



**MESYS<sup>®</sup>**

**API 6D & 6A**

**TRUNNION BALL VALVES**

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MCSYS® Trunnion ball valves are available in sizes 2" through 36ASME classes 150-2500 and API classes 5000-10000

Engineered for rigorous performance, MCSYS® Trunnion ball valves are forged construction in both carbon and stainless steel

Designed for a wide range of services, MCSYS® ball valves are suitable for many applications including: oil field, oil gas pipelines, chemical /petro-chemical processing offshore, power plant, etc

Strict manufacturing processes are adhered to in order to maintain consistent compliance with API 6D, API 6A, API 6FA, and NACE

MCSYS' quality assurance system is in accordance with ISO 9001 and API Spec Q1

## Standards

<b>Valve Design:</b>	API 6D & 6A, ASME B16.34, ASME B 31.3, CSA Z245.15
<b>Face to Face Dimensions:</b>	ASME B 16.10
<b>End Flange Dimensions:</b>	ASME B16.5, ASME B16.47 MSS SP 44
<b>Butt Weld Ends:</b>	ASME B 16.25
<b>Materials:</b>	NACE MR0175
<b>Test:</b>	API 6D, API 598
<b>Fire Test:</b>	API 6FA, API 607

## Certificates:

API 6D  
 API 6A  
 ISO 9001  
 API 6FA, API 607

# MCSYS®

Manufacturing plants in Korea



Various machines at manufacturing facilities



Precisely machining by CNC machines

Large inventories for fast shipping



Valve design by 3D modeling

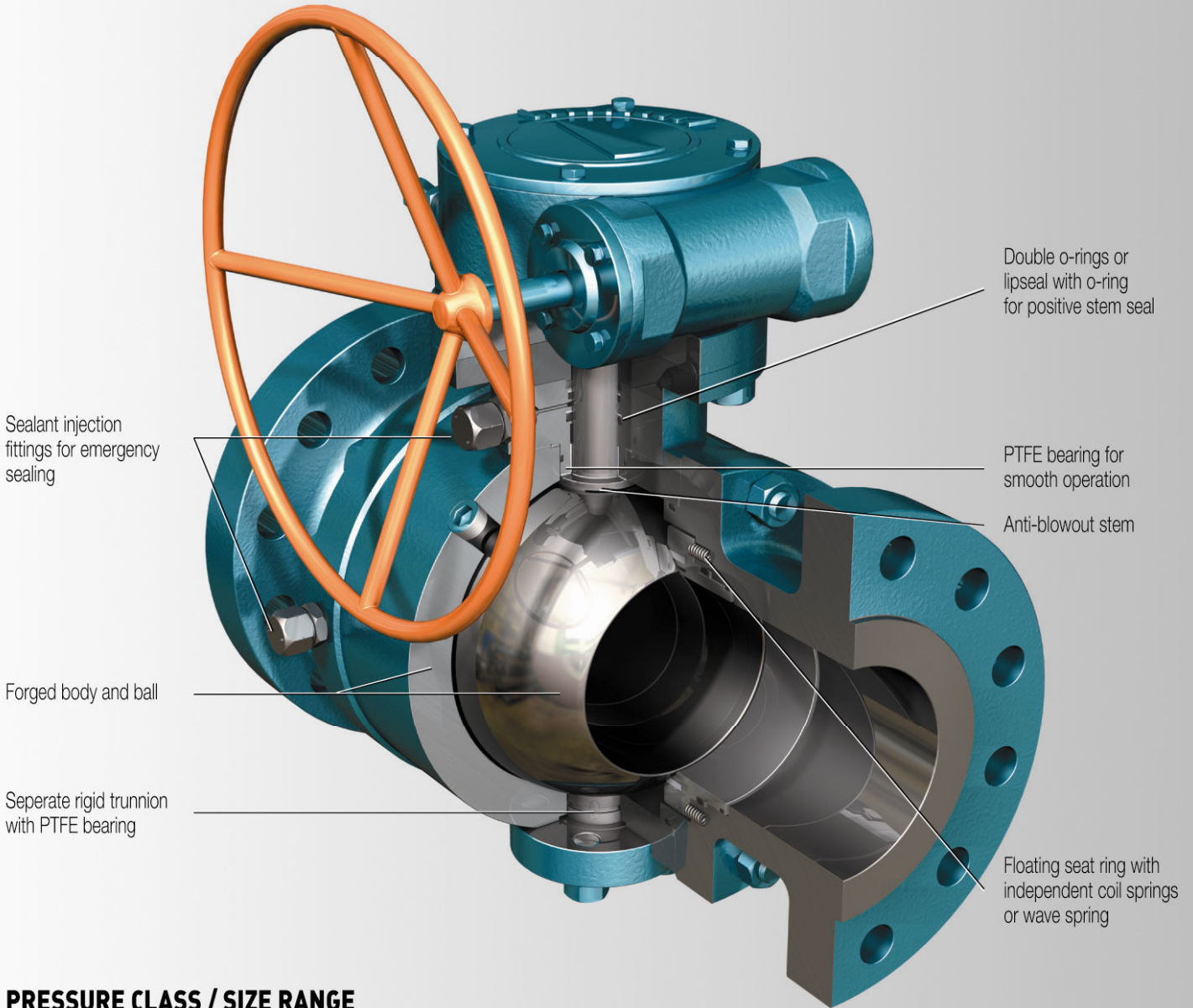
Ball testing by 3D measurement



Full range of MCSYS® Trunnion ball valves

# TRUNNION BALL VALVES

Bolted body ball valve with heavy-duty trunnion in forged carbon or stainless steel. Valves from 2" through 4" have 2 piece body, 6" through 12" are in 3 piece body design. These designs are standard in sizes 2" through 12" for all pressure classes and optional designs are available in sizes over 12".



## PRESSURE CLASS / SIZE RANGE

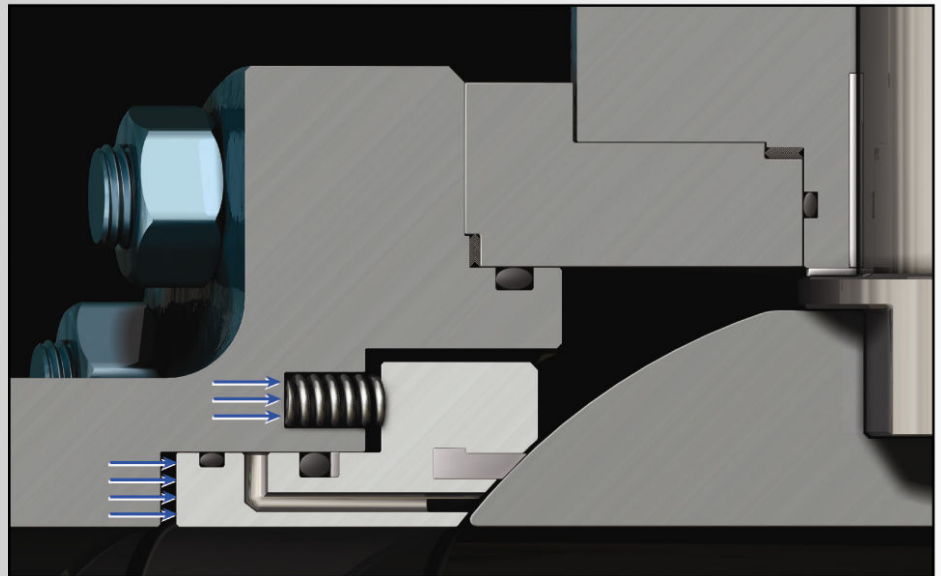
Size / Class	2 R	2	3 R	3	4 R	4	6 R	6	8 R	8	10 R	10	12 R	12	14	16 R	16	18	20 R	20	24 R	24	30 R	30	36 R	36
150	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional
300	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional
600	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional
900	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional
1500	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional
2500	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Standard	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional	Optional

Standard    Optional

# DESIGN FEATURES

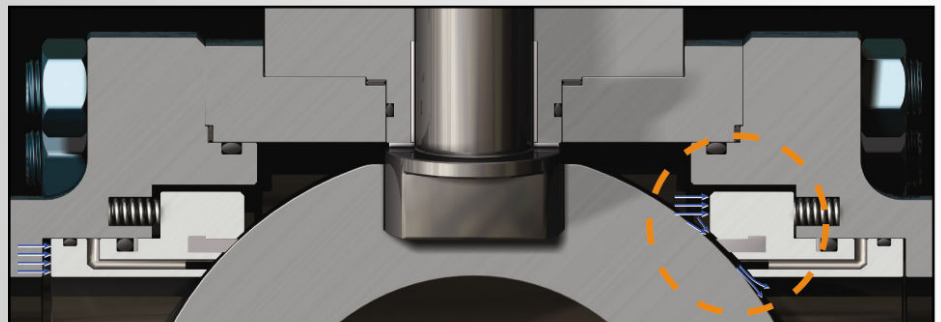
## Seat Sealing

Soft seats are standard. Seat inserts of synthetic material such as Nylon, PTFE, RTFE or Peek are contained within a metal seat ring. With no or very low line pressure, sealing between the seats and ball is achieved by seat springs. With higher line pressure, the line pressure, in conjunction with the spring load, forces the upstream seat ring against the ball, which results in tighter sealing. O-ring seat insert design is available.



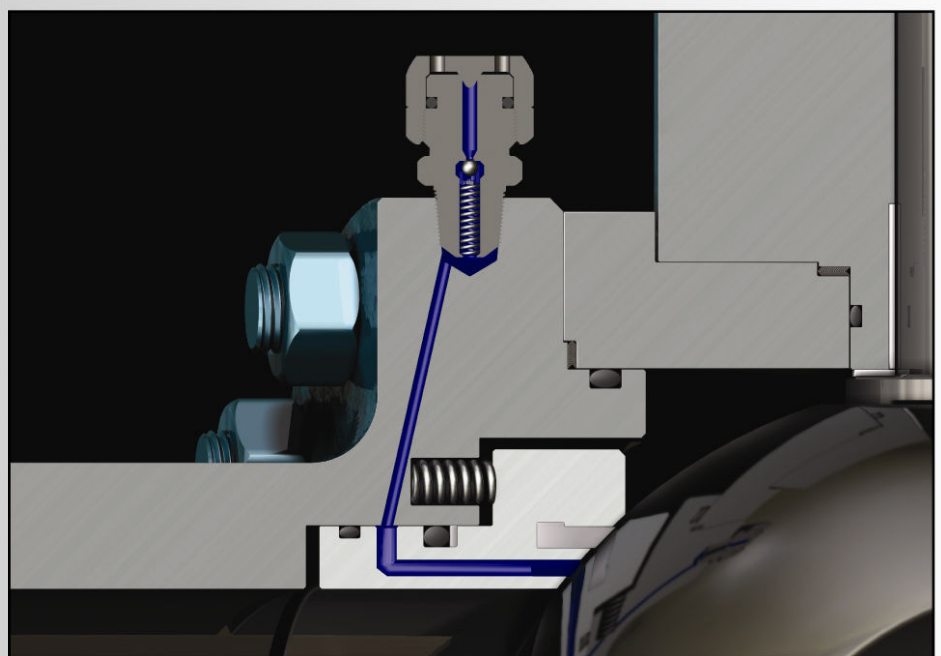
## Self Relieving Seat

This standard feature is designed to prevent excessive pressure buildup within the valve by automatically relieving pressure when body cavity pressure exceeds the spring load on the seats. Double Piston Seat is also available as an option.



