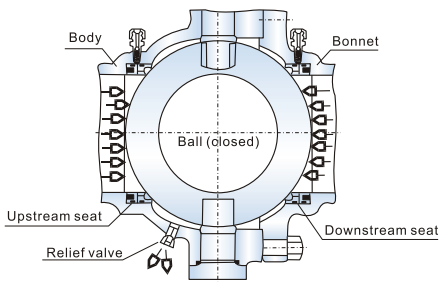


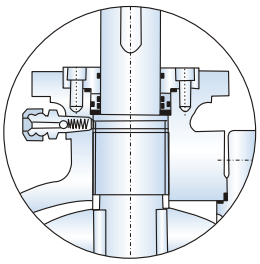
Double-block and bleed functions

In general, 3D trunnion ball valve features the front ball Sealing design structure.Each seat of the ball valve can separately cut off the medium at both inlet and outlet of the valve to realize double-block functions. When the ball valve is closed, body cavity and two of the body ends can be blocked with each other even if both the inlet and outlet are under pressure, when the medium left in the body cavity might be bled through the relief valve.

Blow-out proof stem

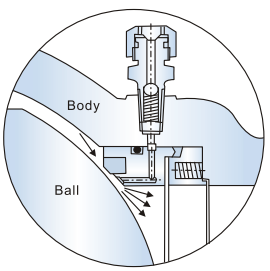
Blow-out proof structure is provited with for the stem, which is positioned by the up-end cap and screw, being guaranteed not to be blown-out by the medium even if at abnormal risen pressure in the cavity.

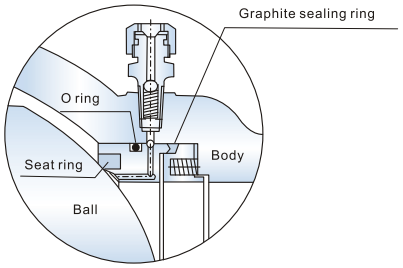




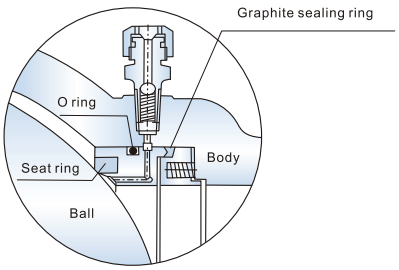
Self-relief in the body cavity

As the liquid medium left in the body cavity gasifies due to increased temperature, the pressure in the body cavity becomes abnormally higher, when the medium itself in the cavity would propel the seat and self-relieves the pressure to ensure the safety of valve.



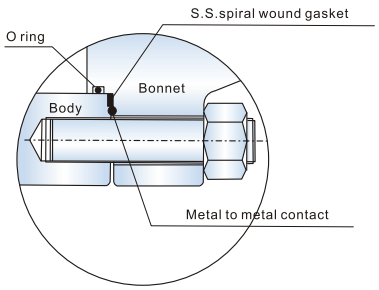


Before fire

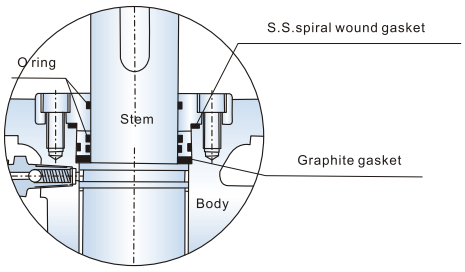


After fire

Fire safe design of seat



Fire safe design of valve body and bonnet flanges



Fire safe design of stem

Fire safe design

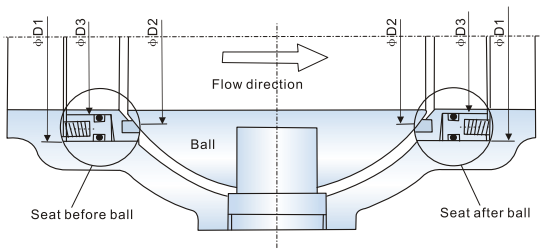
With the valve heated in a fire application, the nonmetal material parts such as seat sealing ring of PTFE, O ring for the stem,and sealing gasket for body and bonnet, might be damaged due to high temperature. 3D's special design of auxiliary metal to metal or the graphite seal is provided fo r the trunnion ball valve to effectively prevent both internal and external leakage of the valve.As required by customers, 3D's fire safe design for the trunnion ball valve meets the requirement of API 607, API 6F,.BS6755 and JB/T6899.

The BI-sealing design structure, i.e. seat sealing in front of the ball and seat sealing behind the ball

According to some special working conditions and customers' requirement, 3D has provided the trunnion ball valve with the BI-sealing design structure, i.e. seat sealing in front of the ball and seat sealing behind the ball, thus the reliable sealing of the valve is ensured because the valve can perform normally even if one of the effective sealing designs becomes lost due to the abnormal condition.

Regarding the seat in front of the ball, the piston effect formed by the area difference between D1 and D2, plus the pre-tightened force of a spring would cause the seat in front of the ball by the pressure difference of the medium before and after the valve to touch the ball closely to form the tightness, of which the sealing force will become bigger as the pressure difference gets higher.

Regarding the seat after the ball, the piston effect formed by the area difference between D2 and D3, plus the pre-tightened force of a spring would cause the seat behind the ball to touch the ball closely to form the tight ness, of which the sealing force will become bigger as the pressure difference gets higher.

