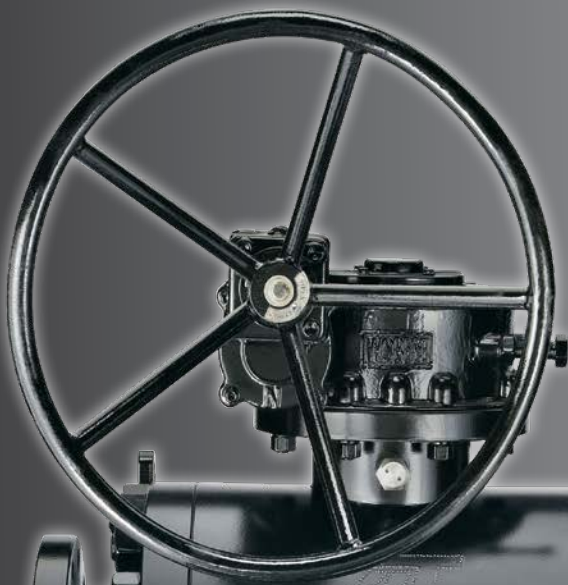


Trunnion Mounted Ball Valves

2 pc. Cast Soft Seat

3 pc. Forged Soft Seat

3 pc. Metal Seat



16
CL150
A105N
15E101773



Trunnion Mounted Valves Contents:

TS SERIES

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A-T Controls has been providing automated valve solutions for process industries since 1994. We have a 122,000 sq. ft. facility in Cincinnati, Ohio and a 68,000 sq. ft. facility in Houston, Texas. With strong engineering and application expertise, and an unparalleled inventory, A-T is ready to provide the highest quality quarter-turn valve packages from 1/4" – 48" in multiple end connections and port configurations.



TS2 Series

2" to 12" Cast, ANSI Class 150/300

2-Piece CAST SOFT Seated



TS3 Series

2" to 48" Forged
ANSI Class 150/300/600

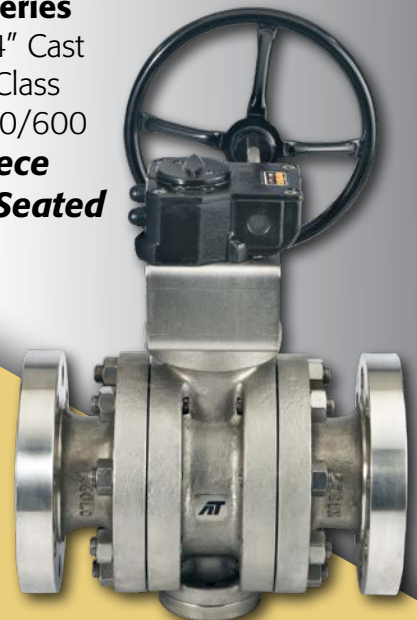
3-Piece FORGED SOFT Seated



TM3 Series

2" to 24" Cast
ANSI Class
150/300/600

3-Piece METAL Seated



SOFT SEAT

Valve Standards, Testing & Certifications

SOFT SEAT TRUNNION STANDARDS

DESIGN	API 6D, ASME B16.34, CSA Z245.15-13
END CONNECTIONS	Raised Face (RF), Ring Type Joint (RTJ), Butt Weld
TEMPERATURE RANGE	-50°F to 400°F
FACE-TO-FACE DIMENSION	API 6D, ASME B16.10
FLANGED DIMENSION	ASME B16.5
BODY PRESSURE TESTING	API 6D, ASME B16.34, API 598
SEAT LEAKAGE TESTING	API 6D, API 598
FIRE TESTING	API 607 Firesafe, 6th Edition
NACE	MR0175/MR0103
MOUNTING	ISO 5211
MARKING SYSTEM FOR VALVES	MSS SP-25, ISO 5209
SAFETY INTEGRITY	IEC 61508:2010; SIL 3
MATERIAL CERTIFICATION	EN 10204-3.1
QUALITY ASSURANCE	ISO 9001:2015; CE/PED 2014/68/EU
CANADA REGISTRATION	CRN on file

API 607 - 6th Edition
F I R E S A F E



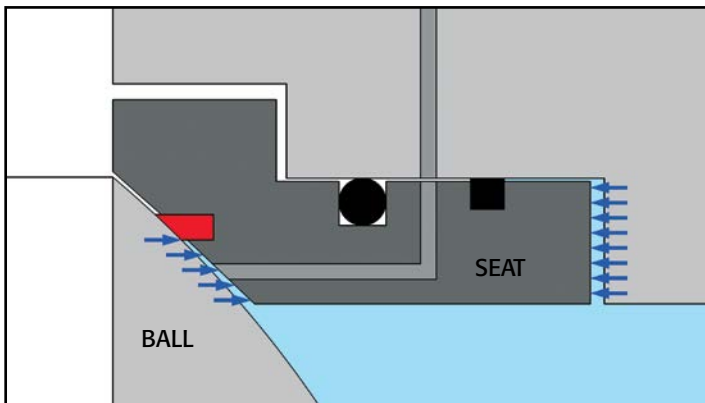
CE
0035



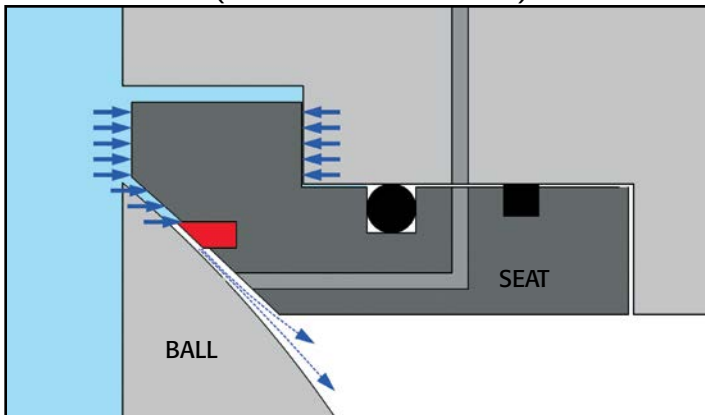
TRUNNION Mounted Ball Valve

Principle Features

SPE - PRESSURE AT THE SEAT UPSTREAM



SPE - PRESSURE AT THE SEAT DOWNSTREAM
(PRESSURE SELF-RELIEVING)

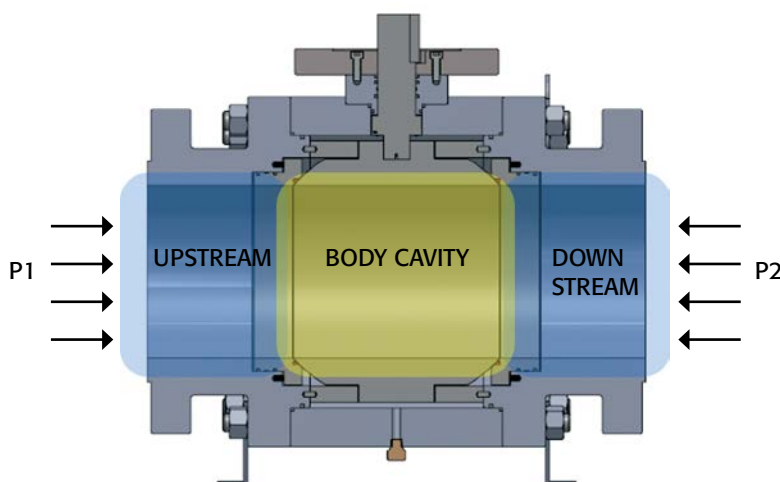


SINGLE PISTON Effect (SPE)/Self-Relieving Seats

Standard seat design is SPE seat or self-relieving seat with a soft seat insert. Under normal working conditions, the resultant pressure force pushes the seat against the ball to ensure a tight seal.

When the trapped pressure inside the body cavity is building up, it will push the seat away and relieve the pressure into the pipeline.

Double Block & Bleed



When pressure is applied to both closures, each seat will be forced against the ball, creating a double block. The vent in the main body can then be used to vent out the center cavity.

PRINCIPLE FEATURES

TRUNNION Mounted Ball Valve

DOUBLE PISTON Effect (DPE)/Double Isolation Block and Bleed

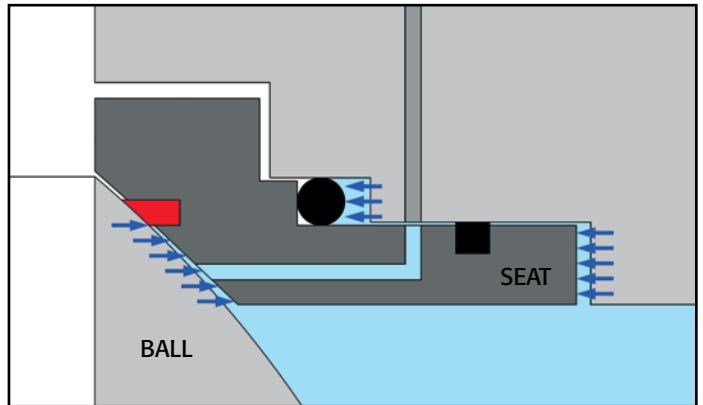
The DPE seat is an optional feature. The seat design comprises of a unique seal design that allows the seat to seal in both directions with the pressure either acting from the upstream or downstream of the seat.

When the pressure is applied from the upstream, the DPE seat works just like the SPE seat design.

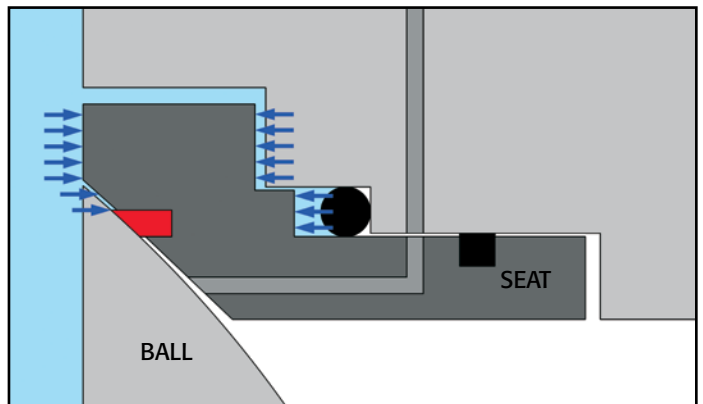
When the pressure is acting from the downstream or body cavity, the floating seal design allows the downstream pressure to push the seat against the ball.