## Sealant Injection Fitting

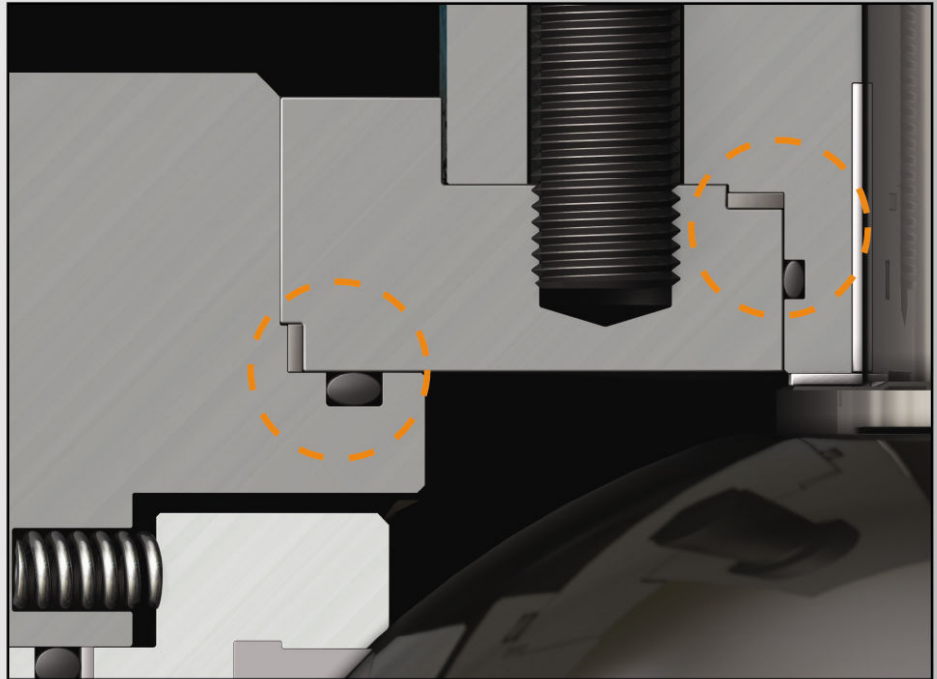
This feature is standard except in sizes 2"-4" for pressure classes 150, 300 and 600. In case of seat ring damage, sealant injection provides a fast, reliable way to restore tight sealing. This injection system can also be used for routine flushing of the seat ring area while in service.



# DESIGN FEATURES

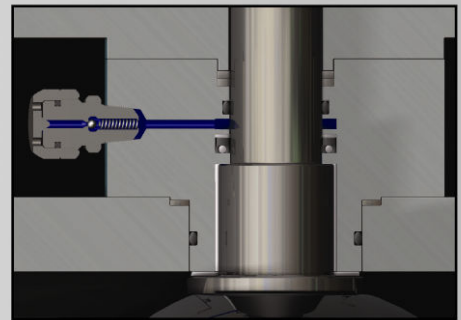
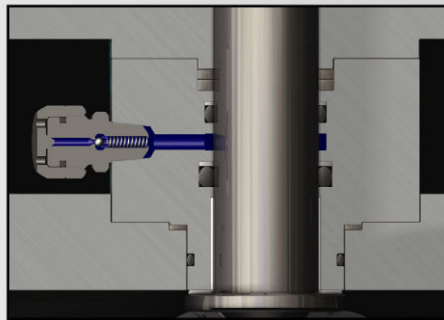
## Double Seals at all Joints

All connecting parts employ a double sealing design incorporating a spiral wound 316SS/graphite gasket and o-ring to ensure positive sealing. Delta ring is used optionally for class 1500-2500



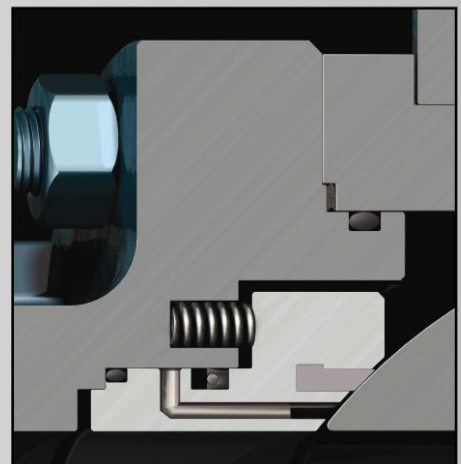
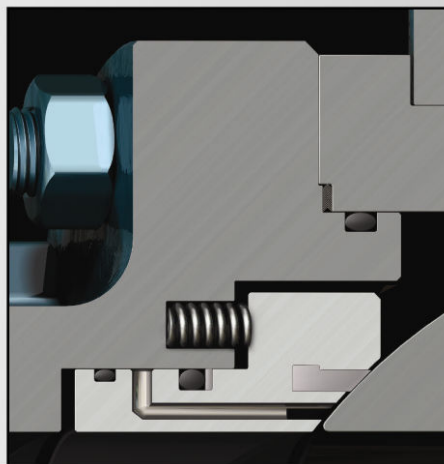
## Stem Sealing & Sealant Injection Fitting

Two o-rings and graphite packing are used for pressure classes 150 through 600. One each of lipseal and o-ring plus graphite packing are used for pressure classes 900 through 2500. In case of damage to the o-ring lipseal, sealant injection stops leaking and restores tight sealing.



## Seat Ring Sealing

Two o-rings or one each of an o-ring and graphite ring are used for pressure classes 150 through 600. One lipseal with an o-ring or graphite ring is used for the pressure class 900 up to 2500



# DESIGN FEATURES

## Actuation

Mcsys® Trunnion ball valves are designed to easily install a variety of actuators including pneumatic, hydraulic, electric actuators, electro-mechanical, electro-hydraulic, vane, etc. Hand operated valves are normally supplied with a lever or gear operator. High-performance hydraulic actuators, which have been specially developed for Mcsys® trunnion ball valves, can be supplied directly from MCSYS Further information can be received on request.



## Double Block and Bleed

Mcsys® Trunnion ball valves provide a positive seal at both upstream and downstream independently. Since pressure on each side of the ball is blocked from the body cavity, a pressure releasing device can be used by an operator to check the integrity of the upstream and downstream seats.

## Low Friction Stem/Trunnion Bearings and Thrust Washers

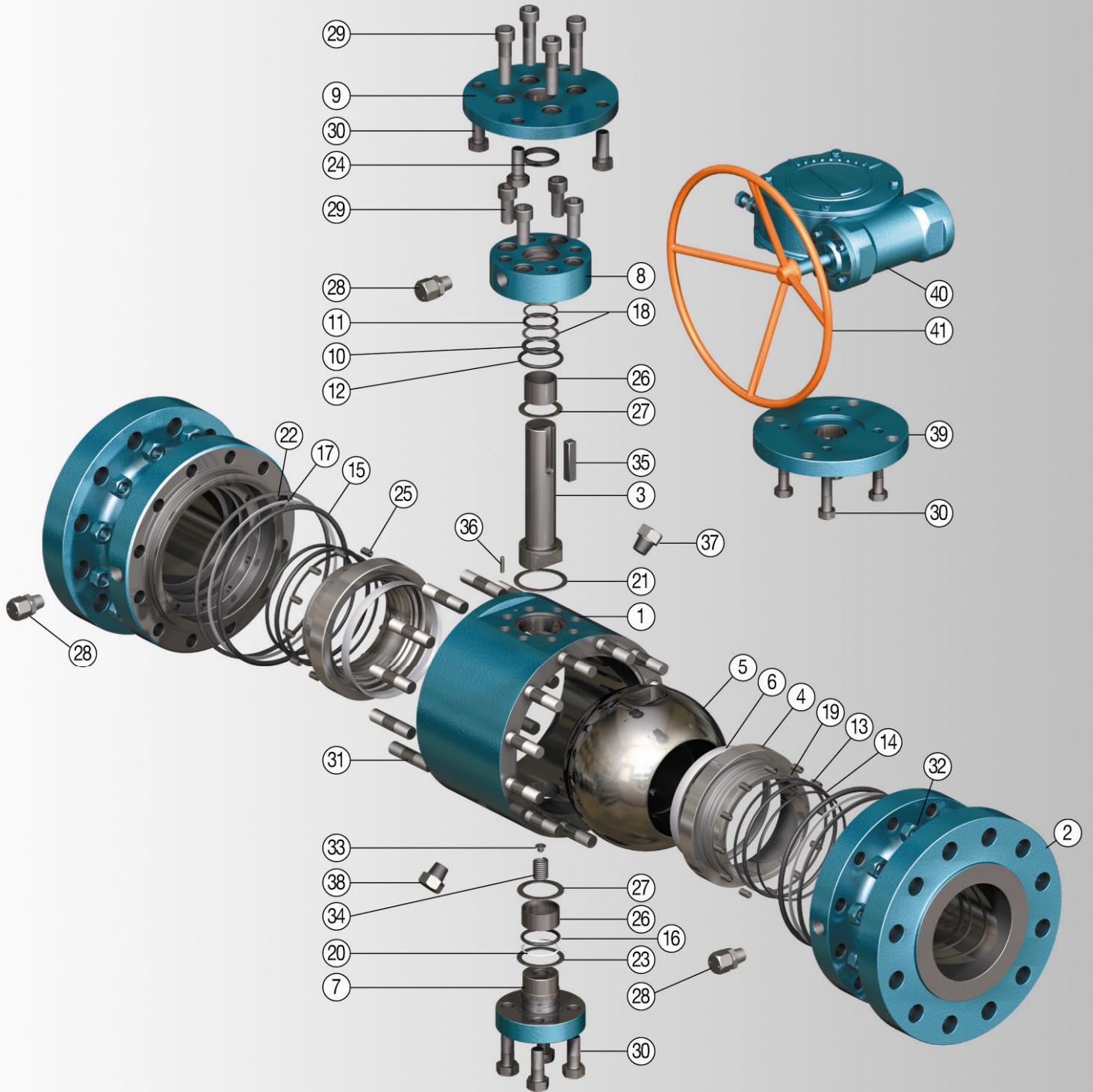
Heavy duty PTFE lined carbon or stainless steel bearing and thrust washers ensure durable and low torque operation

## Other Features

- Anti Static Device for Grounding
- ISO 5211 Mounting pad and Adaptability for all types of Actuator mounting
- Blow-Out Proof Stem
- Stem extension pieces or pups