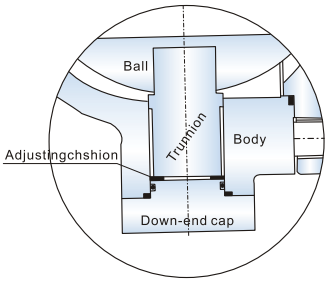


Anti-static design

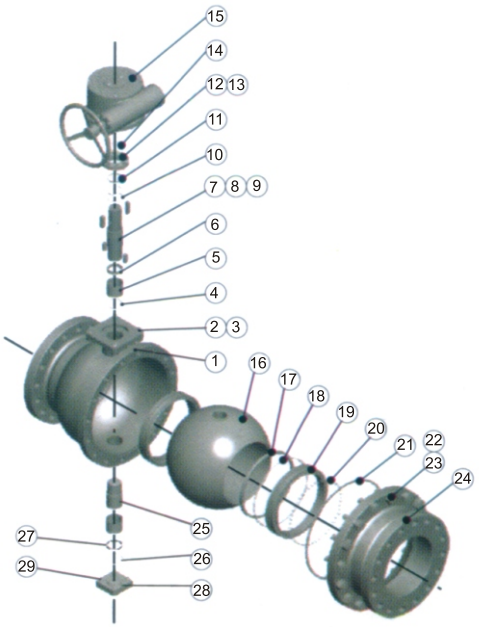
The ball of the trunnion ball valve gets close contact with each other through the trunnion, adjusting cushion, and down-end cap, the passage of static electricity thus forms together with the valve, which may lead the static electricity caused by sparks generated by friction between the ball and seat during on and off performance to the ground to prevent the possible risk of fire or explosion.

Mounting pad provided

3D has provided for trunnion ball valve with amounting pad for fixing the actuators, such as worm gear, pneumatic, electric, hydraulic, and pneumatic & hydraulic acturtors.



Typical drawing of trunnion ball valve and parts compositio



Application

Trunnion ball valves are suitable for kinds of pipelines of Class 150~Class 2500, PN16~PN160, JIS10K~JIS20K to cut off or turn on the pipeline medium, of which the operation types include worm gear, manual, pneumatic or electric actuators, being in general of flange connection, and butt welding ends connection as well.

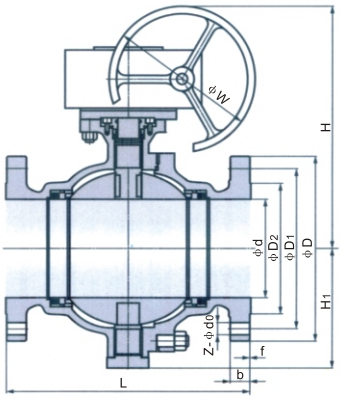
Parts and material list

Parts No.	Parts name	Materials				
		WCB/13Cr	WCB/304	WCB/316	CF8	CF8M
1	Body	ASTMA216 WCB	ASTM A216 WCB	ASTM A216 WCB	ASTM A351 CF8	ASTM A351 CF8M
2	Nut	ASTM A194 2H	ASTM A194 2H	ASTM A194 2H	ASTM A194 2H	ASTM A194 2H
3	Bolting	ASTM A193 B7	ASTM A193 B7	ASTM A193 B7	ASTM A193 B7	ASTM A193 B7
4	O ring	Vton	Viton	Viton	Viton	Viton
5	Stem bearing	Metal backed PTFE	Metal backed PTFE	Metal backed PTFE	Metal backed PTFE	Metal backed PTFE
6	Gasket	ASTM A182 F6a	ASTM A182 F304	ASTM A182 F316	ASTM A182 F304	ASTM A182 F316
7	Stem	ASTM A182 F6a	ASTM A182 F304	ASTM A182 F316	ASTM A182 F304	ASTM A182 F316
8	Key	Carbon steel	Carbon steel	Carbon steel	Stainless steel	Stainless steel
9	Key	Carbon steel	Carbon steel	Carbon steel	Stainloss steel	Stainless steel
10	O ring	Viton	Viton	Viton	Viton	Viton
11	Gasket	PTFE	PTFE	PTFE	PTFE	PTFE
12	Cover	ASTM A105	ASTM A105	ASTM A105	ASTM A182 F304	ASTM A182 F316
13	Capscrew	ASTM A193 B7	ASTM A193 B7	ASTM A193 B7	ASTM A193 B8	ASTM A193 B8M
14	O ring	Viton	Viton	Viton	Viton	Viton
15	Gear Box	Carbon steel	Carbon steel	Carbon steel	Carbon steel	Carbon steel
16	Ball	ASTM A182 F6a	ASTM A182 F304	ASTM A182 F316	ASTM A182 F304	ASTM A182 F316
17	Seat	Reinforced PTFE	Reinforced PTFE	Reinforced PTFE	Reinforced PTFE	Reinforced PTFE
18	O ring	Viton	Viton	Viton	Viton	Viton
19	Seat	ASTM A105	ASTM A105	ASTM A 105	ASTM A182 F304	ASTM A182 F316
20	Spring	SS304 or Inconel 750	SS304 or Inconel 750	SS316 or Inconel 750	SS304 or Inconel 750	SS316 or Inconel 750
21	Gasket	Viton or PTFE or Graphite	Viton or PTFE or Graphite	Viton or PTFE or Graphite	Viton or PTFE or Graphite	Viton or PTFE or Graphite
22	Body bolting	ASTM A193 B7	ASTM A193 B7	ASTM A193 B7	ASTM A193 B8	ASTM A193 B8M
23	Body nut	ASTM A194 2H	ASTM A194 2H	ASTM A194 2H	ASTM A194 8	ASTM A194 8M
24	Closure	ASTM A216 WCB	ASTM A216 WCB	ASTM A216 WCB	ASTM A351 CF8	ASTM A351 CF8M
25	Lower trunnion	ASTM A182 F6a	ASTM A182 F304	ASTM A182 F316	ASTM A182 F304	ASTM A182 F316
26	O ring	Viton	Viton	Viton	Viton	Viton
27	Gasket	ASTM A182 F6a	ASTM A182 F304	ASTM A182 F316	ASTM A182 F304	ASTM A182 F316
28	Lower cover	ASTM A105	ASTM A105	ASTM A105	ASTM A182 F304	ASTM A182 F316
29	Cap screw	ASTM A193 B7	ASTM A193 B7	ASTM A193 B7	ASTM A193 B8	ASTM A193 B8M

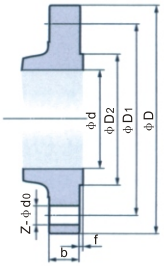
Note: The chart above only lists out some common composition of steel ball valve parts. We may provide other different parts material composition according to the customer's request or the actual valve working condition.