Note that the DPE seat configuration does not have self-relieving capability, and it requires a pressure relief valve to be installed in order to avoid the pressure build up inside the body cavity.

DPE - PRESSURE AT THE SEAT UPSTREAM



DPE - PRESSURE AT THE SEAT DOWNSTREAM



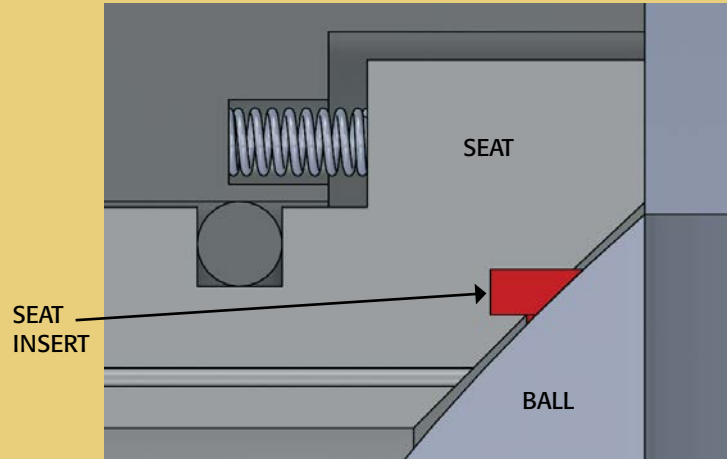
SOFT SEAT

Valve Features

Seat/Ball Sealing

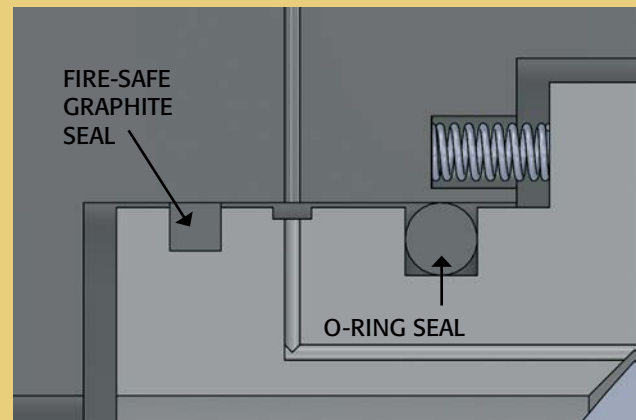
To reduce the operating torque, the seat is designed with a pressure assisted sealing mechanism coupled with seat springs to ensure a tight seal under very low differential pressure conditions.

The seat insert is made from a thermoplastic material and can be offered with a variety of materials for specific applications. Single Piston/SPE is standard. Double Piston/DPE is optional.



Seat/Body Sealing

Fire-safe seat design is a standard feature. The seat/body seal design includes a combination of soft seal and graphite seal.

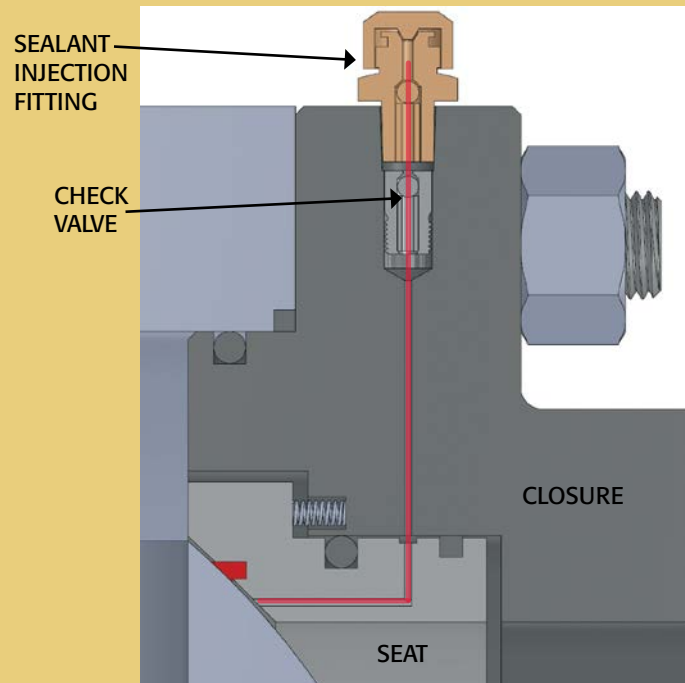


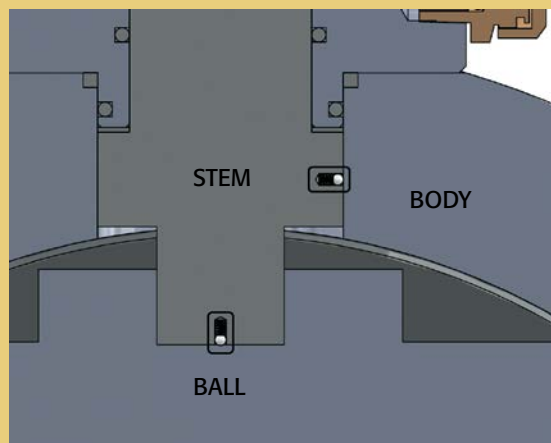
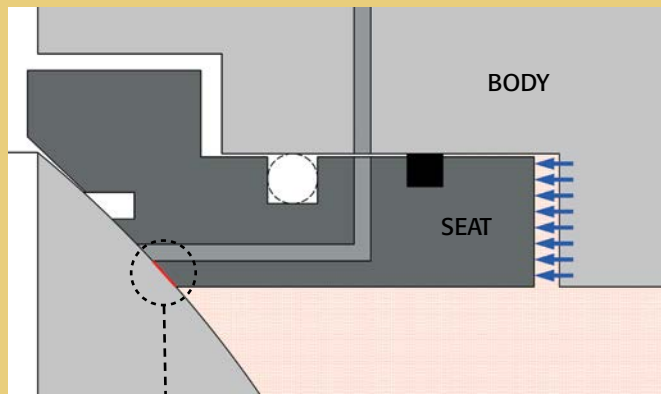
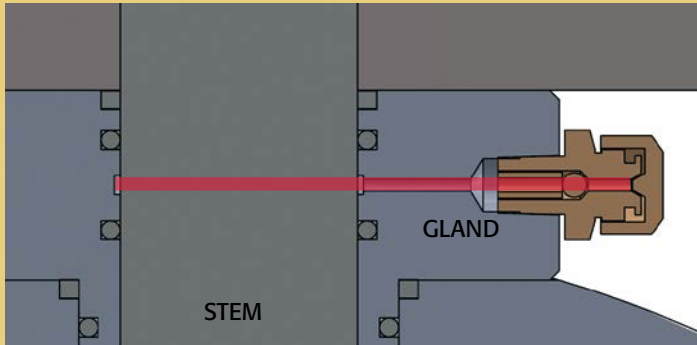
Emergency Seat Sealant Injection

Under normal operating conditions, A-T trunnion valves do not require sealants or lubricants. In the unlikely event that the seat gets damaged, an emergency shutoff may be achieved with a sealant injected into the seat sealing area.

SEALANT INJECTION FOR THE SEAT

- Requires a check valve
- Not available on smaller sizes (3"-4" CL 150/300)





Emergency Stem Sealing & Sealant Injection

Standard stem seal configuration consists of double O-Rings and a graphite seal ring. In the unlikely event that the soft seals get damaged, the seal can be restored by injecting valve sealant into the sealing area through the sealant fitting.

Fire-safe Metal Sealing After Fire

If the soft seat insert gets damaged due to fire, the seat is designed with a secondary sealing mechanism that allows a metal-to-metal contact between the seat and ball. This secondary metal sealing is a standard feature for all A-T soft-seated trunnion mounted ball valves.

Anti-Static Device

- Anti-static devices between
- Body and Stem
 - Stem and Ball

Paint Specification

- 4-5 mil Epoxy Primer
- 3-4 mil Epoxy Finish Coat (Black)
- Special paint available upon request