# PART LIST

## TRUNNION BALL VALVE





# STANDARD MATERIAL SPECIFICATIONS

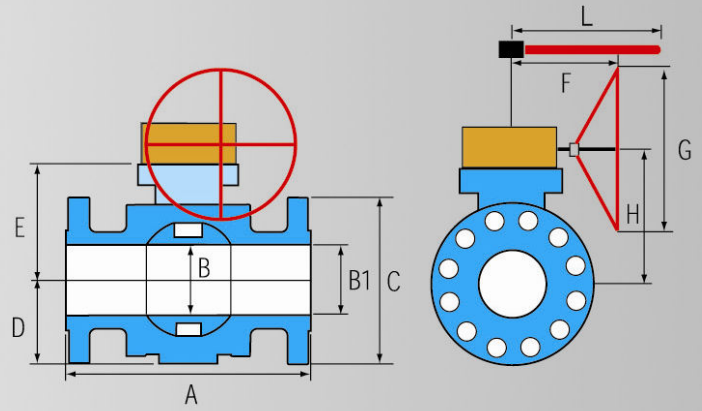
## TRUNNION BALL VALVE

NO	Part Name	Carbon Steel NACE	Low Temp NACE	Stainless Steel NACE
1	Body	A105	A350 LF2	A182 F316
2	Cap	A105	A350 LF2	A182 F316
3	Stem	AISI 1020 + ENP	AISI 4140 + ENP/A182 F316	A182 F316/A564 630
4	Seat Ring	A105 + ENP	A350 LF2 + ENP/A182 F316	A182 F316
5	Ball	A105 + ENP	A350 LF2 + ENP/A182 F316	A182 F316/A351 CF8M
6	Seat Insert	Nylon/PTFE/RTFE/PEEK		
7	Trunnion	AISI 1020/A105 + ENP	AISI 4140/A350 LF2 + ENP	A479 316
8	Gland	AISI 1020/A105	AISI 4140/A350 LF2	A479 316
9	Adapter Plate	AISI 1045	AISI 1045	A479 316
10	Stem O-ring *	Viton A	HNBR/Polymite/Viton GLT	HNBR/Viton GLT
11	Stem Sub-Seal **	Viton A	HNBR/Polymite/Viton GLT	HNBR/Viton GLT
12	Gland O-ring *	Viton A	HNBR/Polymite/Viton GLT	HNBR/Viton GLT
13	Seat O-ring *	Viton A	HNBR/Polymite/Viton GLT	HNBR/Viton GLT
14	Seat Sub-seal **	Viton A	HNBR/Polymite/Viton GLT	HNBR/Viton GLT
15	Cap O-ring *	Viton A	HNBR/Polymite/Viton GLT	HNBR/Viton GLT
16	Trunnion O-ring *	Viton A	HNBR/Polymite/Viton GLT	HNBR/Viton GLT
17	Cap Backup Ring	PTFE/Nylon	PTFE/Nylon	PTFE/Nylon
18	Gland Backup Ring	PTFE/Nylon	PTFE/Nylon	PTFE/Nylon
19	Seat Backup Ring	PTFE/Nylon	PTFE/Nylon	PTFE/Nylon
20	Trunnion Backup Ring	PTFE/Nylon	PTFE/Nylon	PTFE/Nylon
21	Gland Seal	Spiral Wound Gasket 316SS + Graphite		
22	Cap Seal	Spiral Wound Gasket 316SS + Graphite		
23	Trunnion Seal	Spiral Wound Gasket 316SS + Graphite		
24	Stem Packing	Graphite		
25	Seat Spring	Inconel X-750		
26	Bearing	SS316+PTFE/Carbon Steel + PTFE		
27	Thrust Washer	SS316+PTFE/Carbon Steel + PTFE		
28	Sealant Fitting	AISI 4140/A479 316		
29	Socket Bolt	A193 B7M	A320 L7M	A193 B8M
30	Hex/Socket Bolt	A193 B7M	A320 L7M	A193 B8M
31	Stud Bolt	A193 B7M	A320 L7M	A193 B8M
32	Hex, Nut	A194 2HM	A194 7M	A194 8M
33	Grounding Pin	A479 316		
34	Grounding Spring	A479 316		
35	Key	AISI 1045		A479 316
36	Dowel Pin	AISI 1045		A479 316
37	Relief Plug	A105	A350 LF2	A182 F316
38	Drain Plug	A105	A350 LF2	A182 F316
39	Mounting Plate	AISI 1045		A182 F316
40	Gear Operator	A536 Case/A322 Worm Gear		
41	Hand Wheel	A53		

\* Primary seal    \*\* Secondary seal

# ASME CLASS 150

## DIMENSIONS AND WEIGHTS

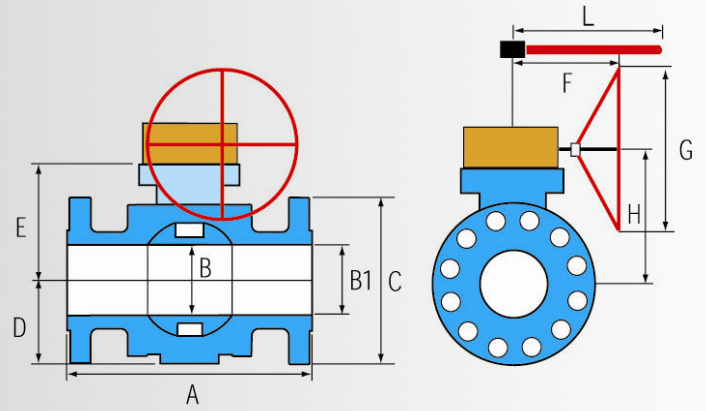


Size	Unit	A			B	B1	C	D	E	F	G	H	L	Weight(lb)	
		RF	RTJ	WE										FL	WE
2 × 1½ × 2	inch	7.0	7.5	8.5	1.6	2.0	6.0	3.1	3.7	-	-	-	20.3	51	44
2	inch	7.0	7.5	8.5	2.0	2.0	6.0	3.4	4.3	-	-	-	20.3	55	51
3 × 2 × 3	inch	8.0	8.5	11.1	2.0	3.0	7.5	3.4	4.3	-	-	-	20.3	70	57
3	inch	8.0	8.5	11.1	3.0	3.0	7.5	4.2	5.3	-	-	-	20.3	99	110
4 × 3 × 4	inch	9.0	9.5	12.0	3.0	4.0	9.0	4.2	5.3	-	-	-	20.3	106	130
4	inch	9.0	9.5	12.0	4.0	4.0	9.0	4.8	5.8	-	-	-	31.5	132	205
6 × 4 × 6	inch	15.5	16.0	18.0	4.0	6.0	11.0	4.8	5.8	-	-	-	31.5	229	220
6	inch	15.5	16.0	18.0	6.0	6.0	11.0	6.9	8.6	-	-	-	39.0	309	289
8 × 6 × 8	inch	18.0	18.5	20.5	6.0	8.0	13.5	6.9	8.6	-	-	-	39.0	421	390
8	inch	18.0	18.5	20.5	8.0	8.0	13.5	8.9	12.0	11.5	18.1	14.0		617	591
10 × 8 × 10	inch	21.0	21.5	22.0	8.0	10.0	16.0	8.9	12.0	11.5	18.1	14.0		660	679
10	inch	21.0	21.5	22.0	10.0	10.0	16.0	9.9	13.2	13.2	24.0	15.2		814	785
12 × 10 × 12	inch	24.0	24.5	25.0	10.0	12.0	19.0	9.9	13.2	13.2	24.0	15.2		926	851
12	inch	24.0	24.5	25.0	12.0	12.0	19.0	11.6	15.0	13.2	24.0	17.3		1,323	1,224
14	inch	27.0	27.5	30.0	13.3	13.3	21.0	13.5	16.9	13.2	24.0	19.1		1,850	1,750
16 × 12 × 16	inch	30.0	30.5	33.0	12.0	15.2	23.5	11.6	15.0	13.2	24.0	17.3		1,649	1,550
16	inch	30.0	30.5	33.0	15.2	15.2	23.5	15.2	18.9	13.2	24.0	21.5		2,200	2,101
18	inch	34.0	34.5	36.0	17.2	17.2	25.0	16.7	20.3	14.8	29.9	23.0		3,642	3,501
20	inch	36.0	36.5	39.0	19.3	19.3	27.5	17.5	21.0	14.8	29.9	23.6		4,200	4,030
24 × 20 × 24	inch	42.0	42.5	45.0	19.3	23.3	32.0	17.5	21.0	14.8	29.9	23.6		4,500	4,325
24	inch	42.0	42.5	45.0	23.3	23.3	32.0	21.0	24.5	14.8	29.9	27.6		5,899	5,725
30 × 24 × 30	inch	51.0	-	55.0	23.3	29.0	38.7	21.0	24.5	14.8	29.9	27.6		6,400	6,199
30	inch	51.0	-	55.0	29.0	29.0	38.7	27.8	30.0	18.4	35.4	33.1		10,600	10,399
36 × 30 × 36	inch	60.0	-	68.0	29.0	34.5	46.0	27.8	30.0	18.4	35.4	33.1		11,001	10,800
36	inch	60.0	-	68.0	34.5	34.5	46.0	32.2	34.0	18.4	35.4	38.0		16,499	16,400

Size	Unit	A			B	B1	C	D	E	F	G	H	L	Weight(kg)	
		RF	RTJ	WE										FL	WE
50 × 40 × 50	mm	178.0	191.0	216.0	40.0	51.0	152.4	78.0	94.0	-	-	-	516.0	23	20
50	mm	178.0	191.0	216.0	51.0	51.0	152.4	86.0	108.0	-	-	-	516.0	25	23
80 × 50 × 80	mm	203.0	216.0	283.0	51.0	76.0	190.5	86.0	108.0	-	-	-	516.0	32	26
80	mm	203.0	216.0	283.0	76.0	76.0	190.5	107.0	133.5	-	-	-	516.0	45	50
100 × 80 × 100	mm	229.0	241.0	305.0	76.0	102.0	228.5	107.0	133.5	-	-	-	516.0	48	59
100	mm	229.0	241.0	305.0	102.0	102.0	228.6	121.0	147.0	-	-	-	800.0	60	93
150 × 100 × 150	mm	394.0	406.0	457.0	102.0	152.0	279.4	121.0	147.0	-	-	-	800.0	104	100
150	mm	394.0	406.0	457.0	152.0	152.0	279.4	175.5	218.5	-	-	-	991.0	140	131
200 × 150 × 200	mm	457.0	470.0	521.0	152.0	203.0	342.9	175.5	218.5	-	-	-	991.0	191	177
200	mm	457.0	470.0	521.0	203.0	203.0	342.9	227.0	304.5	293.0	460.0	356.5		280	268
250 × 200 × 250	mm	533.0	546.0	559.0	203.0	254.0	406.4	227.0	304.5	293.0	460.0	356.5		300	308
250	mm	533.0	546.0	559.0	254.0	254.0	406.4	251.0	334.5	335.0	610.0	387.0		370	356
300 × 250 × 300	mm	610.0	622.0	635.0	254.0	305.0	482.6	251.0	334.5	335.0	610.0	387.0		420	386
300	mm	610.0	622.0	635.0	305.0	305.0	482.6	294.5	382.0	335.0	610.0	440.0		600	555
350	mm	686.0	699.0	762.0	337.0	337.0	533.4	343.0	429.5	335.0	610.0	485.0		839	794
400 × 300 × 400	mm	762.0	775.0	838.0	305.0	387.0	596.9	294.5	382.0	335.0	610.0	440.0		748	703
400	mm	762.0	775.0	838.0	387.0	387.0	596.9	385.0	479.0	335.0	610.0	547.0		998	953
450	mm	864.0	876.0	914.0	438.0	438.0	635.0	424.0	515.0	376.0	760.0	583.0		1,652	1,588
500	mm	914.0	927.0	991.0	489.0	489.0	698.5	445.0	533.0	376.0	760.0	599.0		1,905	1,828
600 × 500 × 600	mm	1,067.0	1,080.0	1,143.0	489.0	591.0	812.8	445.0	533.0	376.0	760.0	599.0		2,041	1,962
600	mm	1,067.0	1,080.0	1,143.0	591.0	591.0	812.8	533.0	622.0	376.0	760.0	701.0		2,676	2,597
750 × 600 × 750	mm	1,295.0	-	1,397.0	591.0	737.0	984.0	533.0	622.0	376.0	760.0	701.0		2,903	2,812
750	mm	1,295.0	-	1,397.0	737.0	737.0	984.0	706.0	762.0	468.0	900.0	841.0		4,808	4,717
900 × 750 × 900	mm	1,524.0	-	1,727.0	737.0	876.0	1,168.0	706.0	762.0	468.0	900.0	841.0		4,990	4,899
900	mm	1,524.0	-	1,727.0	876.0	876.0	1,168.0	818.0	864.0	468.0	900.0	965.0		7,484	7,439