Main size and weight

Butt-welding ends



Gear box



Class600~Class1500 flange

Pressure stage	Size		Dimensions(mm)						Weight (kg)
	DN	NPS	L		d	H	H1	W	
			RF	BW					
Class150 PN 20	100	4	229	305	102	330	135	300	60
	125	5	356	381	127	360	165	300	60
	150	6	394	457	152	392	193	300	101
	200	8	457	521	203	492	240	300	166
	250	10	533	559	254	548	293	300	283
	300	12	610	635	305	688	340	400	463
	350	14	686	762	337	722	372	400	622
	400	16	762	838	387	722	415	400	900
	450	18	864	914	438	804	462	500	1150
	500	20	914	991	489	952	511	600	1360
	600	24	1067	1143	591	1154	601	750	2514
	650	26	1143	1245	633	1300	700	750	3200
	700	28	1245	1346	684	1550	780	750	4000
	750	30	1295	1397	735	1650	830	750	4800
	800	32	1372	1524	779	1740	870	750	5800
	900	36	1524	1727	874	1950	970	750	8000
Class300 PN 20	100	4	305	305	102	340	140	300	70
	125	5	381	381	127	370	170	300	95
	150	6	403	457	152	402	192	300	128
	200	8	502	521	203	498	246	300	234
	250	10	568	559	254	655	303	400	403
	300	12	648	635	305	658	348	400	602
	350	14	762	762	337	686	378	400	803
	400	16	838	838	387	880	429	600	1273
	450	18	914	914	438	1050	518	750	1450
	500	20	991	991	489	1110	540	750	1700
	600	24	1143	1143	591	1400	650	750	3100
	650	26	1245	1245	633	1500	750	750	4500
	700	28	1346	1346	684	1600	800	750	6000
	750	30	1397	1397	735	1720	860	750	7500
	800	32	1524	1524	779	1800	900	750	9000
	900	36	1727	1727	874	2200	1020	600	12000

Pressure stage	Size		Dimensions(mm)							Weight (kg)
	DN	NPS	L			d	H	H1	W	
			RF	RTJ	B W					
Class600 PN110	50	2	292	295	292	51	240	94	300	32
	65	2 ½	330	333	330	64	290	115	300	47
	80	3	356	359	356	76	340	136	300	68
	100	4	423	435	432	102	358	152	300	106
	125	5	508	511	508	127	400	180	300	170
	150	6	559	562	559	152	445	209	400	241
	200	8	660	664	660	203	498	263	400	444
	250	10	787	791	787	254	653	312	400	668
	300	12	838	841	838	305	665	354	500	1050
	350	14	889	892	889	334	738	389	600	1317
	400	16	991	994	991	385	920	440	750	1800
	450	18	1092	1095	1092	436	1100	530	750	2400
	500	20	1194	1200	1194	487	1200	560	750	3000
	600	24	1397	1407	1397	538	1480	670	750	5400
Class900 PN150	50	2	368	371	368	51	250	96	300	45
	65	2 ½	419	422	419	64	300	120	300	55
	80	3	381	384	381	76	345	140	300	94
	100	4	457	460	457	102	415	162	300	141
	125	5	559	562	559	127	446	188	300	230
	150	6	610	613	610	152	477	213	400	325
	200	8	737	740	737	203	520	270	400	580
	250	10	838	841	838	254	628	322	400	850
	300	12	965	968	965	305	680	360	500	1330
	350	14	1029	1038	1029	322	750	400	600	1660
	400	16	1130	1140	1130	373	940	460	750	2280
Class1500 PN260	40	1 ½	305	305	305	38	280	100	300	44
	50	2	368	371	371	51	320	113	300	67
	65	2 ½	419	422	422	64	340	125	300	80
	80	3	470	473	473	76	385	138	300	130
	100	4	546	549	549	102	415	171	300	192
	125	5	673	676	676	125	480	200	400	335
	150	6	705	711	711	144	580	222	400	475
	200	8	832	841	841	192	584	280	400	820
	250	10	991	1000	1000	239	650	340	500	1320
	300	12	1130	1146	1146	287	700	370	600	2050
Class2500 PN 420	40	1 ½	384	387	384	38	290	105	300	72
	50	2	451	454	451	42	320	120	300	104
	65	2 ½	508	514	508	52	350	130	300	140
	80	3	578	584	578	62	400	150	300	202
	100	4	673	683	673	87	425	180	400	305
	125	5	794	807	794	100	500	210	400	530
	150	6	914	927	914	131	590	230	500	760
	200	8	1022	1038	1022	179	610	290	500	1200
	250	10	1270	1292	1270	223	660	350	600	2080

Note:1、RF indicates rased flange, RTJ means ring joint fiange, and BW is butt welding connection.

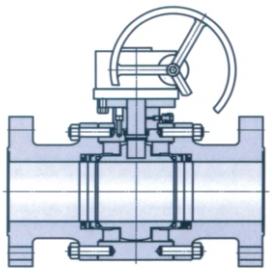
2、Flange dimensions of the above table for valves of NPS≤24 conforms to ASMEB 16.5.

3、For valves of NPS≥26, the flange dimensions of above table conforms to B series of ASMEB16.47 and API 605. As required by customers, flange dimensions may also conform to A series of ASMEB16.47 and MSS-SP-44.