Additional Features

- Blowout Proof Stem
- ISO 5211 Actuator Mounting

Optional Features

- Regular Port
- Extended Bonnet
- Stem Extensions
- Pup Joints

End Connection Options

- Raised Face
- RTJ
- Butt Weld

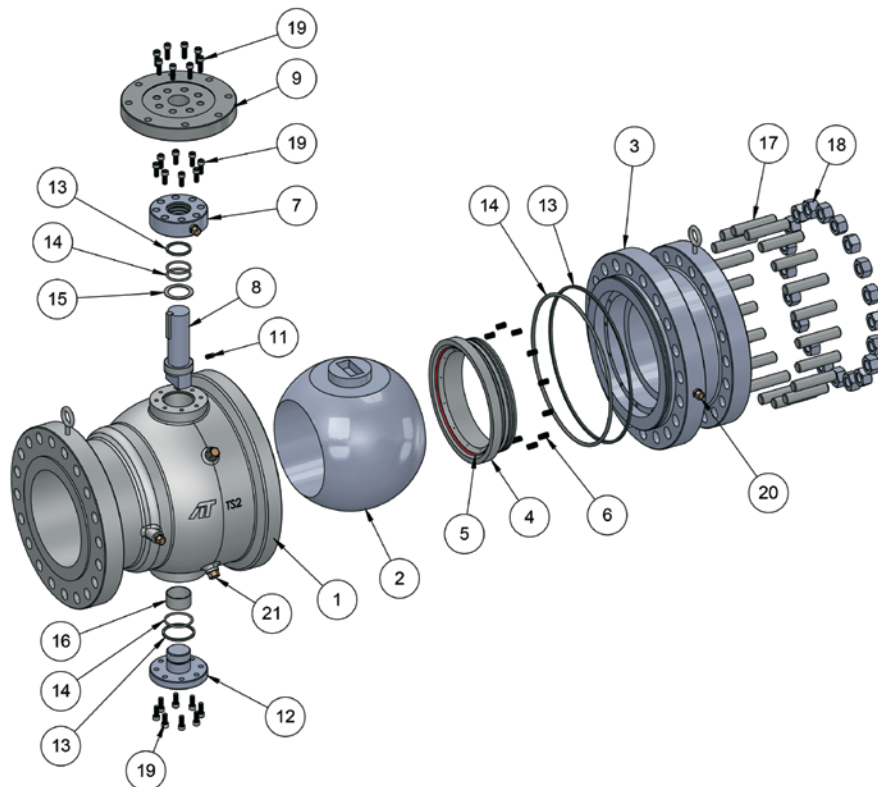
MATERIALS LIST

TRUNNION 2-PIECE DESIGN

NO.	PART NAME	TS2 Series		
		STEEL	LOW TEMP STEEL	STAINLESS STEEL
1	BODY	A216 WCB	A352 LCC	A351 CF8M
2	BALL	A105N	A350 LF2	A182 F316
3	CLOSURE	A216 WCB	A352 LCC	A351 CF8M/CF3M
4	SEAT RING	A105N	A350 LF2	A182 F316
5	SEAT INSERT	RTFE/Devlon®/PEEK	RTFE/Devlon®/PEEK	RTFE/Devlon®/PEEK
6	SPRING	Inconel® X750	Inconel® X750	Inconel® X750
7	BODY COVER	A105N	A350 LF2	A182 F316
8	STEM	A105N/4140	A350 LF2/4140	A182 F316
9	ADAPTER PLATE	A105N	A350 LF2	A182 F316
11	ANTI-STATIC DEVICE	Stainless Steel	Stainless Steel	Stainless Steel
12	LOWER TRUNNION	A105N	A350 LF2	A182 F316
13	FIRE-SAFE SEAL	Graphite	Graphite	Graphite
14	O-RING	FKM	HNBR (Low Temp)	FKM
15	THRUST WASHER	CS/TFE	SS/TFE	SS/TFE
16	BEARING	CS/TFE	SS/TFE	SS/TFE
17	STUD	A193 B7M	A320 L7M	A193 B8M
18	NUT	A194 2HM	A194 7M	A194 8M
19	CAP SCREW	A193 B7M	A320 L7M	A193 B8M
20	SEALANT FITTING	Stainless Steel	Stainless Steel	Stainless Steel
21	DRAIN VALVE	Stainless Steel	Stainless Steel	Stainless Steel

Standard materials subject to change without notice.

Seat Insert Note: RTFE is standard for 2-12"; Devlon® is standard for 14" and larger.



Forged

TS3
SERIES

SOFT SEAT

3-PC BILL OF MATERIALS

MATERIALS LIST

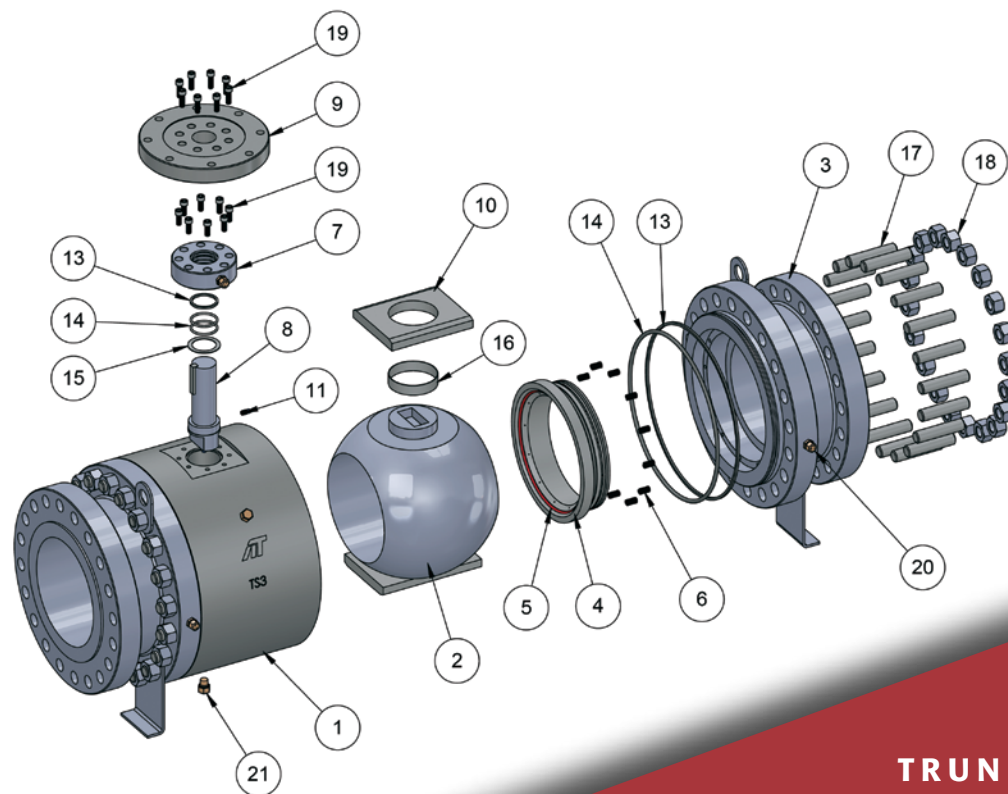
TRUNNION 3-PIECE DESIGN

NO.	PART NAME	TS3 Series		
		STEEL	LOW TEMP STEEL	STAINLESS STEEL
1	BODY	A105N	A350 LF2	A182 F316
2	BALL	A105N	A350 LF2	A182 F316
3	CLOSURE	A105N	A350 LF2	A182 F316/F316L*
4	SEAT RING	A105N	A350 LF2	A182 F316
5	SEAT INSERT	RTFE/Devlon®/PEEK	RTFE/Devlon®/PEEK	RTFE/Devlon®/PEEK
6	SPRING	Inconel® X750	Inconel® X750	Inconel® X750
7	BODY COVER	A105N	A350 LF2	A182 F316
8	STEM	A105N/4140	A350 LF2/4140	A182 F316
9	ADAPTER PLATE	A105N	A350 LF2	A182 F316
10	BEARING RETAINER	A105N	A350 LF2	A182 F316
11	ANTI-STATIC DEVICE	Stainless Steel	Stainless Steel	Stainless Steel
13	FIRE-SAFE SEAL	Graphite	Graphite	Graphite
14	O-RING	FKM/HNBR	HNBR (Low Temp)	FKM
15	THRUST WASHER	CS/TFE	SS/TFE	SS/TFE
16	BEARING	CS/TFE	SS/TFE	SS/TFE
17	STUD	A193 B7M	A320 L7M	A193 B8M
18	NUT	A194 2HM	A194 7M	A194 8M
19	CAP SCREW	A193 B7M	A320 L7M	A193 B8M
20	SEALANT FITTING	Stainless Steel	Stainless Steel	Stainless Steel
21	DRAIN VALVE	Stainless Steel	Stainless Steel	Stainless Steel

Standard materials subject to change without notice.

*F316L FOR WELDED END ONLY

Seat Insert Note: RTFE is standard for 2-12"; Devlon® is standard for 14" and larger.



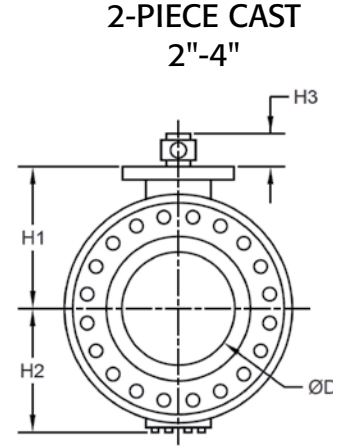
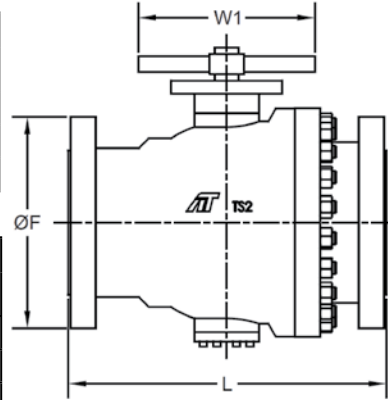
TRUNNION

2-PC Soft Seat Valve Dimensions

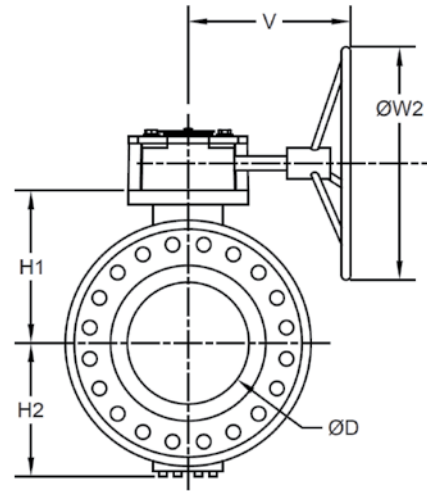
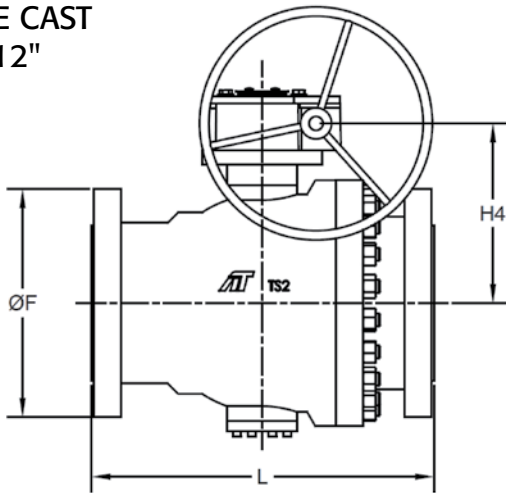
DIMENSIONS (IN)