# ASME CLASS 300

## DIMENSIONS AND WEIGHTS

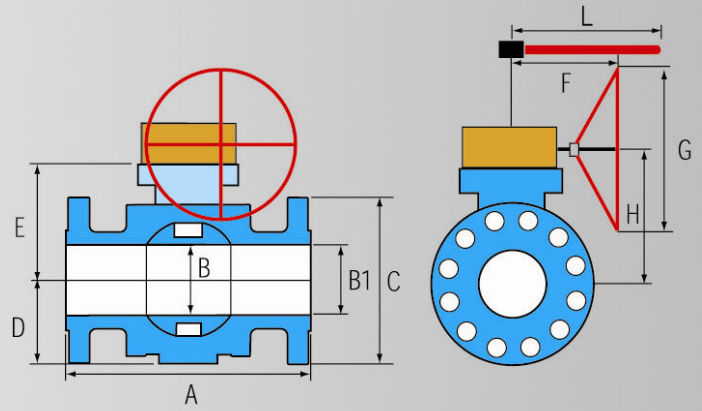


Size	Unit	A			B	B1	C	D	E	F	G	H	L	Weight(lb)	
		RF	RTJ	WE										FL	WE
2×1½×2	inch	8,5	9,1	8,5	1,6	2,0	6,5	3,1	3,7	-	-	-	20,3	51	51
2	inch	8,5	9,1	8,5	2,0	2,0	6,5	3,5	4,3	-	-	-	20,3	55	55
3×2×3	inch	11,1	11,7	11,1	2,0	3,0	8,3	3,5	4,3	-	-	-	20,3	79	62
3	inch	11,1	11,7	11,1	3,0	3,0	8,3	4,8	5,8	-	-	-	23,6	99	115
4×3×4	inch	12,0	12,6	12,0	3,0	4,0	10,0	4,8	5,8	-	-	-	23,6	170	141
4	inch	12,0	12,6	12,0	4,0	4,0	10,0	5,3	6,6	-	-	-	24,3	176	194
6×4×6	inch	15,9	16,5	15,9	4,0	6,0	12,5	5,3	6,6	-	-	-	24,3	304	225
6	inch	15,9	16,5	15,9	6,0	6,0	12,5	7,2	8,7	-	-	-	29,9	375	357
8×6×8	inch	19,8	20,4	20,5	6,0	8,0	15,0	7,2	8,7	-	-	-	29,9	549	474
8	inch	19,8	20,4	20,5	8,0	8,0	15,0	9,2	12,0	11,5	18,1	14,1		683	597
10×8×10	inch	22,4	23,0	22,0	8,0	10,0	17,5	9,2	12,0	11,5	18,1	14,1		899	800
10	inch	22,4	23,0	22,0	10,0	10,0	17,5	10,0	13,2	11,5	18,1	15,7		946	842
12×10×12	inch	25,5	26,1	25,0	10,0	12,0	20,5	10,0	13,2	11,5	18,1	15,7		1,146	1,041
12	inch	25,5	26,1	25,0	12,0	12,0	20,5	12,0	15,6	13,2	24,0	17,9		1,565	1,235
14	inch	30,0	30,6	30,0	13,3	13,3	23,0	12,4	16,8	13,2	24,0	19,1		1,900	1,724
16×12×16	inch	33,0	33,6	33,0	12,0	15,2	25,5	12,0	15,6	13,2	24,0	17,9		1,799	1,574
16	inch	33,0	33,6	33,0	15,2	15,2	25,5	14,0	17,4	14,8	29,9	20,0		2,800	2,299
18	inch	36,0	36,6	36,0	17,2	17,2	28,0	15,9	18,9	14,8	29,9	21,5		3,750	3,300
20	inch	39,0	39,8	39,0	19,3	19,3	30,5	17,5	21,0	14,8	29,9	24,1		4,550	4,034
24×20×24	inch	45,0	45,9	45,0	19,3	23,3	36,0	17,5	21,0	14,8	29,9	24,1		4,850	4,299
24	inch	45,0	45,9	45,0	23,3	23,3	36,0	21,0	24,5	18,4	35,4	27,6		6,799	6,025
30×24×30	inch	55,0	56,0	55,0	23,3	29,0	43,0	21,0	24,5	18,4	35,4	27,6		7,026	6,250
30	inch	55,0	56,0	55,0	29,0	29,0	43,0	29,0	30,0	18,4	35,4	34,0		12,200	10,851
36×30×36	inch	68,0	69,1	68,0	29,0	34,5	50,0	29,0	30,0	18,4	35,4	34,0		13,400	12,050
36	inch	68,0	69,1	68,0	34,5	34,5	50,0	32,0	34,0	18,4	35,4	38,0		18,501	16,649

Size	Unit	A			B	B1	C	D	E	F	G	H	L	Weight(kg)	
		RF	RTJ	WE										FL	WE
50×40×50	mm	216,0	232,0	216,0	40,0	51,0	165,0	78,0	94,0	-	-	-	516,0	23	23
50	mm	216,0	232,0	216,0	51,0	51,0	165,0	88,5	110,0	-	-	-	516,0	25	25
80×50×80	mm	283,0	298,0	283,0	51,0	76,0	210,0	88,5	110,0	-	-	-	516,0	36	28
80	mm	283,0	298,0	283,0	76,0	76,0	210,0	122,0	146,5	-	-	-	600,0	45	52
100×80×100	mm	305,0	321,0	305,0	76,0	102,0	254,0	122,0	146,5	-	-	-	600,0	77	64
100	mm	305,0	321,0	305,0	102,0	102,0	254,0	134,0	167,0	-	-	-	616,0	80	88
150×100×150	mm	403,0	419,0	403,0	102,0	152,0	318,0	134,0	167,0	-	-	-	616,0	138	102
150	mm	403,0	419,0	403,0	152,0	152,0	318,0	183,0	220,5	-	-	-	759,5	170	162
200×150×200	mm	502,0	518,0	521,0	152,0	203,0	381,0	183,0	220,5	-	-	-	759,5	249	215
200	mm	502,0	518,0	521,0	203,0	203,0	381,0	232,5	304,5	293,0	460,0	357,0		310	271
250×200×250	mm	568,0	584,0	559,0	203,0	254,0	445,0	232,5	304,5	293,0	460,0	357,0		408	363
250	mm	568,0	584,0	559,0	254,0	254,0	445,0	253,0	336,5	293,0	460,0	398,8		430	382
300×250×300	mm	648,0	664,0	635,0	254,0	305,0	521,0	253,0	336,5	293,0	460,0	398,9		520	472
300	mm	648,0	664,0	635,0	305,0	305,0	521,0	304,0	397,0	335,0	610,0	455,0		710	560
350	mm	762,0	778,0	762,0	337,0	337,0	584,0	315,0	427,0	335,0	610,0	485,0		862	782
400×300×400	mm	838,0	854,0	838,0	305,0	387,0	647,7	304,0	397,0	335,0	610,0	455,0		816	714
400	mm	838,0	854,0	838,0	387,0	387,0	647,7	356,0	442,0	375,0	760,0	508,0		1,270	1,043
450	mm	914,0	930,0	914,0	438,0	438,0	711,0	404,0	480,0	375,0	760,0	546,0		1,701	1,497
500	mm	991,0	1,010,0	991,0	489,0	489,0	775,0	445,0	533,0	375,0	760,0	612,0		2,064	1,830
600×500×600	mm	1,143,0	1,165,0	1,143,0	489,0	591,0	914,0	445,0	533,0	375,0	760,0	612,0		2,200	1,950
600	mm	1,143,0	1,165,0	1,143,0	591,0	591,0	914,0	533,0	622,0	468,0	900,0	701,0		3,084	2,733
750×600×750	mm	1,397,0	1,422,0	1,397,0	591,0	737,0	1,092,0	533,0	622,0	468,0	900,0	701,0		3,187	2,835
750	mm	1,397,0	1,422,0	1,397,0	737,0	737,0	1,092,0	737,0	762,0	468,0	900,0	864,0		5,534	4,922
900×750×900	mm	1,727,0	1,756,0	1,727,0	737,0	876,0	1,270,0	737,0	762,0	468,0	900,0	864,0		6,078	5,466
900	mm	1,727,0	1,756,0	1,727,0	876,0	876,0	1,270,0	813,0	864,0	468,0	900,0	965,0		8,392	7,552