Nominal pressure	DN		50	65	80	100	125	150	200	250	300	350	400	450	500	600
PN16	L	Flange	-	-	-	-	-	394	457	533	610	686	762	864	914	1067
		BW	-	-	-	-	-	457	521	559	635	762	838	914	991	1143
	H		-	-	-	-	-	392	492	548	688	722	722	804	952	1154
	H1		-	-	-	-	-	193	240	293	340	372	415	462	511	601
	W		-	-	-	-	-	300	300	300	400	400	400	500	600	750
	Weight(kg)		-	-	-	-	-	98	160	282	455	615	889	1150	1360	2530
PN25	L	Flange	-	-	-	-	-	394	457	533	610	686	762	864	914	1067
		BW	-	-	-	-	-	457	521	559	635	762	838	914	991	1143
	H		-	-	-	-	-	392	492	548	688	722	722	804	952	1154
	H1		-	-	-	-	-	193	240	293	340	372	415	462	511	601
	W		-	-	-	-	-	300	300	300	400	400	400	500	600	750
	Weight(kg)		-	-	-	-	-	108	175	295	475	638	930	1200	1400	2580
PN40	L	Flange	-	-	-	-	-	403	502	568	648	762	838	914	991	1143
		BW	-	-	-	-	-	457	521	559	635	762	838	914	991	1143
	H		-	-	-	-	-	402	498	655	658	686	880	1050	1110	1400
	H1		-	-	-	-	-	192	246	303	348	378	429	518	540	650
	W		-	-	-	-	-	300	300	400	400	400	600	750	750	750
	Weight(kg)		-	-	-	-	-	120	228	395	598	790	1278	1440	1680	3000
Pn63	L	Flange	-	-	-	305	381	403	502	568	648	762	838	-	-	-
		BW	-	-	-	305	381	457	521	559	635	762	838	-	-	-
	H		-	-	-	402	498	655	658	686	880	1050	1110	-	-	-
	H1		-	-	-	192	246	303	348	378	429	518	540	-	-	-
	W		-	-	-	300	300	400	400	400	600	750	750	-	-	-
	Weight(kg)		-	-	-	70	99	135	248	416	612	820	1300	-	-	-
PN100	L	Flange	292	330	356	432	508	559	660	787	838	889	991	-	-	-
		BW	292	330	356	432	508	559	660	787	838	889	991	-	-	-
	H		240	290	340	358	400	445	498	653	665	738	920	-	-	-
	H1		94	115	136	152	180	209	263	312	354	389	440	-	-	-
	W		300	300	300	300	300	300	300	400	400	500	600	-	-	-
	Weight(kg)		36	52	72	104	162	238	448	660	1070	1335	1835	-	-	-
PN160	L	Flange	368	419	381	457	559	610	737	838	965	-	-	-	-	-
		BW	368	419	381	457	559	610	737	838	965	-	-	-	-	-
	H		250	300	345	415	446	477	520	628	680	-	-	-	-	-
	H1		98	120	140	162	188	213	270	322	360	-	-	-	-	-
	W		300	300	300	300	300	300	400	400	500	-	-	-	-	-
	Weight(kg)		44	56	99	148	240	338	595	878	1400	-	-	-	-	-
JIS 10K	L		-	-	-	229	356	394	457	533	610	686	762	864	914	1067
	H		-	-	-	330	360	392	492	548	688	722	722	804	952	1154
	H1		-	-	-	135	165	193	240	293	340	372	415	462	511	601
	W		-	-	-	300	300	300	300	300	400	400	400	50	600	750
	Weight(kg)		-	-	-	57	77	98	160	279	448	604	880	1120	1310	2480
JIS 20K	L		-	-	-	305	381	403	502	568	648	762	838	914	991	1143
	H		-	-	-	340	370	402	498	655	658	686	880	1050	1110	1400
	H1		-	-	-	140	170	192	246	303	348	378	429	518	540	650
	W		-	-	-	300	300	300	300	400	400	400	600	750	750	750
	Weight(kg)		-	-	-	65	91	120	220	388	580	780	1220	1400	1640	3000

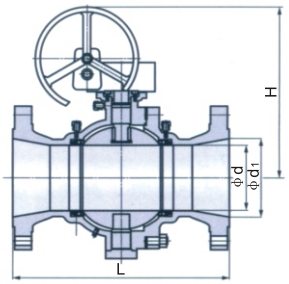
Forged steel trunnion ball valve

3D company manufactures in general trunnion ball valve of casted steel valve body. However, if requiredby customers. forged steel valve body is also available, of which the flange dimensions and face to face dimensions are the same as that of cast steel trunnion ball valve.



Reduced bore ball valve

Except for full bore ball valves, 3D manufactures also the ball valve with reduced bore to meet different requirement of customers, which not only lowers the cost and pricing, but also satisfies the special requirement of customers.



Size		Pressure stage												
		Class150、PN20				Class300、PN50				Class600、PN110				
DN	NPS	Dimensions(mm)												
		L	d	D1	H	L	d	d1	H	L		d	d1	H
										RF	RJ			
125	5	356	102	127	330	381	102	127	340	508	511	102	127	358
150	6	394	102	152	330	403	102	152	340	559	562	102	152	358
200	8	457	152	203	392	502	152	203	402	660	664	152	203	445
250	10	533	203	254	492	568	203	254	498	787	791	203	254	498
300	12	610	254	305	548	648	254	305	655	838	841	254	305	653
350	14	686	305	337	688	762	305	337	658	889	892	305	337	665
400	16	762	305	387	688	838	305	387	658	991	994	305	387	665
450	18	864	337	438	722	914	337	438	686	1092	1095	337	438	738
500	20	914	387	489	750	991	387	489	880	1194	1200	387	489	920
600	24	1067	489	591	950	1143	489	591	1110	1397	1407	489	591	1200
650	26	1143	538	633	1050	1245	538	633	1250	-	-	-	-	-
700	28	1245	591	684	1154	1346	591	684	1400	-	-	-	-	-
750	30	1295	633	735	1300	1397	633	735	1500	-	-	-	-	-
800	32	1372	684	779	1550	1524	684	779	1600	-	-	-	-	-
900	36	1542	779	874	1740	1727	779	874	1800	-	-	-	-	-