150	SIZE	ØD	L			ØF	H1	H2	H3	W1	WEIGHT (Lb)
			RF	WE	RTJ						
	2"	1.94	7.00	8.50	7.50	6.00	5.08	3.74	0.75	12.00	40
	3"	2.94	8.00	11.13	8.50	7.50	5.77	4.41	0.75	12.00	79
	4"	3.94	9.00	12.00	9.50	9.00	6.89	5.75	1.20	27.50	119

300	SIZE	ØD	L			ØF	H1	H2	H3	W1	WEIGHT (Lb)
			RF	WE	RTJ						
	2"	1.94	8.50	8.50	9.13	6.50	5.08	3.75	0.75	2.00	43
	3"	2.94	11.13	11.13	11.75	8.25	5.75	4.45	0.77	2.00	95
	4"	3.94	12.00	12.00	12.63	10.00	6.89	5.75	1.20	27.50	150



2-PIECE CAST 6"-12"



150	SIZE	ØD	L			ØF	H1	H2	H4	ØW2	V	WEIGHT (Lb)
			RF	WE	RTJ							
	6"	5.94	15.50	18.00	16.00	11.00	9.11	7.70	11.16	12.00	10.00	221
	8"	7.94	18.00	20.50	18.50	13.50	11.28	9.50	13.33	12.00	10.00	395
	10"	9.94	21.00	22.00	21.50	16.00	12.78	11.32	14.78	16.00	11.25	650
	12"	11.94	24.00	25.00	24.50	19.00	14.50	13.00	16.52	16.00	11.25	1,131

300	SIZE	ØD	L			ØF	H1	H2	H4	ØW2	V	WEIGHT (Lb)
			RF	WE	RTJ							
	6"	5.94	15.88	18.00	16.50	12.50	9.11	7.70	11.16	12.00	10.00	357
	8"	7.94	19.75	20.50	20.38	15.00	11.28	9.50	13.37	16.00	11.25	571
	10"	9.94	22.38	22.00	23.00	17.50	12.78	11.32	16.52	18.00	14.00	726
	12"	11.94	25.50	25.00	26.13	20.50	14.50	13.03	16.59	20.00	15.75	1,207

Forged

TS3
SERIES

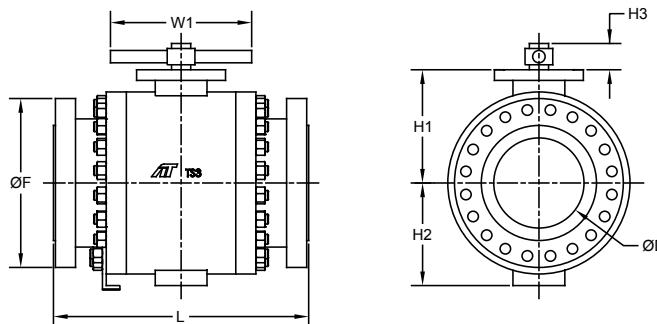
SOFT SEAT

3-PC Soft Seat Valve Dimensions

3-PIECE FORGED 2"-4" Class 150/300 2"-3" Class 600

150	SIZE	ØD	L			ØF	H1	H2	H3	W1	WEIGHT (Lb)
			RF	WE	RTJ						
	2"	1.94	7.00	8.50	7.50	6.00	4.84	3.54	0.75	11.8	45
	3"	2.94	8.00	11.13	8.50	7.50	5.51	4.21	0.75	11.8	67
	4"	3.94	9.00	12.00	9.50	9.00	6.61	5.47	1.20	17.7	120

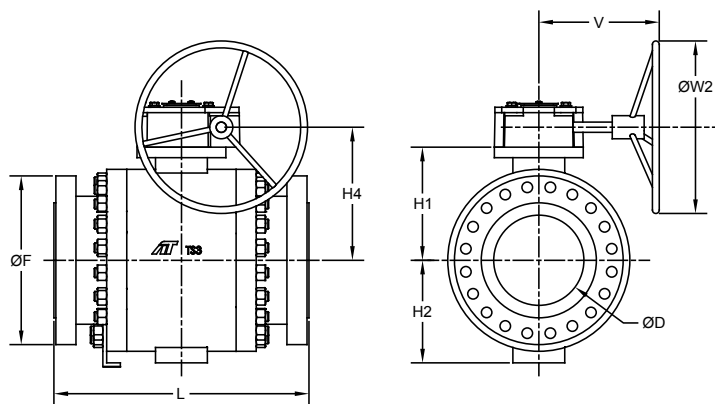
300	SIZE	ØD	L			ØF	H1	H2	H3	W1	WEIGHT (Lb)
			RF	WE	RTJ						
	2"	1.94	8.50	8.50	9.13	6.50	4.84	3.54	0.75	11.8	53
	3"	2.94	11.13	11.13	11.75	8.25	5.53	4.27	0.77	17.7	97
	4"	3.94	12.00	12.00	12.63	10.00	6.61	5.47	1.20	17.7	168



600	SIZE	ØD	L			ØF	H1	H2	H3	W1	WEIGHT (Lb)
			RF	WE	RTJ						
	2"	1.94	11.50	11.50	11.63	6.50	4.88	3.62	0.77	21.7	76
	3"	2.94	14.00	14.00	14.13	8.25	5.91	4.76	1.20	27.6	145

3-PIECE FORGED 6"-36" Class 150/300, 4"-36" Class 600

150	SIZE	D	L			ØF	H1	H2	H4	ØW2	V	WEIGHT (Lb)
			RF	WE	RTJ							
	6"	5.94	15.50	18.00	16.00	11.00	9.27	8.66	11.32	12.0	10.00	370
	8"	7.94	18.00	20.50	18.50	13.50	11.38	10.63	13.43	12.0	10.00	630
	10"	9.94	21.00	22.00	21.50	16.00	13.15	12.20	15.16	16.0	11.25	1,050
	12"	11.94	24.00	25.00	24.50	19.00	14.72	13.75	16.75	16.0	11.25	1,506
	14"	13.19	27.00	30.00	27.50	21.00	15.79	16.75	20.31	20.0	18.50	2,205
	16"	15.19	30.00	33.00	30.50	23.50	17.44	18.70	22.24	20.0	18.50	2,954
	18"	17.19	34.00	36.00	34.50	25.00	18.80	20.67	23.60	20.0	18.50	3,583
	20"	19.19	36.00	39.00	36.50	27.50	20.57	22.44	25.38	24.0	18.50	4,850
	24"	23.19	42.00	45.00	42.50	32.00	24.15	26.38	30.06	24.0	19.75	7,518
	30"	28.94	51.00	55.00	---	38.75	28.78	28.94	35.94	28.0	24.00	13,228
	36"	34.44	60.00	68.00	---	46.00	32.95	32.87	40.91	32.0	27.18	20,723



300	SIZE	D	L			ØF	H1	H2	H4	ØW2	V	WEIGHT (Lb)
			RF	WE	RTJ							
	6"	5.94	15.88	18.00	16.50	12.50	9.27	8.66	11.32	12.0	10.00	420
	8"	7.94	19.75	20.50	20.38	15.00	11.38	10.63	13.46	16.0	11.25	717
	10"	9.94	22.38	22.00	23.00	17.50	13.15	12.20	16.89	18.0	14.00	1,125
	12"	11.94	25.50	25.00	26.13	20.50	14.72	13.78	16.81	20.0	15.75	1,628
	14"	13.19	30.00	30.00	30.63	23.00	15.79	16.73	20.59	24.0	18.50	2,370
	16"	15.19	33.00	33.00	33.63	25.50	17.44	18.70	23.39	24.0	20.88	3,274
	18"	17.19	36.00	36.00	36.63	28.00	19.11	20.67	25.06	28.0	20.88	4,321
	20"	19.19	39.00	39.00	39.75	30.50	20.89	22.83	27.30	28.0	20.63	5,952
	24"	23.19	45.00	45.00	45.88	36.00	24.47	26.38	31.63	28.0	24.00	8,863
	30"	28.94	55.00	55.00	56.00	43.00	29.17	29.37	37.13	32.0	27.18	15,432
	36"	34.44	68.00	68.00	69.13	50.00	33.62	33.39	41.89	32.0	28.38	24,692