# ASME CLASS 600

## DIMENSIONS AND WEIGHTS

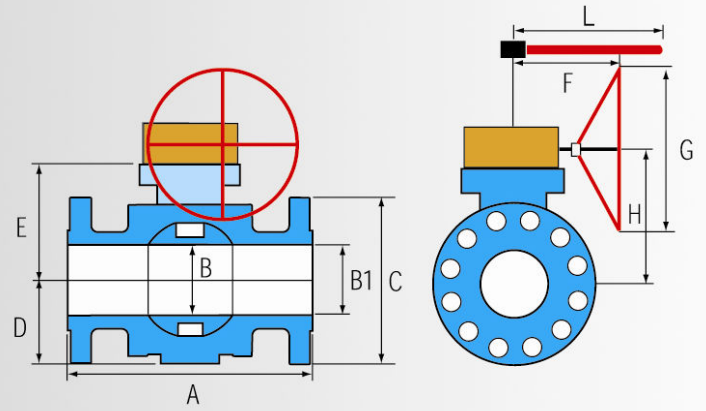


Size	Unit	A			B	B1	C	D	E	F	G	H	L	Weight(lb)	
		RF	RTJ	WE										FL	WE
2 × 1½ × 2	inch	11,5	11,6	11,5	1,6	2,0	6,5	3,3	4,1	-	-	-	23,6	68	55
2	inch	11,5	11,6	11,5	2,0	2,0	6,5	3,9	4,9	-	-	-	23,6	77	62
3 × 2 × 3	inch	14,0	14,1	14,0	2,0	3,0	8,3	3,9	4,9	-	-	-	23,6	110	66
3	inch	14,0	14,1	14,0	3,0	3,0	8,3	4,6	5,7	-	-	-	31,5	132	121
4 × 3 × 4	inch	17,0	17,1	17,0	3,0	4,0	10,7	4,6	5,7	-	-	-	31,5	220	141
4	inch	17,0	17,1	17,0	4,0	4,0	10,7	6,0	7,4	-	-	-	39,4	309	282
6 × 4 × 6	inch	22,0	22,1	22,0	4,0	6,0	14,0	6,0	7,4	-	-	-	39,4	441	344
6	inch	22,0	22,1	22,0	6,0	6,0	14,0	7,0	10,1	11,5	18,1	12,2		551	437
8 × 6 × 8	inch	26,0	26,1	26,0	6,0	8,0	16,5	7,0	10,1	11,5	18,1	12,2		661	591
8	inch	26,0	26,1	26,0	8,0	8,0	16,5	8,8	12,3	13,2	24,0	14,6		926	820
10 × 8 × 10	inch	31,0	31,1	31,0	8,0	10,0	20,0	8,8	12,3	13,2	24,0	14,6		1,168	985
10	inch	31,0	31,1	31,0	10,0	10,0	20,0	10,7	14,0	14,8	29,9	16,7		1,653	1,376
12 × 10 × 12	inch	33,0	33,1	33,0	10,0	12,0	22,0	10,7	14,0	14,8	29,9	16,7		1,830	1,731
12	inch	33,0	33,1	33,0	12,0	12,0	22,0	12,3	15,7	14,8	29,9	18,4		2,249	1,995
14	inch	35,0	35,1	35,0	13,3	13,3	23,7	14,6	16,8	18,4	35,4	19,9		2,641	2,291
16 × 12 × 16	inch	39,0	39,1	39,0	12,0	15,2	27,0	12,3	15,7	14,8	29,9	18,4		3,230	2,866
16	inch	39,0	39,1	39,0	15,2	15,2	27,0	15,6	20,1	18,4	35,4	22,4		3,814	3,355
18	inch	43,0	43,1	43,0	17,2	17,2	29,3	18,1	18,9	18,4	35,4	22,0		4,901	4,299
20	inch	47,0	47,2	47,0	19,3	19,3	32,0	18,9	23,9	18,4	35,4	25,0		5,800	5,099
24 × 20 × 24	inch	55,0	55,4	55,0	19,3	23,3	37,0	19,6	21,0	18,4	35,4	25,0		7,500	6,799
24	inch	55,0	55,4	55,0	23,3	23,3	37,0	23,0	24,5	18,4	35,4	28,5		8,699	8,025
30 × 24 × 30	inch	65,0	65,5	65,0	23,3	29,0	44,5	23,0	24,5	18,4	35,4	28,5		10,399	9,724
30	inch	65,0	65,5	65,0	29,0	29,0	44,5	28,0	30,0	25,0	42,1	35,0		14,700	13,450
36 × 30 × 36	inch	82,0	82,6	82,0	29,0	34,5	51,7	28,0	30,0	25,0	42,1	35,0		16,199	14,949
36	inch	82,0	82,6	82,0	34,5	34,5	51,7	33,0	34,0	25,0	42,1	39,0		23,400	20,851

Size	Unit	A			B	B1	C	D	E	F	G	H	L	Weight(kg)	
		RF	RTJ	WE										FL	WE
50 × 40 × 50	mm	292,0	295,0	292,0	40,0	51,0	165,0	85,0	104,0	-	-	-	600,0	31	25
50	mm	292,0	295,0	292,0	51,0	51,0	165,0	99,5	125,0	-	-	-	600,0	35	28
80 × 50 × 80	mm	356,0	359,0	356,0	51,0	76,0	210,0	99,5	125,0	-	-	-	600,0	50	30
80	mm	356,0	359,0	356,0	76,0	76,0	210,0	116,0	145,0	-	-	-	800,0	60	55
100 × 80 × 100	mm	432,0	435,0	432,0	76,0	102,0	273,0	116,0	145,0	-	-	-	800,0	100	64
100	mm	432,0	435,0	432,0	102,0	102,0	273,0	152,0	188,0	-	-	-	1,000,0	140	128
150 × 100 × 150	mm	559,0	562,0	559,0	102,0	152,0	356,0	152,0	188,0	-	-	-	1,000,0	200	156
150	mm	559,0	562,0	559,0	152,0	152,0	356,0	178,5	257,0	293,0	460,0	310,0		250	198
200 × 150 × 200	mm	660,0	664,0	660,0	152,0	203,0	419,0	178,5	257,0	293,0	460,0	310,0		300	268
200	mm	660,0	664,0	660,0	203,0	203,0	419,0	224,5	312,5	335,0	610,0	370,5		420	372
250 × 200 × 250	mm	787,0	791,0	787,0	203,0	254,0	508,0	224,5	312,5	335,0	610,0	370,5		530	447
250	mm	787,0	791,0	787,0	254,0	254,0	508,0	271,5	356,5	375,0	760,0	424,5		750	624
300 × 250 × 300	mm	838,0	841,0	838,0	254,0	305,0	559,0	271,5	356,5	375,0	760,0	424,5		830	785
300	mm	838,0	841,0	838,0	305,0	305,0	559,0	311,5	400,0	375,0	760,0	468,5		1,020	905
350	mm	889,0	892,0	889,0	337,0	337,0	603,0	371,0	427,0	468,0	900,0	505,0		1,198	1,039
400 × 300 × 400	mm	991,0	994,0	991,0	305,0	387,0	686,0	311,5	400,0	375,0	760,0	468,0		1,465	1,300
400	mm	991,0	994,0	991,0	387,0	387,0	686,0	396,0	510,0	468,0	900,0	570,0		1,730	1,522
450	mm	1,092,0	1,095,0	1,092,0	438,0	438,0	743,0	460,0	480,0	468,0	900,0	559,0		2,223	1,950
500	mm	1,194,0	1,200,0	1,194,0	489,0	489,0	813,0	480,5	607,0	468,0	900,0	635,0		2,631	2,313
600 × 500 × 600	mm	1,397,0	1,407,0	1,397,0	489,0	591,0	940,0	498,0	533,0	468,0	900,0	635,0		3,402	3,084
600	mm	1,397,0	1,407,0	1,397,0	591,0	591,0	940,0	584,0	622,0	468,0	900,0	724,0		3,946	3,640
750 × 600 × 750	mm	1,651,0	1,664,0	1,651,0	591,0	737,0	1,130,0	584,0	622,0	468,0	900,0	724,0		4,717	4,411
750	mm	1,651,0	1,664,0	1,651,0	737,0	737,0	1,130,0	711,0	762,0	635,0	1,070,0	889,0		6,668	6,101
900 × 750 × 900	mm	2,083,0	2,099,0	2,083,0	737,0	876,0	1,314,0	711,0	762,0	635,0	1,070,0	889,0		7,348	6,781
900	mm	2,083,0	2,099,0	2,083,0	876,0	876,0	1,314,0	838,0	864,0	635,0	1,070,0	991,0		10,614	9,458

# ASME CLASS 900

## DIMENSIONS AND WEIGHTS

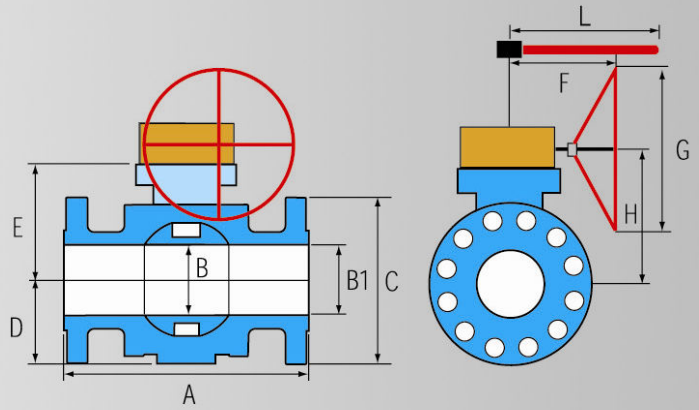


Size	Unit	A			B	B1	C	D	E	F	G	H	L	Weight(lb)	
		RF	RTJ	WE										FL	WE
2x1½x2	inch	14,5	14,6	14,5	1,6	2,0	8,5	3,9	4,1	-	-	-	23,6	99	66
2	inch	14,5	14,6	14,5	2,0	2,0	8,5	4,4	5,7	-	-	-	29,9	110	73
3x2x3	inch	15,0	15,1	15,0	2,0	3,0	9,5	4,4	5,7	-	-	-	29,9	134	119
3	inch	15,0	15,1	15,0	3,0	3,0	9,5	5,0	7,0	-	-	-	35,4	209	176
4x3x4	inch	18,0	18,1	18,0	3,0	4,0	11,5	5,0	7,0	-	-	-	35,4	258	205
4	inch	18,0	18,1	18,0	4,0	4,0	11,5	6,3	8,9	11,5	18,1	10,9		441	384
6x4x6	inch	24,0	24,1	24,0	4,0	6,0	15,0	6,3	8,9	11,5	18,1	10,9		549	450
6	inch	24,0	24,1	24,0	6,0	6,0	15,0	7,7	10,8	11,5	18,1	12,9		750	549
8x6x8	inch	29,0	29,1	29,0	6,0	8,0	18,5	7,7	10,8	11,5	18,1	12,9		950	650
8	inch	29,0	29,1	29,0	8,0	8,0	18,5	9,8	13,2	13,2	24,0	15,5		1,433	899
10x8x10	inch	33,0	33,1	33,0	8,0	10,0	21,5	9,8	13,2	13,2	24,0	15,5		1,451	1,175
10	inch	33,0	33,1	33,0	10,0	10,0	21,5	11,4	15,2	14,8	29,9	17,8		1,675	1,301
12x10x12	inch	38,0	38,1	38,0	10,0	12,0	24,0	11,4	15,2	14,8	29,9	17,8		2,000	1,601
12	inch	38,0	38,1	38,0	12,0	12,0	24,0	13,4	17,4	18,4	35,4	20,1		2,500	2,000
14	inch	40,5	40,9	40,5	12,8	12,8	25,2	16,1	19,2	18,4	35,4	22,3		3,501	2,749
16x12x16	inch	44,5	44,9	44,5	12,0	14,8	27,8	13,6	17,4	18,4	35,4	20,1		4,200	3,201
16	inch	44,5	44,9	44,5	14,8	14,8	27,8	17,3	19,8	18,4	35,4	22,9		4,400	3,501
18	inch	48,0	48,5	48,0	16,7	16,7	31,0	18,9	21,5	18,4	35,4	25,5		6,151	4,850
20	inch	52,0	52,5	52,0	18,6	18,6	33,7	20,6	23,1	22,5	42,1	27,1		7,500	6,001
24x20x24	inch	61,0	61,7	61,0	18,6	22,5	41,0	20,6	23,1	22,5	42,1	27,1		9,901	6,951
24	inch	61,0	61,7	61,0	22,5	22,5	41,0	24,1	25,2	25,0	42,1	30,2		12,000	9,149