		Class900、PN150					Class1500、PN260					Class2500、PN420				
DN	NPS	L		d	d1	H	L		d	d1	H	L		d	d1	H
		RF	RJ				RF	RJ				RF	RJ			
65	2½	419	422	50	64	250	419	422	50	64	320	508	514	42	52	320
80	3	381	384	64	76	300	470	473	64	76	340	578	584	52	62	350
100	4	457	460	76	102	345	546	549	76	102	385	673	683	62	87	400
125	5	559	562	102	127	415	673	676	102	127	415	794	807	87	100	425
150	6	610	613	102	152	415	705	711	102	144	480	914	927	87	131	500
200	8	737	740	152	203	477	823	841	144	192	580	1022	1038	131	179	590
250	10	838	841	203	254	520	991	1000	192	239	584	1270	1292	179	223	610
300	12	965	968	254	305	628	1130	1146	239	287	650	1422	1445	223	265	660
350	14	1029	1038	305	322	680	-	-	-	-	-	-	-	-	-	-
400	16	1130	1140	305	373	680	-	-	-	-	-	-	-	-	-	-

Note:Flange dimentions of ball valve with reduced bore are the same as that of full bore ball valve.

Brief description

The seat material of general purpose ball valve employs generally non-metal material, such as PTFE. Limited by the seat material, the general purpose ball valve can not be used in case of high temperature application, and application medium with solid articles, and ash dregs neither, So, the application medium with solid articles, and ash dregs neither. So. the application scope of general purpose ball valve is restricted partially. Taking this into consideration, 3D has developed successfully after years of hard study full range of metal to metal sealed ball valve, including floating ball valve and trunnion ball valve. which have found extensive applications in such industries as petroleum, chemistry, power, metallurgy, and light industry.

Design features of metal to metal sealed ball valve

Except for such features as wrong operation prevention, stemblow-out proof, mounting pad provited, the metal to metal sealed ball valves made by 3D posses the following unique features.

Valve stuck under high temperature prevented

In the case of high temperature working condition, the valve seat and ball would easily get stuck due to heat expansion, and the valve could not be open .Metal to metal sealed ball valves made by 3D employ the patented design of bevelling spring loading, which would absorb the heat expansion of parts caused by the bevelling spring . So, it is ensured that the valve would not get stuck and be open and close easily in the case of high temperature condition.

An entire fire safe structure

The metal to metal sealed structure has been adopted for the valve sealing surface design. Packing is so designed with graphite, and gasket is so designed with stainless steel, plus graphite that the valve can assure reliable tightness even if under fire condition.

Natural anti-atatic structure

Metal to metal sealed ball valve with its body sear, ball, other metal parts, and so forth, closely contact with each other, having naturally formed a static electricity passage, In this respect, there is no need to provide special antistatic device.

Advanced hardening technology employed for ball and seat

Metal to metal sealed design has been employed perfectly for the ball and seat, which has also adopted the advanced hardening technologies, such as ultro-sonic spray coating, nickel base spray welding, surface specially hardening, ste-llite spray welding, ceramic material with high strength and hardness, and so on. Surface hardness of the ball and seat may generally reach more than HRC60, Maximum is up to HRC74,and application temperature of the material may be up to 540'C,Maxinum is 980'C. Combining strength of the material gets to more than 10000PSI. Besides, the surface materials posses also very good resistance properties of friction and impact. Metal to metal sealed ball valves made by 3D are suitable for use in most criticle working conditions.

Excellent tightness function

A unique technique has been employed for the ball grinding, which makes the ball surface reach extreme round and smooth by rotating the ball and grinding apparatus at different directions in space. The tightness function of the valve meets completely and exceeds the standard requirement.

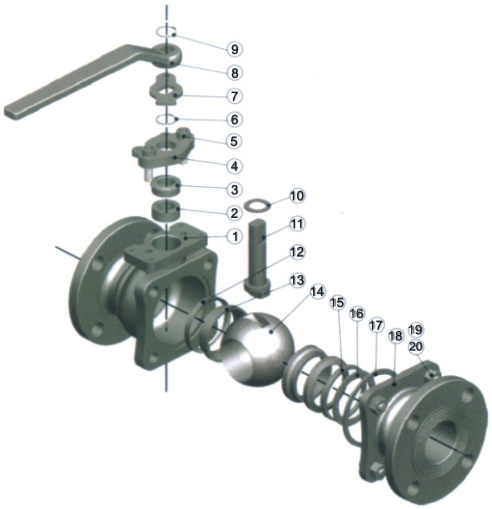
Double-block and bleed function

3D'S metal to metal sealed trunnion ball valve is in general of the front ball sealing structure. Actually, two seats of the metal to metal sealed trunnion ball valve can both cut off separately the medium at inlet and outlet to realize double-block function. When the valve is closed, the body cavity and both the bore ends can be blocked with each other even if both ends of the valve are under pressure at the same time, whereas the medium left in the body cavity may relieve through the relief valve.

3D's metal to metal sealed floating ball valve is of behind ball sealing structure, employing in general single direction tightness. The flow direction is indicated on the valve body, If specially required by customers, 3D's patent of bi-direction sealing design may be selected.