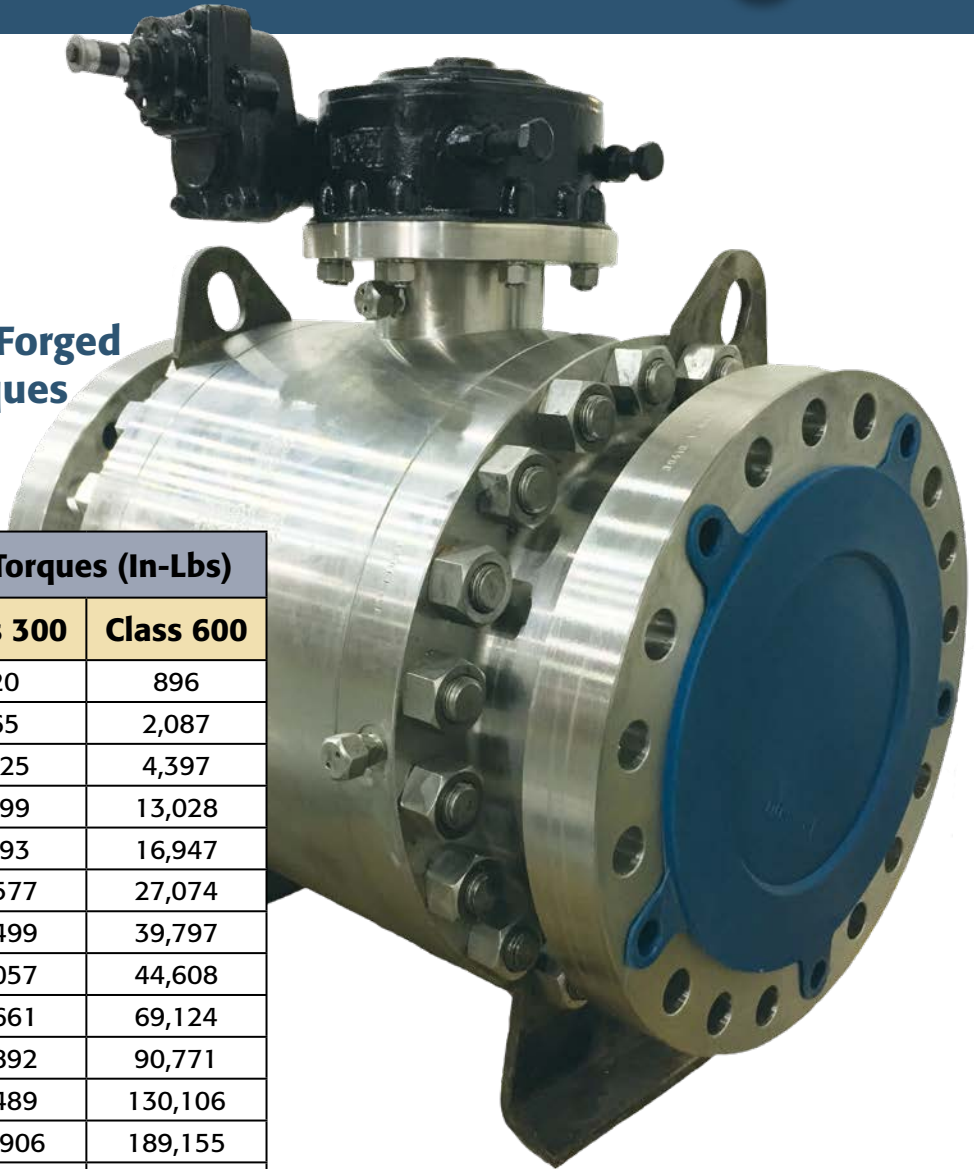
600	SIZE	D	L			ØF	H1	H2	H4	ØW2	V	WEIGHT (Lb)
			RF	WE	RTJ							
	4"	3.94	17.00	17.00	17.13	10.75	7.20	5.83	8.86	12.0	10.00	300
	6"	5.94	22.00	22.00	22.13	14.00	9.92	9.06	12.01	16.0	11.25	615
	8"	7.94	26.00	26.00	26.13	16.50	11.87	11.02	13.96	20.0	15.75	1,091
	10"	9.94	31.00	31.00	31.13	20.00	13.48	12.80	18.29	20.0	18.50	1,720
	12"	11.94	33.00	33.00	33.13	22.00	15.28	14.96	20.08	24.0	18.50	2,458
	14"	13.19	35.00	35.00	35.13	23.75	16.36	17.13	22.30	28.0	20.88	3,109
	16"	15.19	39.00	39.00	39.13	27.00	18.01	19.49	24.43	28.0	21.50	4,222
	18"	17.19	43.00	43.00	43.13	29.25	20.49	21.65	27.66	28.0	24.00	5,886
	20"	19.19	47.00	47.00	47.25	32.00	22.15	23.82	30.33	30.0	26.00	7,760
	24"	23.19	55.00	55.00	55.38	37.00	25.31	27.17	33.66	32.0	27.18	11,729
	30"	28.94	65.00	65.00	65.50	44.50	30.08	30.00	38.35	32.0	28.25	19,621
	36"	34.44	82.00	82.00	82.63	51.75	34.65	34.65	45.75	32.0	31.50	32,011

Dimensions subject to change without notice.

TRUNNION

2-Piece Cast and 3-Piece Forged Soft-Seat TRUNNION Torques

Series TS2 & TS3 Torques
(with standard seats)



SIZE (NPS)	Break to OPEN Torques (In-Lbs)		
	Class 150	Class 300	Class 600
2"	354	620	896
3"	672	865	2,087
4"	875	1,425	4,397
6"	3,369	4,499	13,028
8"	6,005	9,293	16,947
10"	11,285	15,577	27,074
12"	13,453	28,499	39,797
14"	15,807	32,057	44,608
16"	22,658	42,661	69,124
18"	29,278	52,892	90,771
20"	41,244	82,489	130,106
24"	97,834	129,906	189,155
28"	102,669	182,325	261,097
30"	163,159	228,830	340,242
32"	128,336	245,166	355,844
36"	216,331	296,631	416,658
40"	226,668	364,208	620,897
42"	252,352	401,116	720,026
46"	CF	CF	CF
48"	CF	CF	CF

Notes:

1. Torques are tested by clean water at full differential pressure, based on carbon steel trim and standard seats.
2. Torques are based on SPE (Single Piston Effect) seats.
3. Contact factory for DPE (Double Piston Effect) seat option.
4. Torque values include a 15% safety factor.
5. For regular port, use dimensions of ball diameter.
6. Contact factory for other safety factors for different operating conditions.

Cast & Forged

SOFT SEAT

Soft Seat Valve Technical Data

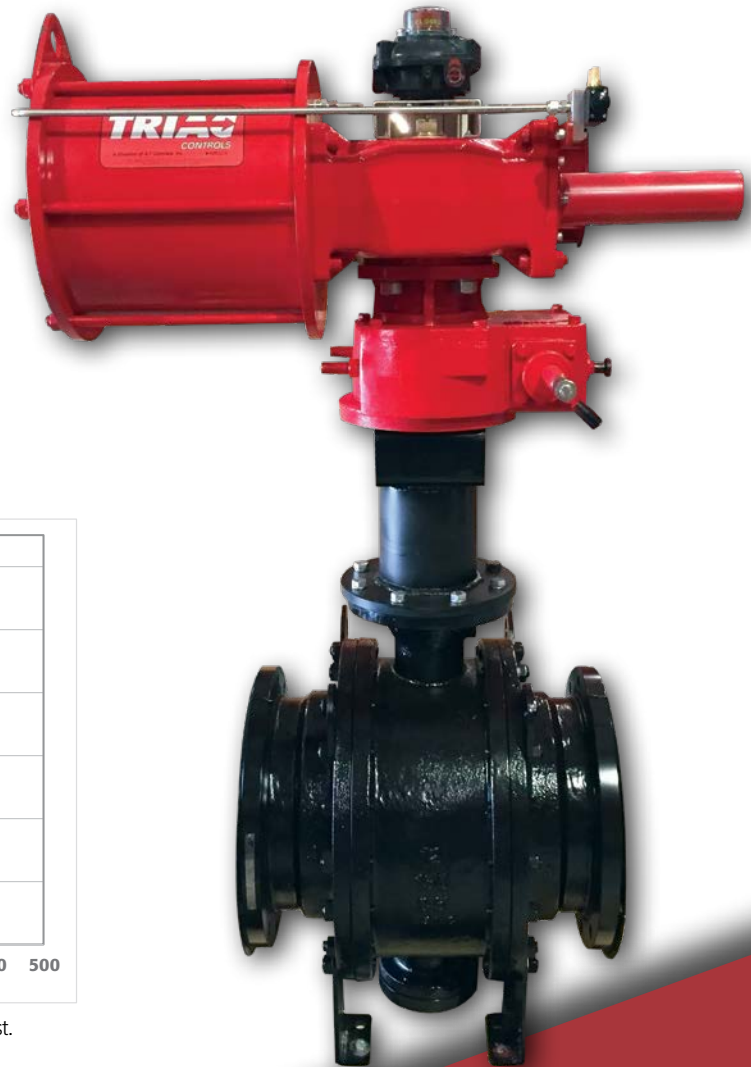
Cv VALUES

Valve Size	Class 150	Class 300	Class 600
2"	420	420	350
3" x 2"	220	210	190
3"	1,290	1,050	1,000
4" x 3"	630	600	560
4"	2,350	2,000	1,850
6" x 4"	855	830	800
6"	5,249	5,186	4,400
8" x 6"	2,400	2,398	2,150
8"	10,250	10,250	8,450
10" x 8"	5,000	5,000	4,500
10"	16,775	16,775	14,250
12" x 10"	8,200	8,200	8,000
12"	24,250	24,250	22,790
14"	30,600	30,600	28,600
16" x 12"	9,130	9,130	9,010
16"	40,700	40,700	39,250
18"	52,500	51,450	52,000
20"	66,000	62,700	62,500
24" x 20"	29,000	28,850	28,750
24"	103,500	100,150	99,000
30"	159,300	151,700	148,900
36"	228,300	223,050	226,300

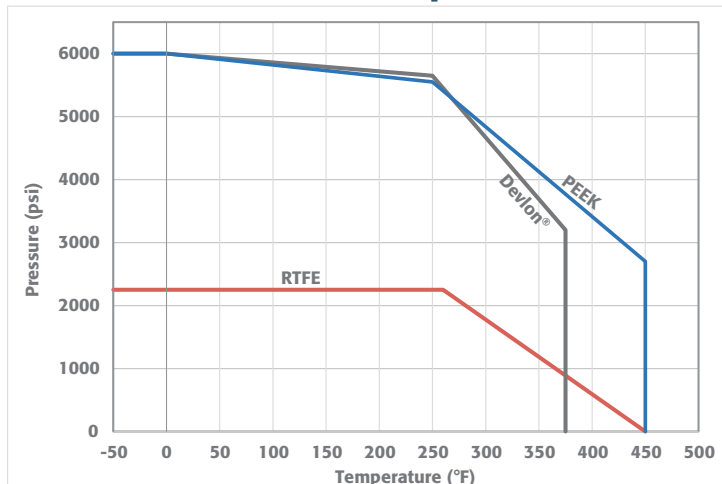
O-RING SEAL OPTIONS

Material	Operating Temp. (°F)	Short Term Temp. (°F)
EPDM	-40° ~ 280°	-50° ~ 300°
HNBR	-30° ~ 275°	-40° ~ 300°
HNBR AED	-40° ~ 280°	-58° ~ 300°
FKM	5° ~ 428°	-4° ~ 480°
FKM AED	5° ~ 390°	-4° ~ 480°

Note: For specific operating conditions or low temp capabilities, consult factory for other seal options.