Size	Unit	A			B	B1	C	D	E	F	G	H	L	Weight(kg)	
		RF	RTJ	WE										FL	WE
50x40x50	mm	368,0	371,0	368,0	40,0	51,0	216,0	98,0	105,0	-	-	-	600,0	45	30
50	mm	368,0	371,0	368,0	51,0	51,0	216,0	112,0	145,0	-	-	-	760,0	50	33
80x50x80	mm	381,0	384,0	381,0	51,0	76,0	241,0	112,0	145,0	-	-	-	760,0	61	54
80	mm	381,0	384,0	381,0	76,0	76,0	241,0	128,0	178,0	-	-	-	900,0	95	80
100x80x100	mm	457,0	460,0	457,0	76,0	102,0	292,0	128,0	178,0	-	-	-	900,0	117	93
100	mm	457,0	460,0	457,0	102,0	102,0	292,0	160,0	225,0	293,0	460,0	277,5		200	174
150x100x150	mm	610,0	613,0	610,0	102,0	152,0	381,0	160,0	225,0	293,0	460,0	277,5		249	204
150	mm	610,0	613,0	610,0	152,0	152,0	381,0	196,0	275,0	293,0	460,0	327,5		340	249
200x150x200	mm	737,0	740,0	737,0	152,0	203,0	470,0	196,0	275,0	293,0	460,0	327,5		431	295
200	mm	737,0	740,0	737,0	203,0	203,0	470,0	249,0	334,5	335,0	610,0	392,5		650	408
250x200x250	mm	838,0	841,0	838,0	203,0	254,0	546,0	249,0	334,5	335,0	610,0	392,5		658	533
250	mm	838,0	841,0	838,0	254,0	254,0	546,0	290,0	385,0	375,0	760,0	453,0		760	590
300x250x300	mm	965,0	968,0	965,0	254,0	305,0	610,0	290,0	385,0	375,0	760,0	453,0		907	726
300	mm	965,0	968,0	965,0	305,0	305,0	610,0	341,5	441,0	468,0	900,0	510,0		1,134	907
350	mm	1,029,0	1,038,0	1,029,0	324,0	324,0	641,0	409,0	488,0	468,0	900,0	566,0		1,588	1,247
400x300x400	mm	1,130,0	1,140,0	1,130,0	305,0	375,0	705,0	345,0	441,0	468,0	900,0	510,0		1,905	1,452
400	mm	1,130,0	1,140,0	1,130,0	375,0	375,0	705,0	439,0	503,0	468,0	900,0	582,0		1,996	1,588
450	mm	1,219,0	1,232,0	1,219,0	425,0	425,0	787,0	480,0	546,0	468,0	900,0	648,0		2,790	2,200
500	mm	1,321,0	1,334,0	1,321,0	473,0	473,0	857,0	523,0	587,0	572,0	1,070,0	688,0		3,402	2,722
600x500x600	mm	1,549,0	1,568,0	1,549,0	473,0	572,0	1,041,0	523,0	587,0	572,0	1,070,0	688,0		4,491	3,153
600	mm	1,549,0	1,568,0	1,549,0	572,0	572,0	1,041,0	612,0	640,0	635,0	1,070,0	767,0		5,443	4,150

# ASME CLASS 1500

## DIMENSIONS AND WEIGHTS

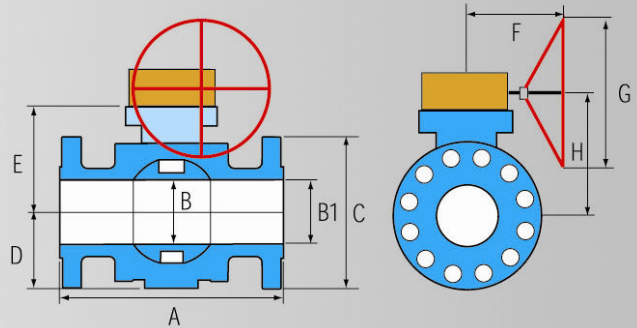


Size	Unit	A			B	B1	C	D	E	F	G	H	L	Weight(lb)	
		RF	RTJ	WE										FL	WE
2 × 1½ × 2	inch	14,5	14,6	14,5	1,6	2,0	8,5	3,9	4,1	-	-	-	23,6	99	66
2	inch	14,5	14,6	14,5	2,0	2,0	8,5	4,4	6,2	-	-	-	23,6	187	159
3 × 2 × 3	inch	18,5	18,6	18,5	2,0	3,0	10,5	4,4	6,2	-	-	-	23,6	229	216
3	inch	18,5	18,6	18,5	3,0	3,0	10,5	5,4	8,5	10,5	11,8	10,4		331	271
4 × 3 × 4	inch	21,5	21,6	21,5	3,0	4,0	12,2	5,4	8,5	10,5	11,8	10,4		406	351
4	inch	21,5	21,6	21,5	4,0	4,0	12,2	6,8	10,2	11,5	18,1	12,3		562	437
6 × 4 × 6	inch	27,8	28,0	27,8	4,0	5,7	15,5	6,8	10,2	11,5	18,1	12,3		650	540
6	inch	27,8	28,0	21,8	5,7	5,7	15,5	8,7	12,8	13,2	24,0	15,1		1,213	968
8 × 6 × 8	inch	32,8	33,1	32,8	5,7	7,6	19,0	8,7	12,8	13,2	24,0	15,1		1,451	981
8	inch	32,8	33,1	32,8	7,6	7,6	19,0	10,5	14,5	13,2	24,0	16,8		1,585	1,076
10 × 8 × 10	inch	39,0	39,4	39,0	7,6	9,5	23,0	10,5	14,5	13,2	24,0	16,8		1,920	1,250
10	inch	39,0	39,4	39,0	9,5	9,5	23,0	12,8	16,9	18,4	35,4	19,6		2,440	1,799
12 × 10 × 12	inch	44,5	45,1	44,5	9,5	11,4	26,5	12,8	16,9	18,4	35,4	19,6		2,780	1,951
12	inch	44,5	45,1	44,5	11,4	11,4	26,5	14,4	19,3	14,8	29,9	22,0		3,501	2,421

Size	Unit	A			B	B1	C	D	E	F	G	H	L	Weight(kg)	
		RF	RTJ	WE										FL	WE
50 × 40 × 50	mm	368,0	371,0	368,0	40,0	51,0	216,0	98,0	105,0	-	-	-	600,0	45	30
50	mm	368,0	371,0	368,0	51,0	51,0	216,0	113,0	157,0	-	-	-	600,0	85	72
80 × 50 × 80	mm	470,0	473,0	470,0	51,0	76,0	267,0	113,0	157,0	-	-	-	600,0	104	98
80	mm	470,0	473,0	470,0	76,0	76,0	267,0	138,0	217,0	267,0	300,0	265,0		150	123
100 × 80 × 100	mm	546,0	549,0	546,0	76,0	102,0	311,0	138,0	217,0	267,0	300,0	265,0		184	159
100	mm	546,0	549,0	546,0	102,0	102,0	311,0	172,0	260,0	293,0	460,0	312,5		255	198
150 × 100 × 150	mm	705,0	711,0	705,0	102,0	146,0	394,0	172,0	260,0	293,0	460,0	312,5		295	245
150	mm	705,0	711,0	705,0	146,0	146,0	394,0	220,0	325,0	335,0	610,0	383,0		550	439
200 × 150 × 200	mm	832,0	841,0	832,0	146,0	194,0	483,0	220,0	325,0	335,0	610,0	383,0		658	445
200	mm	832,0	841,0	832,0	194,0	194,0	483,0	267,0	369,5	335,0	610,0	427,5		719	488
250 × 200 × 250	mm	991,0	1,000,0	991,0	194,0	241,0	584,0	267,0	369,5	335,0	610,0	427,5		871	567
250	mm	991,0	1,000,0	991,0	241,0	241,0	584,0	325,0	430,0	468,0	900,0	499,0		1,107	816
300 × 250 × 300	mm	1,130,0	1,146,0	1,130,0	241,0	289,0	673,0	325,0	430,0	468,0	900,0	499,0		1,261	885
300	mm	1,130,0	1,146,0	1,130,0	289,0	289,0	673,0	366,5	490,0	375,0	760,0	558,0		1,588	1,098

# ASME CLASS 2500

## DIMENSIONS AND WEIGHTS

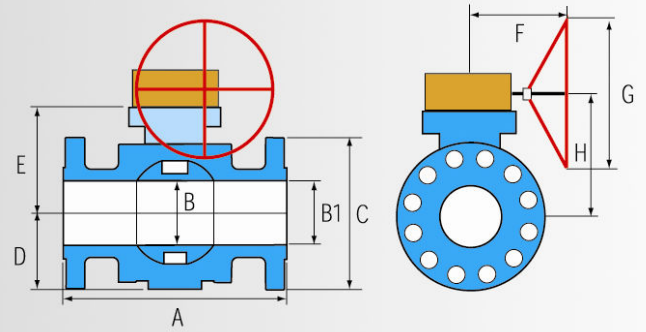


Size	Unit	A			B	B1	C	D	E	F	G	H	Weight(lb)	
		RF	RTJ	WE									FL	WE
2	inch	17,8	17,9	17,8	1,7	1,7	9,3	5,0	7,5	11,5	18,1	9,6	287	220
3	inch	22,8	23,0	22,8	2,5	2,5	12,0	6,4	9,5	11,5	18,1	11,6	573	390
4	inch	26,5	26,9	26,5	3,5	3,5	14,0	7,6	11,2	13,2	24,0	13,5	990	730
6	inch	36,0	36,5	36,0	5,2	5,2	19,0	10,0	14,5	14,8	29,9	17,2	2,200	1,499

Size	Unit	A			B	B1	C	D	E	F	G	H	Weight(kg)	
		RF	RTJ	WE									FL	WE
50	mm	451,0	454,0	451,0	44,0	44,0	235,0	127,5	191,0	293,0	460,0	243,5	130	100
80	mm	578,0	584,0	578,0	64,0	64,0	305,0	163,0	242,0	293,0	460,0	294,5	260	177
100	mm	673,0	683,0	673,0	89,0	89,0	356,0	192,0	285,5	335,0	610,0	343,5	450	331
150	mm	914,0	927,0	914,0	133,0	133,0	483,0	255,0	368,0	375,0	760,0	436,0	1,000	680

# CLASS API 5000

## DIMENSIONS AND WEIGHTS

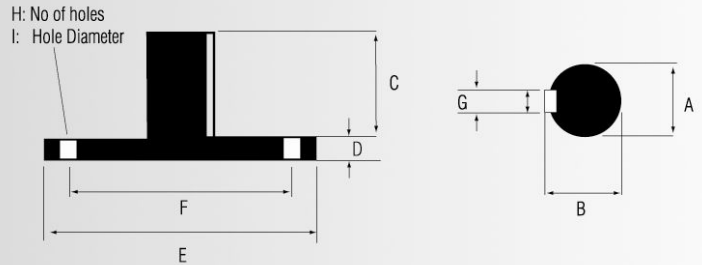


Size	Unit	A-RTJ	B	B1	C	D	E	F	G	H	Weight(lb)
2 1/16	inch	14,6	2,1	2,1	8,5	4,3	6,5	10,5	17,0	8,4	242
3 1/8	inch	18,6	3,1	3,1	10,5	5,5	7,9	11,5	20,0	10,5	385
4 1/16	inch	21,6	4,1	4,1	12,2	6,7	8,3	13,2	24,0	11,9	605
5 1/8	inch	28,6	5,1	5,1	16,7	10,2	11,0	14,8	30,0	13,5	1,075
7 1/16	inch	32,0	7,1	7,1	21,3	13,4	13,6	18,4	30,0	16,5	1,594

Size	Unit	A-RTJ	B	B1	C	D	E	F	G	H	Weight(kg)
50	mm	371	52	52	216	110	165	267	432	213	110
80	mm	473	79	79	267	140	200	292	508	267	175
100	mm	549	103	103	311	170	210	335	610	302	275
150	mm	727	130	130	423	258	280	376	762	343	489
200	mm	813	179	179	540	340	345	467	762	419	725