Metal to metal sealed floating ball valve

Typical drawing and parts composition



Parts and materia llist

Parts No.	Parts Name	Materials				
		WCB/13Cr	WCB/304	WCB/316	CF8	CF8M
1	Body	ASTM A216 WCB	ASTM A216 WCB	ASTM A216 WCB	ASTM A351 CF8	ASTM A351 CF8M
2	Packing	Graphite	Graphite	Graphite	Graphite	Graphite
3	Gland	ASTM A182 F6a	ASTM A182 F304	ASTM A182 F316	ASTM A182 F304	ASTM A182 F316
4	Gland flange	ASTM A216 WCB	ASTM A216 WCB	ASTM A216 WCB	ASTM A351 CF8	ASTM A351 CF8M
5	Gland bolt	ASTM A193 B7	ASTM A193 B7	ASTM A193 B7	ASTM A193 B8	ASTM A193 B8M
6	Circlip	Carbon steel	Carbon steel	Carbon steel	Stainless steel	Stainless steel
7	Stop collar	Carbon steel	Carbon steel	Carbon steel	Stainless steel	Stainless steel
8	Lever	Carbon steel	Carbon steel	Carbon steel	Carbon steel	Carbon steel
9	Circlip	Carbon steel	Carbon steel	Carbon steel	Stainless steel	Stainlees steel
10	Thrust washe	304 Sheet+Graphite	304 Sheet+Graphite	316 Sheet+Graphite	304 Sheet+Graphite	316 Sheet+Graphite
11	Stem	ASTM A182 F6a	ASTEM A182 F304	ASTM A182 F316	ASTM A182 F304	ASTM A182 F316
12	Seat seal	Graphite	Graphite	Graphite	Graphite	Graphite
13	Seat	ASTM A182 F6a +WC-Co	ASTM A182 F304 +WC-Co	ASTM A182 F316 +WC-Co	ASTM A182 F304 +WC-Co	ASTM A182 F316 +WC-Co
14	Ball	ASTM A182 F6a +WC-Co	ASTM A182 F304 +WC-Co	ASTM A182 F316 +WC-Co	ASTM A182 F304 +WC-Co	ASTM A182 F316 +WC-Co
15	Seat seal gland	ASTM A182 F6a	ASTM A182 F304	ASTM A182 F316	ASTM A182 F304	ASTM A182 F316
16	Spring	Inconel 750	Inconel 750	Inconel 750	Inconel 750	Inconel 750
17	Gasket	304 Sheet+Graphite	304 Sheet+Graphite	316 Sheet+Graphite	304 Sheet+Graphite	316 Sheet+Graphite
18	Closure	ASTM A216WCB	ASTM A216 WCB	ASTM A216 WCB	ASTM A351 CF8	ASTM A351 CF8M
19	Body bolting	ASTM A193 B7	ASTM A193 B7	ASTM A193 B7	ASTM A193 B8	ASTM A193 B8M
20	Body nut	ASTM A194 2H	ASTM A194 2H	ASTM A194 2H	ASTM A194 8	ASTM A194 8M

Note: The chart above only lists out some common composition of steel ball valve parts. We may provide other different parts material composition according to the customer's request or the actual valve working condition.

Main sizes and weights

Refer to that of floating ball valve for main dimensions and weights of metal to metal sealed floating ball valve. The flange dimensions and face to face dimensions are the same as that of floating ball valve.

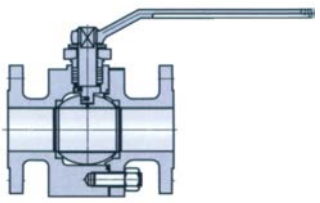
Products range of metal to metal sealed floating ball valve as follows

Size	NPS	½	¾	1	1 ¼	1 ½	2	2 ½	3	4	5	6
	DN	15	20	25	32	40	50	65	80	100	125	150
Pressure stage or nominal pressure	Class 150/PN20	☆	☆	☆	☆	☆	☆	☆	☆	△	△	△
	Class300/PN50	☆	☆	☆	☆	☆	☆	△	△	△	–	–
	Class600/PN110	☆	☆	☆	☆	☆	△	△	△	–	–	–
	Class900/PN150	☆	☆	☆	☆	△	△	△	△	–	–	–
	Class1500/PN260	☆	☆	☆	☆	△	△	–	–	–	–	–
	PN16	☆	☆	☆	☆	☆	☆	☆	☆	△	△	△
	PN25	☆	☆	☆	☆	☆	☆	☆	△	△	△	△
	PN40	☆	☆	☆	☆	☆	☆	☆	△	△	–	–
	PN63	☆	☆	☆	☆	☆	△	△	△	–	–	–
	PN100	☆	☆	☆	☆	☆	△	△	△	–	–	–

Note: For the manual ball valve, ☆ indicates that Lever is suggested, △ indicates that worm gear is suggested.

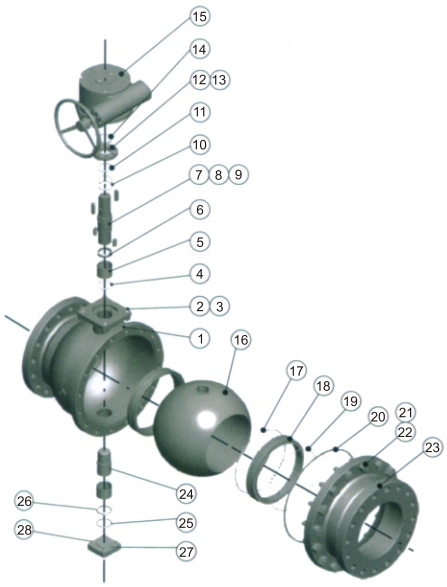
Forged steel metal to metal sealed floating ball valve

3D's metal to metal sealed floating ball valve is in general employing casted steel valve body. If required by customers, forged steel valve body is also available, of which the flange dimensions and face to face dimensions are the same as that of cast steel ball valve.