Soft Seat TRUNNION Pressure vs. Temperature



Note: Additional material options may be available upon request.

TM3

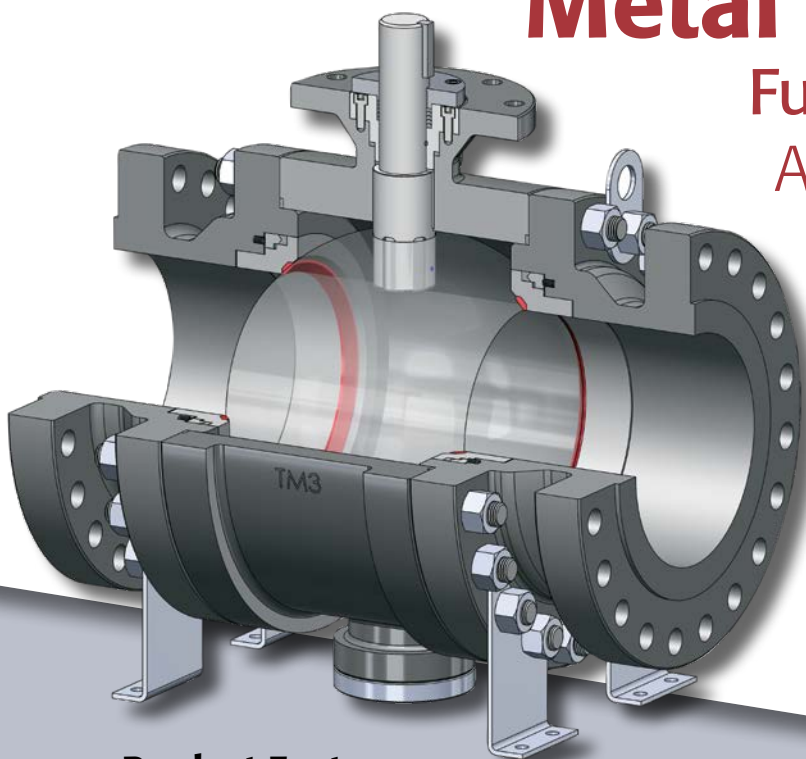
SERIES

METAL SEAT

Valve Features

TRUNNION Mounted Metal Seat Ball Valve

Full Bore 3-piece Flanged ANSI Class 150/300/600



Series TM3 metal seated valves are designed in accordance with the leading industry standards such as API 6D, API 598 and ASME B16.34.

To ensure product reliability, the valve designs are validated by actual prototype testing that includes a high cycle testing.

The valves are produced by employing state-of-the-art manufacturing technology and under strict quality control standards.

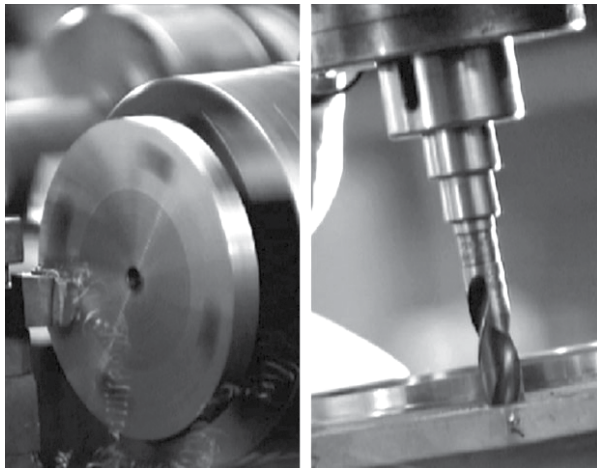
Product Features

- Bi-directional metal seat design
- Standard SPE (Single Piston Effect) metal seat design with self-relieving features
- DPE (Double Piston Effect) metal seat design is available*
- Metal seat hard face coatings are available in Stellite®, Tungsten Carbide or Chrome Carbide options.
- Standard metal seat leakage rating is in compliance with ANSI/FCI-70-2 Class V for Stellite® seats. Class VI is standard for Tungsten Carbide and Chrome Carbide coated seats.
- Standard splined stem connection (6" and larger)
- Standard graphite stem packing design
- Trunnion mounted ball valve design for high pressure applications
- Anti-blowout stem design
- Anti-static design
- Fire-safe design in accordance with API 6FA
- ISO 5211 mounting design
- Optional drain plug and body purge device available

Valve Standards, Testing & Certifications

API 6FA
FIRE SAFE

METAL SEAT TRUNNION MOUNTED VALVE STANDARDS



DESIGN	API 6D, ASME B16.34
END CONNECTIONS	Raised Face (RF), Ring Type Joint (RTJ)
TEMPERATURE RANGE	-50°F to 932°F (<i>higher on application</i>)
FACE-TO-FACE DIMENSION	ANSI/ASME B16.10
FLANGED DIMENSION	ANSI/ASME B16.5
BODY PRESSURE TESTING	ANSI/ASME B16.34, API 598, API 6D
SEAT LEAKAGE TESTING	ANSI/FCI 70-2
FIRE TESTING	API 6FA and ISO 10497
MOUNTING	ISO 5211
MARKING SYSTEM	MSS SP-25, MSS SP-55
SAFETY INTEGRITY	SIL 3
FUGITIVE EMISSIONS	Certified to ISO 15848-1 (<i>up to 14"</i>)
MATERIAL CERTIFICATION	EN 10204-3.1
QUALITY ASSURANCE	ISO 9001:2015

A-T Series TM3 trunnion mounted ball valves are designed for severe service applications such as high temperature and corrosive environments. The ball and the metal seat contact surfaces are coated with wear resistant materials by HVOF (High Velocity Oxygen Fuel) thermal spraying process. The HVOF coating method is a high-velocity, low-temperature coating process which can provide a strong metal bonding and with minimal impact to the metal deformation.



Ball	Seat	Max Temperature	Typical Applications	Shutoff Class
Tungsten Carbide Coated 316SS	Tungsten Carbide Coated 316SS	842°F (450°C)	High temperature environment. Corrosive, high wearing, and abrasive applications.	VI
Chrome Carbide Coated 316SS	Chrome Carbide Coated 316SS	932°F (500°C)	Excellent for high temperature or hot gas environments. Cavitation and high wearing applications.	VI
316/HCr	316/Stellite®	661°F (350°C)	High-pressure and high-temperature conditions.	V

TM3 SERIES

METAL SEAT

Valve Features



Standard Design

Anti-Blowout Stem Design

Stem is retained by the body cover when the valve is under pressure.

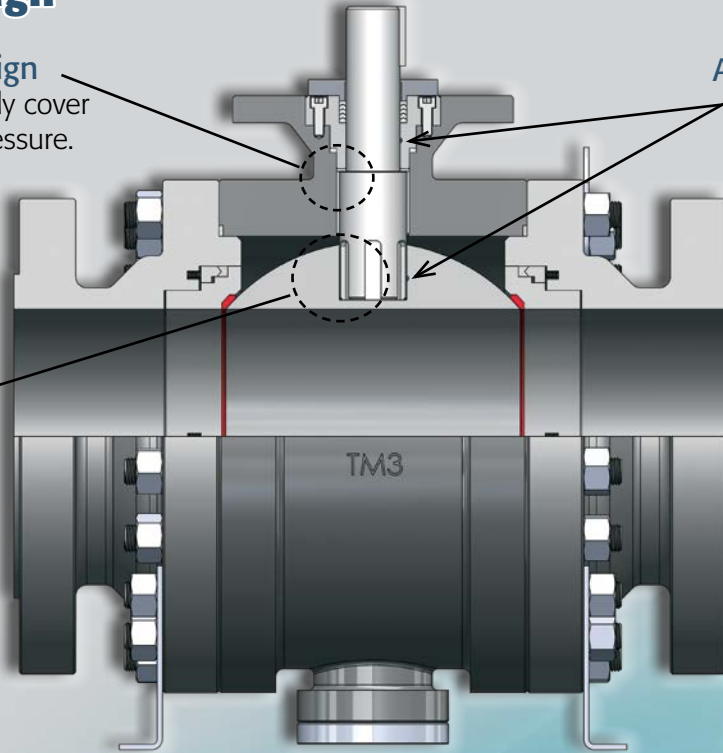
Anti-Static Device

Anti-static devices between

- Body and Stem
- Stem and Ball

Splined Stem/Ball Connection

Splined connection for a greater torque transmitting capacity.

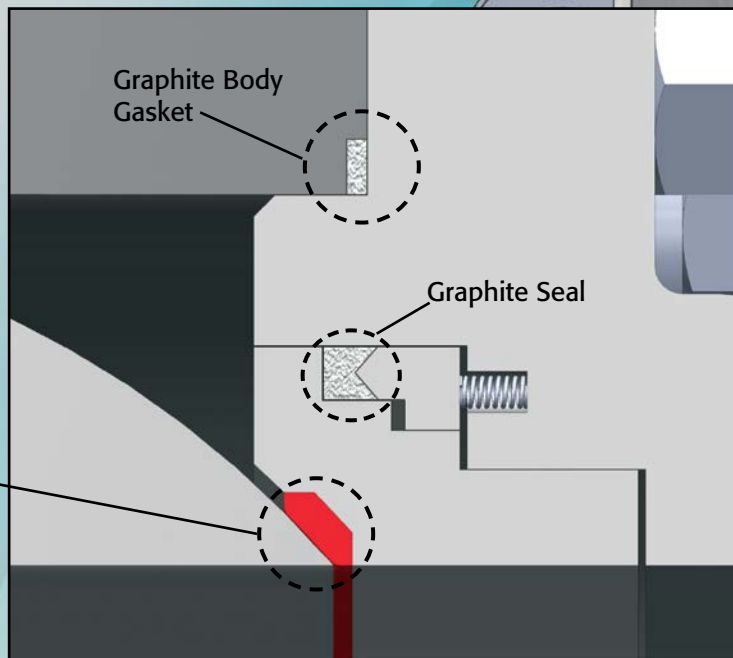


Standard Fire-safe Design

Graphite Body Gasket

Graphite Seal

Bi-directional metal seat design with various hard face coating options.