# TOP MOUNTING DIMENSIONS AND STEM TORQUE

DIMENSIONS UNIT : mm / TORQUE UNIT : inch-lb



Size	Class	A	B	C	D	E	F	G	H	I	Torque
2	150	18,0	20,5	31,0	16,5	127,0	70,0	6,0	4	6,0	1,054
	300	18,0	20,5	31,0	16,5	127,0	70,0	6,0	4	6,0	1,054
	600	21,0	23,5	31,0	16,5	165,1	70,0	6,0	4	6,0	1,302
	900	25,0	28,4	41,4	16,5	165,1	125,0	8,0	4	12,0	1,640
	1500	22,0	26,0	31,0	20,1	165,1	125,0	8,0	4	12,0	2,325
3	2500	28,0	34,0	65,0	20,1	209,6	140,0	8,0	4	16,0	3,459
	150	21,0	23,5	31,0	16,5	127,0	70,0	6,0	4	6,0	1,801
	300	21,0	23,5	31,0	16,5	165,1	70,0	6,0	4	6,0	1,970
	600	26,0	28,5	31,0	20,1	165,1	70,0	6,0	4	6,0	2,575
	900	30,0	35,0	51,0	20,1	209,6	102,0	10,0	4	10,0	3,170
4	1500	35,0	42,0	65,0	20,1	209,6	125,0	12,0	4	12,0	4,673
	2500	45,0	52,0	65,0	30,0	259,8	140,0	12,0	4	16,0	7,167
	150	26,0	28,5	31,0	20,1	165,1	70,0	6,0	4	6,0	3,107
	300	26,0	28,5	31,0	20,1	209,6	70,0	6,0	4	6,0	3,418
	600	37,0	42,0	51,0	20,1	209,6	102,0	10,0	4	10,0	4,072
6	900	38,0	43,0	60,0	20,1	209,6	140,0	10,0	4	16,0	7,075
	1500	50,8	59,3	75,0	24,4	260,4	140,0	14,0	4	16,0	8,627
	2500	50,8	60,8	75,0	30,0	292,1	165,0	16,0	4	20,0	10,619
	150	37,0	42,0	51,0	20,1	209,6	102,0	10,0	4	10,0	6,236
	300	37,0	42,0	51,0	20,1	209,6	102,0	10,0	4	10,0	7,093
8	600	45,0	53,5	71,0	24,4	240,0	140,0	14,0	4	16,0	8,048
	900	50,8	59,3	70,0	24,4	260,4	140,0	14,0	4	16,0	13,304
	1500	50,8	59,3	90,0	30,0	292,1	165,0	14,0	4	20,0	15,281
	2500	75,0	88,0	100,0	30,0	292,1	254,0	22,0	8	16,0	44,894
	150	45,0	54,0	61,0	20,1	240,0	140,0	14,0	4	16,0	9,160
10	300	45,0	54,0	71,0	24,4	240,0	140,0	14,0	4	16,0	13,304
	600	50,0	58,5	85,0	30,0	260,4	165,0	14,0	4	20,0	18,587
	900	63,5	74,5	85,0	30,0	292,1	165,0	18,0	4	20,0	24,527
	1500	76,2	89,2	115,0	30,0	292,1	165,0	22,0	4	20,0	44,330
	150	50,0	59,0	71,0	24,4	260,4	140,0	14,0	4	16,0	13,156
36	300	60,0	59,0	71,0	24,4	260,4	140,0	14,0	4	16,0	18,084
	600	60,0	70,0	85,0	30,0	292,1	254,0	16,0	8	16,0	25,942
	900	76,2	89,2	115,0	30,0	292,1	254,0	22,0	8	16,0	41,774
	1500	88,9	106,0	130,0	35,1	340,1	298,0	24,0	8	20,0	76,215

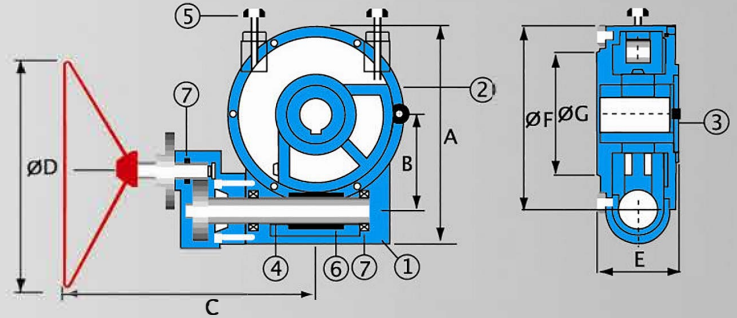
Size	Class	A	B	C	D	E	F	G	H	I	Torque
12	150	60,0	71,0	90,0	24,4	26,4	165,0	18,0	4	20,0	21,007
	300	60,0	71,0	90,0	30,0	292,1	165,0	18,0	4	20,0	28,003
	600	70,0	82,5	114,0	30,0	292,1	254,0	20,0	8	16,0	39,380
	900	88,9	104,9	130,0	35,1	340,1	298,0	24,0	8	20,0	50,758
	1500	101,6	119,6	130,0	35,1	340,1	254,0	28,0	8	16,0	92,720
14	150	63,4	67,4	85,1	30,0	292,1	254,0	18,0	4	20,0	25,859
	300	63,4	67,4	114,3	30,0	292,1	254,0	18,0	8	16,0	35,813
	600	88,8	93,9	114,3	30,0	340,1	300,2	22,3	8	16,0	52,000
	900	101,5	106,6	132,1	35,1	340,1	300,2	25,4	8	20,0	82,975
	150	63,4	67,4	85,1	30,0	292,1	254,0	18,0	4	20,0	31,121
16	300	76,1	80,2	114,3	30,0	292,1	254,0	20,0	8	16,0	44,885
	600	88,8	93,9	114,3	35,1	340,1	300,2	22,3	8	20,0	67,270
	900	101,5	106,6	132,1	35,1	340,1	300,2	25,4	8	30,0	100,025
	150	76,1	80,2	114,3	30,0	292,1	254,0	20,0	8	16,0	39,862
	300	76,1	80,2	132,1	35,1	292,1	254,0	20,0	8	20,0	59,598
18	600	88,8	106,6	132,1	35,1	340,1	300,2	25,4	8	20,0	91,695
	900	101,5	127,0	182,9	38,1	419,1	360,2	32,0	8	30,0	147,210
	150	76,1	80,2	114,3	30,0	292,1	254,0	20,0	8	16,0	48,350
	300	88,8	93,9	132,1	35,1	340,1	300,2	22,3	8	20,0	75,650
	600	120,0	127,0	182,9	38,1	419,1	360,2	36,0	8	30,0	213,425
20	150	88,8	93,9	132,1	38,1	340,1	300,2	22,3	8	20,0	90,113
	300	101,5	106,6	182,9	38,1	340,1	300,2	32,0	8	30,0	112,200
	600	120,0	127,0	182,9	38,1	419,1	360,2	32,0	8	30,0	147,250
	900	150,0	158,0	203,2	44,5	480,1	410,2	36,0	8	36,0	300,975
	150	101,5	106,6	182,9	38,1	340,1	300,2	32,0	8	30,0	102,219
24	300	120,0	127,0	182,9	38,1	419,1	360,2	32,0	8	30,0	167,625
	600	150,0	158,0	203,2	44,5	480,1	410,2	36,0	8	36,0	327,175
	150	101,5	106,6	182,9	38,1	340,1	300,2	32,0	8	30,0	102,219
	300	120,0	127,0	182,9	38,1	419,1	360,2	32,0	8	30,0	167,625
	600	150,0	158,0	203,2	44,5	480,1	410,2	36,0	8	36,0	327,175
30	150	120,0	127,0	182,9	38,1	419,1	360,2	32,0	8	30,0	152,393
	300	120,0	127,0	203,2	44,5	419,1	360,2	32,0	8	36,0	295,650
	600	150,0	158,0	203,2	44,5	480,1	410,2	36,0	8	36,0	420,625

Note : 1. See page 8, part No. 9 for the mounting pad, No. 35 for the key, and No. 3 for the stem.  
2. Breakout torque is based on valve's maximum pressure on clean fluid.

# GEAR OPERATORS

## QUARTER TURN WORM GEAR

No	Part	Material
1	Housing	A536
2	Worm Gear	A536
3	Indicator Cover	A536
4	Work Wheel	A536
5	Adjusting Bolt	A307 B
6	Worm	A322 4140
7	Bearing	A295



Model	Unit	A	B	C	D	E	F	G	Stem dia	Gear Ratio	Torque(N,m)
JWG 1 (F-12)	inch	7.52	2.80	10.51	11.81	1.88	1.89	3.77	1.57		
	mm	191	71	267	300	47.8	48	95.8	40	1/42	2234
JWG 2 (F-14)	inch	9.06	3.39	11.54	18.11	2.12	2.05	4.19	1.97		
	mm	230	86	293	460	53.8	52	106.3	50	1/48	2793
JWG 3 (F-16)	inch	10.67	4.17	13.19	24.02	2.37	2.28	4.66	2.36		
	mm	271	106	335	610	60.3	58	118.3	60	1/55	3577
JWG 4 (F-25)	inch	13.27	5.18	14.76	29.92	2.61	2.68	5.29	2.95		
	mm	337	131.5	375	760	66.3	68	134.3	75	1/60	4508
JWG 5 (F-30)	inch	15.75	6.46	18.43	35.43	2.65	2.72	5.37	3.35		
	mm	400	164	468	900	67.3	69	136.3	85	1/68	5694

Note : The figures in parenthesis show ISO 5211 bolt patterns.

### Notice

- Data listed in this catalogue, including pressure / temperature rating, material specifications, and other performance related data are intended to provide general information, and guidelines about MCSYS products.
- For any specific application, users are kindly requested to contact SAMJIN JMC for technical advice. Failure to follow this request may result in property damage and / or personal injury, for which we shall not be liable.
- While this catalogue has been compiled with the utmost care, we assume no responsibility for errors, impropriety or inadequacy relevant to any information provided in this catalogue. Any information in this catalogue is subject to change without prior notice.