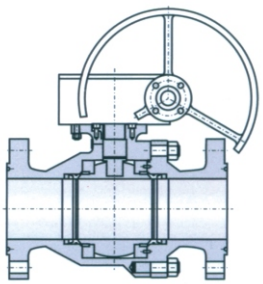


Metal to metal sealed trunnion ball valve

Typical drawing of metal to metal sealed trunnion ball valve and parts composition



1-Body
2-Stud
3-Nut
4-O ring
5-Bush
6-Washer
7-Stem
8-Key
9-Key
10-O ring
11-Gasket
12-Gland
13-Bolt
14-O ring
15-Worm gear
16-Ball
17-O ring
18-Seat
19-Spring
20-Gasket
21-Stud
22-Nut
23-Bonnet
24-Trunnion
25-O ring
26-Adjusting chshion
27-Down end cap
28-Bolt



Main sizes and weights

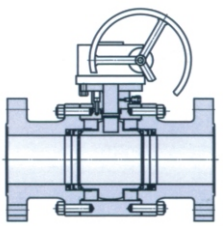
Refer to that of trunnion ball valve for main sizes and weights of metal to metal sealed trunnion ball valve. of which the flange dimensions and face to face dimensions are the same as that of trunnion ball valve.

Products range of metal to metal sealed trunnion ball valve is as below table

Size	NPS	4	5	6	8	10	12	14	16	18	20	24
	DN	100	125	150	200	250	300	350	400	450	500	600
Pressure stage or nominal pressure	Class 150/PN20	△	△	△	△	△	△	△	△	△	△	△
	Class300/PN50	△	△	△	△	△	△	△	△	△	△	-
	Class600/PN110	△	△	△	△	△	△	△	△	-	-	-
	Class900/PN150	△	△	△	△	△	△	-	-	-	-	-
	Class1500/PN260	△	△	△	△	△	△	-	-	-	-	-
	Class2500/PN420	△	△	△	△	-	-	-	-	-	-	-
	PN16	△	△	△	△	△	△	△	△	△	△	△
	PN25	△	△	△	△	△	△	△	△	△	△	-
	PN40	△	△	△	△	△	△	△	△	△	△	-
	PN63	△	△	△	△	△	△	△	△	-	-	-
	PN100	△	△	△	△	△	△	△	△	-	-	-
	PN160	△	△	△	△	△	-	-	-	-	-	-

Forged steel metal to metal sealed trunnion ball valve

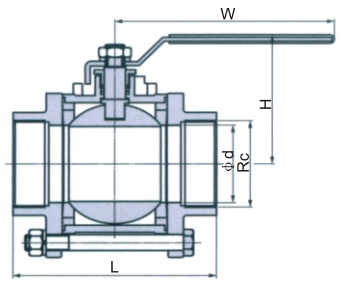
3D company's metal to metal sealed trunnion ball valve is in general employing casted steel valve body. As per customers' requirement, forged steel valve body is also available, of which the flange dimensions and face to face dimensions are the same as that of cast steel trunnion ball valve.



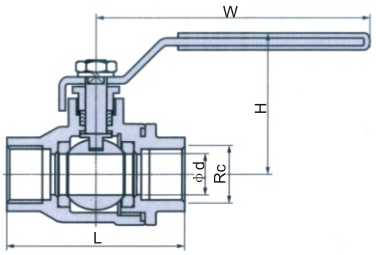
Application

Female threaded ball valves are suitable for use on pipelines of medium or low pressure to turn off or swith on pipeline medium. Operation manners are in general of manual, and pneumatic or electric actuators are available. Based on design structures, the valves get divided into three pieces, two pieces, and one piece types.

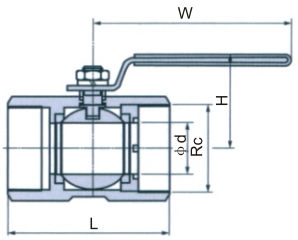
Main sizes and weights



QS11F female threaded three pieces ball valve



QL11F female threaded two pieces ball valve



QZ11F female threaded one pieces ball valve

Structures	Size		Rc	Dimensions(mm)				Weight (kg)
	DN	NPS		L	d	W	H	
Three pieces	10	3/8	3/8	60	10	95	57	0.4
	15	½	½	75	14	110	68	0.5
	20	¾	¾	80	19	110	70	0.7
	25	1	1	90	25	140	80	1.2
	32	1 ¼	1 ¼	110	32	140	85	1.9
	40	1 ½	1 ½	120	38	180	100	2.7
	50	2	2	144	50	180	110	3.9
	65	2 ½	2 ½	186	64	200	130	7.1
	80	3	3	206	76	250	150	11.5
	100	4	4	240	100	250	170	20.5
Two pieces	10	3/8	3/8	55	10	95	57	0.3
	15	½	½	65	14	110	68	0.4
	20	¾	¾	78	19	110	70	0.6
	25	1	1	88	25	140	80	1.0
	32	1 ¼	1 ¼	105	32	140	85	1.6
	40	1 ½	1 ½	112	38	180	100	2.3
	50	2	2	125	50	180	110	3.3
	65	2 ½	2 ½	165	64	200	130	6.0
	80	3	3	184	76	250	150	9.8
One piece	10	3/8	3/8	39	6	70	35	0.2
	15	½	½	57	9	95	44	0.3
	20	¾	¾	59	12	95	47	0.4
	25	1	1	71	16	110	55	0.6
	32	1 ¼	1 ¼	80	20	110	60	1.1
	40	1 ½	1 ½	83	25	140	75	1.5
	50	2	2	100	32	140	80	2.8

Operation torque of floating ball valve

The operation torque data of soft sealed floating ball valve in the following table are calculated based on normal temperature and clean medium.As selecting actuator, it is suggested that drive torque of actuator be more than 1.3 times the operation torque of ball valve at least. In case of high temperature and low temperature working conditions or unclean medium, it is possible hat valve operation torque gets increased,which should be taken to full consideration as selecting actuators. Operation torque for metal to metal sealed floating ball valve is about 4 times that of soft sealed floating ball valve.