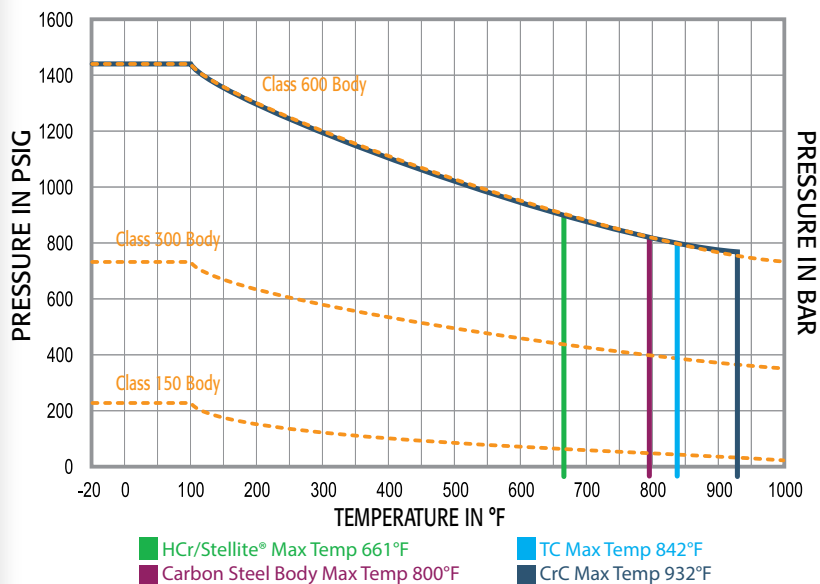


TM3 SERIES Technical Data

Cv VALUES

Size	Cv Value
2"	501
3"	1,158
4"	2,118
6"	5,074
8"	9,337
10"	14,590
12"	21,802
14"	29,675
16"	38,760
18"	51,058
20"	63,035
24"	90,770

Pressure vs. Temperature Chart
TM3 Trunnion Mounted Valves 2" to 24"



NOTE: Dotted line shows the rating for valve body. Solid line shows the rating for valve seat. Both ratings need to be considered when determining the limitation of the valve for specific application. Consult factory for other seat materials.



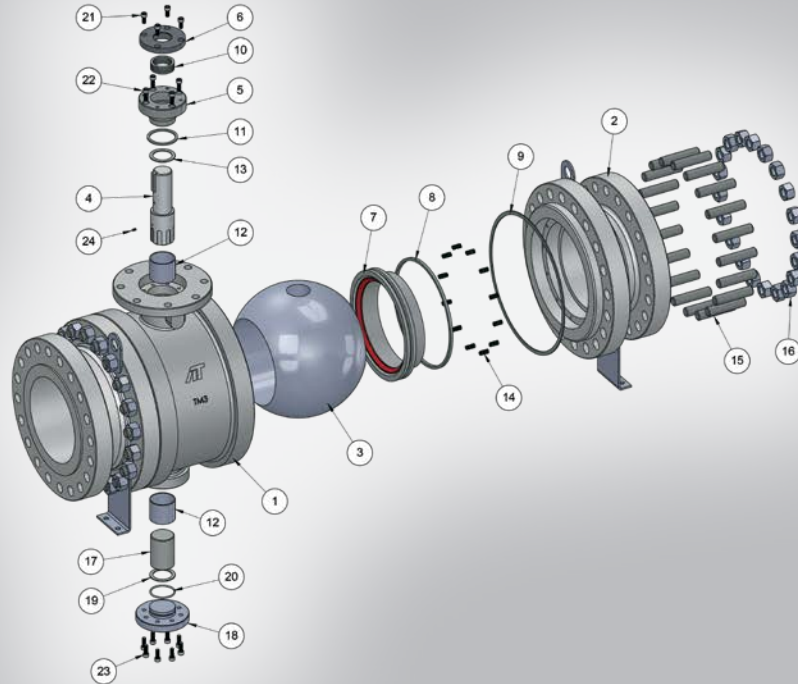
TM3 SERIES

METAL SEAT

TRUNNION Mounted 3-PC Valve

metal

TM3 Series
2"-14"



MATERIALS LIST		CARBON STEEL			STAINLESS STEEL		
		STELLITE® SEAT	TUNGSTEN CARBIDE	CHROME CARBIDE	STELLITE® SEAT	TUNGSTEN CARBIDE	CHROME CARBIDE
SEAT HARD FACE OPTION		STELLITE® SEAT	TUNGSTEN CARBIDE	CHROME CARBIDE	STELLITE® SEAT	TUNGSTEN CARBIDE	CHROME CARBIDE
OPERATING TEMP. RANGE		-20°F - 661°F	-20°F - 800°F	-20°F - 800°F	-50°F - 661°F	-50°F - 842°F	-50°F - 932°F
NO.	PART NAME						
1	BODY	A216 WCB			A351 CF8M		
2	CLOSURE	A216 WCB			A351 CF8M		
3	BALL	A351 CF8M + HCr	A351 CF8M + TC	A351 CF8M + CrC	A351 CF8M + HCr	A351 CF8M + TC	A351 CF8M + CrC
4	STEM	A564 17-4 PH	XM-19	XM-19	XM-19	XM-19	XM-19
5	BODY COVER	A216 WCB			A351 CF8M		
6	GLAND PLATE	A216 WCB			A351 CF8M		
7	SEAT ASSEMBLY	A351 CF8M + Stellite®	A351 CF8M + TC	A351 CF8M + CrC	A351 CF8M + Stellite®	A351 CF8M + TC	A351 CF8M + CrC
8	SEAT RING SEAL	GRAPHITE					
9	BODY GASKET	STAINLESS STEEL + GRAPHITE					
10	GLAND PACKING	GRAPHITE					
11	GLAND SEAL	GRAPHITE					
12	STEM BEARING	STAINLESS STEEL					
13	STEM THRUST WASHER	STAINLESS STEEL					
14	SEAT SPRING	INCONEL® X750					
15	STUD	A193 Gr B7			A193 Gr B8		
16	NUT	A194 Gr 2H			A194 Gr 8		
17	TRUNNION STEM	A564 17-4 PH	XM-19	XM-19	XM-19	XM-19	XM-19
18	LOWER COVER	A216 WCB			A351 CF8M		
19	TRUNNION STEM WASHER	STAINLESS STEEL					
20	TRUNNION STEM GASKET	GRAPHITE					
21	CAP SCREW	STAINLESS STEEL					
22	CAP SCREW	STAINLESS STEEL					
23	CAP SCREW	STAINLESS STEEL					

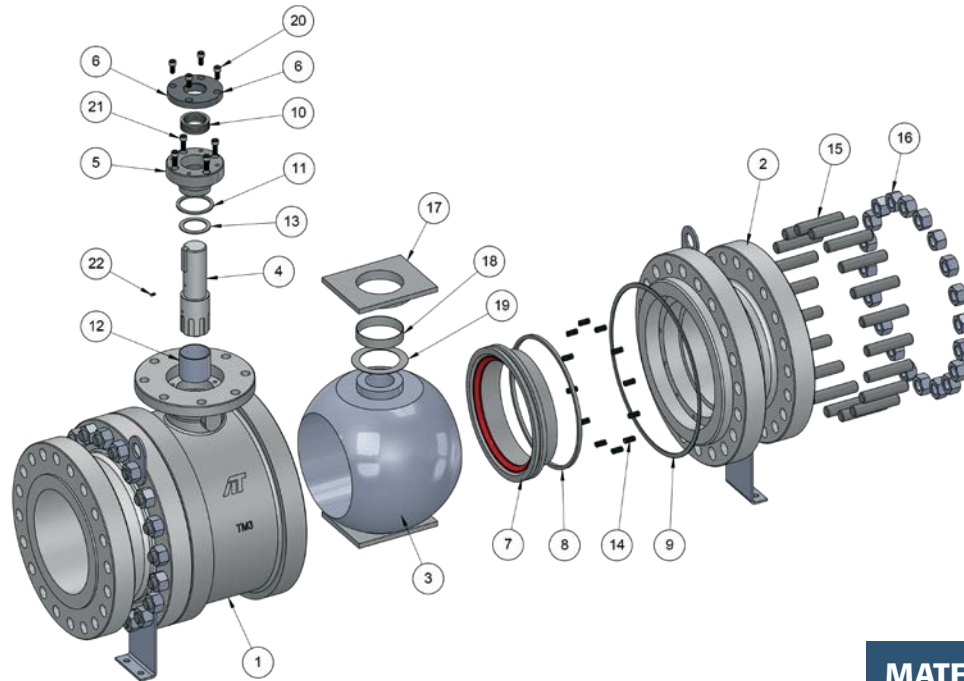
seated

TM3 SERIES

METAL SEAT

TRUNNION Mounted 3-PC Valve

TM3 Series
16"-24"



MATERIALS LIST

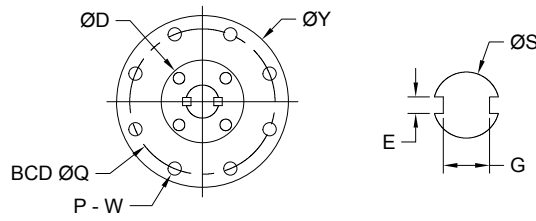
SEAT HARD FACE OPTION	CARBON STEEL			STAINLESS STEEL		
	STELLITE® SEAT	TUNGSTEN CARBIDE	CHROME CARBIDE	STELLITE® SEAT	TUNGSTEN CARBIDE	CHROME CARBIDE
OPERATING TEMP. RANGE	-20°F - 661°F	-20°F - 800°F	-20°F - 800°F	-50°F - 661°F	-50°F - 842°F	-50°F - 932°F
NO.	PART NAME					
1	BODY			A216 WCB		
2	CLOSURE			A216 WCB		
3	A351 CF8M + HCr	A351 CF8M + TC	A351 CF8M + CrC	A351 CF8M + HCr	A351 CF8M + TC	A351 CF8M + CrC
4	STEM		XM-19	XM-19		
5	BODY COVER			A216 WCB		
6	GLAND PLATE			A216 WCB		
7	A351 CF8M + Stellite®	A351 CF8M + TC	A351 CF8M + CrC	A351 CF8M + Stellite®	A351 CF8M + TC	A351 CF8M + CrC
8	SEAT RING SEAL					
9	BODY GASKET					
10	GLAND PACKING					
11	GLAND SEAL					
12	STEM BEARING					
13	STEM THRUST WASHER					
14	SEAT SPRING					
15	STUD			A193 Gr B7		
16	NUT			A194 Gr 2H		
17	BEARING RETAINER			A216 WCB		
18	BEARING					
19	THRUST WASHER					
20	CAP SCREW					
21	CAP SCREW					