# ENGINEERING DATA

## TEMPERATURE LIMITS

### Seat Insert and Seal

Material	Temperature	
	Min.	Max.
NBR (Buna-N, Nitrile)	-35°F (-37°C)	212°F (100°C)
HNBR (HSN)	-40°F (-40°C)	300°F (149°C)
PTFE, RPTFE	-148°F (-100°C)	450°F (232°C)
Nylon 6 + MOS 2	-65°F (-54°C)	250°F (121°C)
PEEK	-65°F (-54°C)	500°F (260°C)
FKM A (Viton A)	-13°F (-25°C)	400°F (204°C)
FKM GLT (Viton GLT)	-40°F (-40°C)	400°F (204°C)
Polymite	-65°F (-54°C)	275°F (135°C)

### Metal Part

Material	Temperature	
	Min.	Max.
A105	-20°F (-29°C)	800°F (426°C)
A350 LF2	-50°F (-46°C)	650°F (343°C)
A182 F316	-425°F (-254°C)	1500°F (815°C)

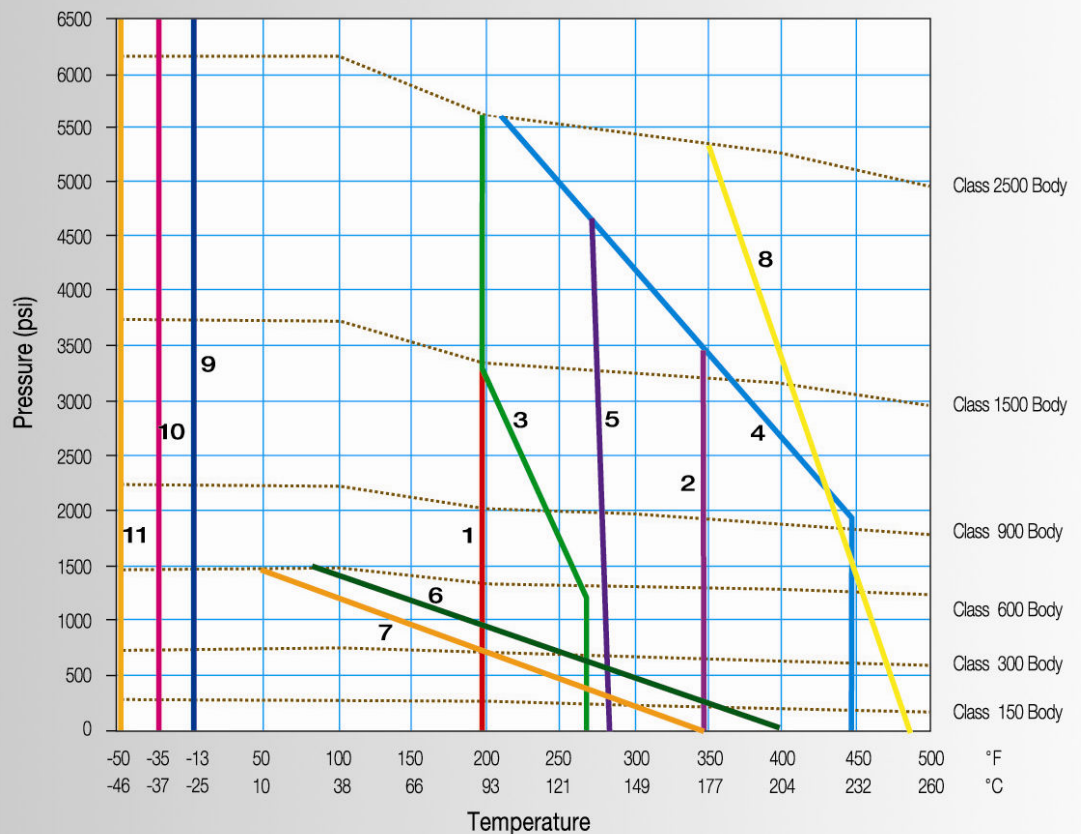
### Spiral Wound Gasket

Material	Temperature	
	Min.	Max.
316SS + Graphite	-420°F (-250°C)	1500°F (815°C)
316SS + PTFE	-200°F (-129°C)	450°F (232°C)

### Pressure Temperature Chart \*

- 1 NBR
- 2 Viton, Viton GLT
- 3 Nylon + MoS2
- 4 PEEK
- 5 HNBR
- 6 PTFE
- 7 RPTFE
- 8 Polymite
- 9 Low temperature Limit of Viton
- 10 Low temperature Limit of NBR
- 11 Low temperature Limit of Viton GLT

\* Body materials are based on A105 and LF2



# Cv FLOW COEFFICIENTS

Size (inches)	CLASSES					
	150	300	600	900	1500	2500
2	440	450	430	370	360	270
3×2	220	220	220	210	190	-
3	1270	1110	1050	960	860	530
4×3	630	630	630	620	580	-
4	2290	2180	1920	1870	1770	1150
6×4	830	830	820	820	810	-
6	5290	5240	4720	4500	3910	2580
8×6	2210	2210	2210	2210	2210	-
8	9690	9590	9180	8670	7550	-
10×8	4390	4390	4390	4540	4540	-
10	15200	15200	14900	14700	11700	-
12×10	7670	7670	7670	8130	9150	-
12	23300	23300	22800	21400	18300	-
14	28500	28500	28500	25300	-	-
16×12	15200	15200	15200	14400	-	-
16	37600	37600	37600	34900	-	-
18	49500	49500	49500	45400	-	-
20	59500	59500	59500	55700	-	-
24×20	28400	28400	28200	25300	-	-
24	92600	92600	92600	84400	-	-
30×24	36200	36200	36200	-	-	-
30	145800	144800	144800	-	-	-
36×30	64300	64300	64300	-	-	-
36	211000	211000	211000	-	-	-

## Method of Calculating Flow

The flow coefficient Cv is the volume (in US gallons) of water at 60°F that will flow per minute through a valve with a pressure drop of 1 psi across the valve. The Cv allows us to estimate the flow of liquid or gas through the valve by the following formulas:

### For liquid:

$$Q_L = C_v \sqrt{\frac{\Delta P}{G_L}}$$

$$\Delta P = G_L \left( \frac{Q_L}{C_v} \right)^2$$

where

$Q_L$  = Flow rate in US gallons per minute

$\Delta P$  = Pressure drop across the valve in psi

$G_L$  = Specific gravity of liquid  
(water = 1 at 60°F)

### For gas:

$$Q_g = 1360 C_v \sqrt{\frac{\Delta P}{G_g T}} \cdot \sqrt{\frac{P_1 + P_2}{2}}$$

$$\Delta P = P_1 - \sqrt{P_1^2 - G_g T \left( \frac{Q_g}{962 C_v} \right)^2}$$

where

$Q_g$  = Volumetric flow rate (SCFH)

$P_1$  = Upstream pressure in psia

$P_2$  = downstream pressure in psia

$G_g$  = Specific gravity of gas at standard conditions (air = 1,000 at 60°F)

$T$  = Absolute temperature of gas (°F+460)

\* Conversion between the flow coefficient Cv and Kv (for the metric system) can be expressed as:  $K_v = 0.853 C_v$

# VALVE FIGURE NUMBER - PART SELECTION CODES

<b>TB</b>	<b>-</b>	<b>03</b>	<b>F</b>	<b>12</b>	<b>RF</b>	<b>-</b>	<b>1</b>	<b>A</b>	<b>1</b>	<b>B</b>	<b>-</b>	<b>S</b>	<b>G</b>
1	-	2	3	4	5	-	6	7	8	9	-	10	11

<b>1 - Valve Type</b>	
Trunnion	TB
<b>2 - Pressure Class</b>	
ASME 150	01
300	03
600	06
900	09
1500	15
2500	25
API 5000	50
<b>3 - Bore</b>	
Full Bore	F
Reduced Bore	R
<b>4 - Size</b>	
2"	02
3"	03
4"	04
6"	06
8"	08
10"	10
12"	12
14"	14
16"	16
18"	18
20"	20

24"	24
30"	30
36"	36
<b>5 - End Connection</b>	
Raised Face	RF
Flat Face	FF
Ring Type Joint	RJ
Butt Weld Ends	BW
RF x BW	FW
RTJ x BW	RW
<b>6 - Body Material</b>	
A105	1
A350 LF2	2
A182 F316	3
A216 WCB	4
A351 CF8M	5
Duplex SS	6
Monel	7
Other	0
<b>7 - Trim</b>	
<b>(Stem / Seat Ring / Ball)</b>	
A105 + ENP	A
A182 F316	B
A182 F6a	C
A564 630	D

Other	X
<b>8 - Seat Insert</b>	
Nylon 6 + MoS2	1
PTFE	2
RPTFE	3
PEEK	4
Other	0
<b>9 - Seal</b>	
NBR (Buna-N, Nitrile)	A
FKM (Viton A)	B
FKM GLT (Viton GLT)	C
HNBR (HSN)	D
Polymite	E
PTFE	F
Other	X
<b>10 - Seat Configuration</b>	
Self Relieving Seat	S
Double Piston Seat	D
<b>11 - Actuation</b>	
Bare Stem	B
Gear Operator	G
Lever	L
Power Actuator	P

Note : Contact SAMJIN JMC for special applications such as high temperature or cryogenic services.

## GENERAL TERMS OF SALE

**GENERAL.** On the terms and subject to the conditions set forth, Seller agrees to sell to Buyer and Buyer agrees to buy from seller, the products or services specified in the sales contract agreement which includes Seller's offer.

**PRICE AND PAYMENT.** All sales are subject to approval of Seller's credit department. If Buyer fails to make a payment when due, Seller may withhold all subsequent deliveries until full payment is made and require such security as Seller deems appropriate to secure future payments. Full risk of loss shall pass to the Buyer upon delivery to FOB point or destination port in case of CIF, however, Seller retains title, for security purposes only, to all products until paid for in full in cash. Unless other terms are specified hereof, payment is due in U.S. dollars, thirty (30) days after invoice date or by Letter of Credit. Amounts not paid by Buyer on or before due date shall bear interest at the lesser rate of eighteen percent (18.0%) per annum or the maximum rate allowed by law from the due until paid. If delivery is delayed by or at the request of Buyer, the date of readiness for delivery shall be deemed date of delivery for invoice purposes and Seller may impose a storage charge.

**SHIPMENT.** Shipment dates offered are estimates and represent the date materials may be available. Shipment dates offered commence only after receipt of Buyer's Purchase Order, clarification of required technical information, resolution of engineering and/or commercial issues of customer's written drawings when required. Any product offered from stock is subject to prior sale.

**WARRANTY.** All Mcsys®Ball Valves are guaranteed against defects in workmanship for a period of twelve (12) months after being placed in service, but not exceeding eighteen (18) months after shipment, when products are properly installed and used within the service and pressure range for which they were manufactured. This guarantee is limited to replacement free of charge any parts found to be defective in material or workmanship. This liability does not extend to cost of labor, freight or any consequential charges. The unauthorized use of third party components and workmanship in Mcsys®Ball Valve products voids this warranty.

**CANCELLATION.** No order may be canceled by the Buyer except upon written notice to Seller and upon payment to Seller of all costs incurred by it arising out of, or in connection with, the order. Seller shall have the right to cancel any order or to refuse to ship or to shipment in the event

Buyer fails to submit payments when due or perform any other obligations of Buyer. Export of goods covered hereby is subject to Korean Government control. In the event a validated Export License is denied by the Korean Government, Buyer's order(s) will be immediately canceled and Buyer will be liable for the order value or actual costs incurred, whichever the greater.

**RETURN OF GOODS.** No product shall be returned to seller without written authorization and shipping instructions having been obtained from Seller. Products authorized for return are to be shipped freight prepaid to the FOB manufacture point and are subject to a restocking charge.

**LIMITATION OF LIABILITY.** The liability of Seller under this agreement or with respect to any products supplied or services performed pursuant to this agreement, whether in contract, in tort, in strict liability of otherwise, shall not exceed the purchase price paid by Buyer with respect thereto. In no event will Seller be liable in contract, in tort, in strict liability or otherwise for any special, indirect, incidental or consequential damages, including, but not limited to, loss of anticipated profits or revenue, loss of use, non-operation or increased expense of operation of equipment, cost of capital, or claims of customers of Buyer for failure or delay in achieving anticipated profits or products.



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