NPS	DN	Operation torque of soft sealed floating ball valve(N.m)											
		Class150 PN20	Class300 PN50	Class600 PN110	Class900 PN150	Class1500 PN260	PN16	PN25	PN40	PN63	PN100	JIS10K	JIS20K
½	15	7	10	17	25	35	6	8	10	15	17	6	10
¾	20	10	16	24	35	50	9	12	15	20	24	9	15
1	25	16	25	40	65	100	14	18	23	35	40	14	23
1 ¼	32	24	35	60	100	150	22	28	32	50	60	22	32
1 ½	40	35	50	90	120	180	32	40	45	70	90	32	45
2	50	50	70	110	180	270	40	55	65	85	110	40	65
2 ½	65	80	100	165	-	-	60	85	95	130	165	60	95
3	80	120	160	300	-	-	90	130	150	200	300	90	150
4	100	180	280	600	-	-	130	190	260	340	600	130	260
5	125	280	600	-	-	-	250	320	550	-	-	250	550
6	150	540	1000	-	-	-	490	620	900	-	-	490	900
8	200	960	2100	-	-	-	860	1100	1800	-	-	860	1800
10	250	1800	-	-	-	-	-	-	-	-	-	-	-

Operation torque of trunnion ball valve

The operation torque data of soft seat trunnion ball valve in the following table are calculated based on normal temperature and clean medium. As selecting actuator, it is suggested that drive torque of actuator be more than 1.3 times the operation toque of ball valve at least. In case of high temperature and low temperature working conditions or unclean medium, it is possible that valve operation torque gets increased, which should be taken into full consideration as selecting actuators. Operation torque for metal to metal sealed trunnion ball valve is about 3~4 times that of soft sealed trunnion ball valve.

NPS	DN	Operation torque of soft sealed trunnion ball valve (N.m)													
		Class150 PN20	Class300 PN50	CLASS600 PN110	CLASS900 PN150	CLASS1500 PN260	CLASS2500 PN 420	PN16	PN25	PN40	PN63	PN100	PN160	JIS10K	JIS20K
1 ½	40	-	-	-	-	100	160	-	-	-	-	-	-	-	-
2	50	-	-	70	100	155	250	-	-	-	-	70	105	-	-
2 ½	65	-	-	120	170	265	420	-	-	-	-	120	180	-	-
3	80	-	-	280	320	500	800	-	-	-	-	230	340	-	-
4	100	110	200	340	480	750	1200	100	140	170	240	340	500	100	170
5	125	180	290	550	780	1200	1900	160	220	260	350	550	820	160	260
6	150	340	480	800	1100	1700	2700	300	380	450	600	800	1150	280	450
8	200	500	850	1700	2400	3700	5900	450	630	750	1300	1700	2500	450	750
10	250	830	1400	2800	4000	6200	9900	750	1050	1250	2000	2800	4200	750	1250
12	300	1400	2400	4200	5900	9100	-	1250	1750	2100	2900	4200	6200	1250	2100
14	350	2200	3100	5800	8100	-	-	2000	2600	2800	3700	5800	-	2000	2800
16	400	2600	4800	7500	10500	-	-	2350	3200	4300	5800	7500	-	2350	4300
18	450	3700	6100	9500	-	-	-	3300	4600	5500	-	-	-	3300	5500
20	500	4800	7500	11500	-	-	-	4300	6000	6800	-	-	-	4300	6800
24	600	8200	12000	16500	-	-	-	7400	10000	11000	-	-	-	7400	11000
26	650	9600	15000	-	-	-	-	-	-	-	-	-	-	-	-
28	700	12000	19000	-	-	-	-	-	-	-	-	-	-	-	-
30	750	14000	22000	-	-	-	-	-	-	-	-	-	-	-	-
32	800	16000	28000	-	-	-	-	-	-	-	-	-	-	-	-
36	900	20000	35000	-	-	-	-	-	-	-	-	-	-	-	-

Flow coefficient CV

NPS	DN	Class150~Class600 PN20~PN110		Class900 PN 150		Class1500 PN 260		Class2500 PN 420	
		Full bore	Reduced bore	Full bore	Reduced bore	Full bore	Reduced bore	Full bore	Reduced bore
		Flow coeffecient Cv							
½	15	24	14	24	14	24	14	24	14
¾	20	55	31	55	31	55	31	55	31
1	25	100	55	100	55	100	55	100	55
1 ¼	32	160	85	160	85	160	85	160	85
1 ½	40	260	123	260	123	260	123	260	123
2	50	450	218	450	218	450	218	330	160
2 ½	65	720	340	720	340	720	340	510	240
3	80	1100	490	1100	490	1100	490	770	350
4	100	2200	880	2200	880	2200	880	1700	680
5	125	3000	1380	3000	1380	3000	1380	2300	1060
6	150	5500	1980	5500	1980	5100	1840	4200	1500
8	200	10000	3500	10000	3500	9100	3200	7900	2800
10	250	17000	5460	17000	5460	15300	4900	13300	4300
12	300	24000	7900	24000	7900	21500	7100	18400	6100
14	350	28000	10700	26000	9940	24900	9500	-	-
16	400	36000	14000	33800	13100	31500	12300	-	-
18	450	46000	18000	43300	17000	-	-	-	-
20	500	57000	22000	53300	20600	-	-	-	-
24	600	75000	31500	70200	29500	-	-	-	-
26	650	84000	37000	-	-	-	-	-	-
28	700	93000	43000	-	-	-	-	-	-
30	750	102000	49000	-	-	-	-	-	-
32	800	110500	56000	-	-	-	-	-	-
36	900	133000	71000	-	-	-	-	-	-