HCr = Hard Chrome Plated; TC = Tungsten Carbide; CrC = Chrome Carbide

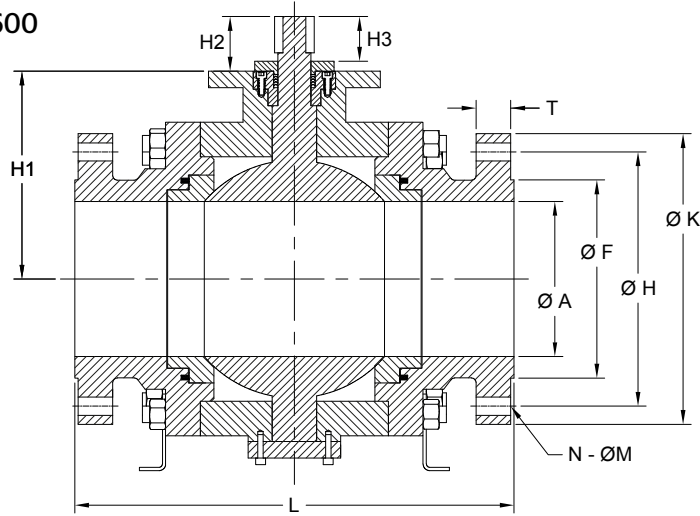
TM3 SERIES

3-PC Metal Seated Valve Dimensions

METAL SEAT



TM3 Series (2"-14")
ANSI Class 150/300/600

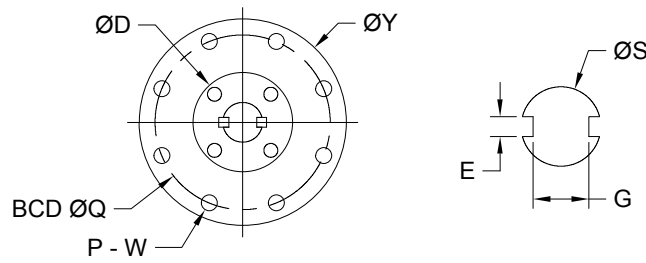


DIMENSIONS (IN)

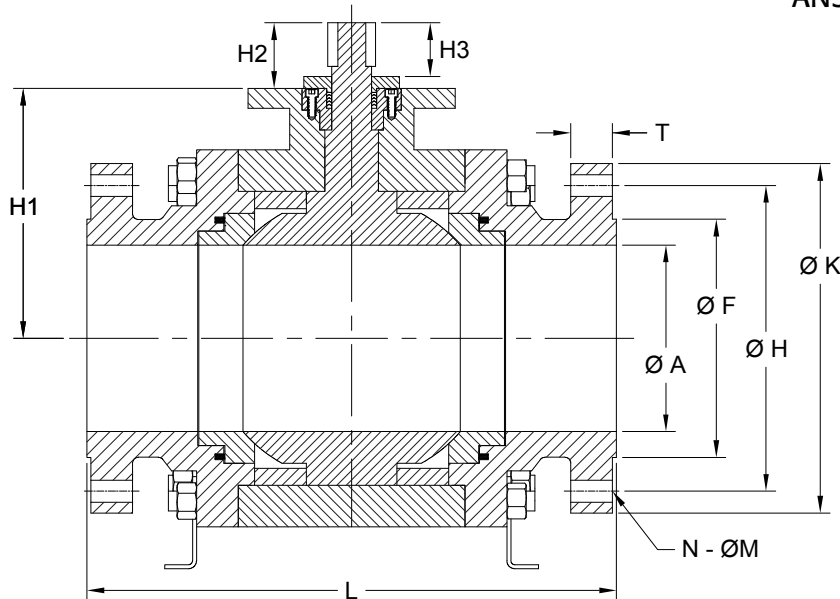
SIZE	DIMENSIONS (IN)																				WEIGHT (Lb)
	A	F	H	K	M	N	L	T	H1	H2	H3	S	E	G	Q	W	P	Y	D		
150	2"	2.00	3.62	4.74	5.98	0.75	4	7.01	0.63	4.59	2.36	1.57	1.063	0.315	0.669	4.02	M10	4	5.12	2.87	38
	3"	3.00	5.00	6.00	7.48	0.75	4	7.99	0.75	6.12	2.40	1.57	1.429	0.394	1.035	4.02	M10	4	5.12	3.35	68
	4"	4.00	6.18	7.50	9.02	0.75	8	9.02	0.94	7.13	3.31	2.36	1.575	0.394	1.181	4.92	M12	4	6.02	3.94	112
	6"	5.91	8.50	9.51	10.98	0.88	8	15.51	1.00	9.25	3.58	2.76	1.890	0.551	1.457	6.50	M20	4	8.27	4.92	262
	8"	7.91	10.63	11.75	13.50	0.88	8	17.99	1.13	11.81	3.94	2.95	2.362	0.709	1.811	6.50	M20	4	8.27	5.04	462
	10"	9.92	12.76	14.25	15.98	1.00	12	20.98	1.19	13.39	3.94	2.95	2.362	0.709	1.811	6.50	M20	4	8.27	5.04	700
	12"	11.93	15.00	17.01	19.02	1.00	12	24.33	1.25	15.94	4.72	3.74	2.756	0.787	2.126	10.00	M16	8	11.42	6.14	1,078
14"	13.15	16.26	18.76	20.98	1.13	12	27.01	1.38	17.26	5.75	4.33	2.953	0.787	2.323	10.00	M16	8	11.42	6.69	1,386	

SIZE	DIMENSIONS (IN)																				WEIGHT (Lb)
	A	F	H	K	M	N	L	T	H1	H2	H3	S	E	G	Q	W	P	Y	D		
300	2"	2.00	3.62	5.00	6.50	0.75	8	8.50	0.88	4.59	2.36	1.57	1.063	0.315	0.669	4.02	M10	4	5.12	2.87	47
	3"	3.00	5.00	6.61	8.27	0.88	8	11.10	1.13	6.12	2.40	1.57	1.429	0.394	1.035	4.02	M10	4	5.12	3.35	103
	4"	4.00	6.18	7.87	10.00	0.88	8	12.01	1.25	7.13	3.31	2.36	1.575	0.394	1.181	4.92	M12	4	6.02	3.94	165
	6"	5.91	8.50	10.63	12.52	0.88	12	15.87	1.44	9.25	3.58	2.76	1.890	0.551	1.457	6.50	M20	4	8.27	4.92	330
	8"	7.91	10.63	12.99	15.00	1.00	12	19.76	1.63	11.81	3.94	2.95	2.362	0.709	1.811	6.50	M20	4	8.27	5.04	591
	10"	9.92	12.76	15.26	17.48	1.13	16	22.36	1.88	13.39	3.94	2.95	2.362	0.709	1.811	10.00	M16	8	11.42	5.04	950
	12"	11.93	15.00	17.76	20.51	1.25	16	25.51	2.00	15.94	4.72	3.74	2.756	0.787	2.126	10.00	M16	8	11.42	6.14	1,445
14"	13.15	16.26	20.26	22.99	1.25	20	30.00	2.13	17.26	5.75	4.33	2.953	0.787	2.323	10.00	M16	8	11.42	6.69	1,881	

SIZE	DIMENSIONS (IN)																				WEIGHT (Lb)
	A	F	H	K	M	N	L	T	H1	H2	H3	S	E	G	Q	W	P	Y	D		
600	2"	2.00	3.62	5.00	6.50	0.75	8	11.50	1.25	4.59	2.36	1.57	1.063	0.315	0.669	4.02	M10	4	5.12	2.87	62
	3"	3.00	5.00	6.61	8.27	0.88	8	14.02	1.50	6.12	2.40	1.57	1.429	0.394	1.035	4.02	M10	4	5.12	3.35	136
	4"	4.00	6.18	8.50	10.75	1.00	8	17.01	1.75	7.13	3.31	2.36	1.575	0.394	1.181	4.92	M12	4	6.02	3.94	239
	6"	5.91	8.50	11.50	14.02	1.13	12	22.01	2.13	9.25	3.58	2.76	1.890	0.551	1.457	6.50	M20	4	8.27	4.92	482
	8"	7.91	10.63	13.74	16.50	1.25	12	25.98	2.44	11.81	3.94	2.95	2.362	0.709	1.811	6.50	M20	4	8.27	5.04	961
	10"	9.92	12.76	17.01	20.00	1.38	16	30.98	2.75	13.39	3.94	2.95	2.362	0.709	1.811	10.00	M16	8	11.42	5.04	1,419
	12"	11.93	15.00	19.25	22.01	1.38	20	32.99	2.88	15.94	4.72	3.74	2.756	0.787	2.126	10.00	M16	8	11.42	6.14	1,914
14"	13.15	16.26	20.75	23.74	1.50	20	35.00	3.00	17.26	5.75	4.33	2.953	0.787	2.323	10.00	M16	8	11.42	6.69	2,519	



TM3 Series (16"-24")
ANSI Class 150/300/600



DIMENSIONS (IN)

150	SIZE	A	F	H	K	M	N	L	T	H1	H2	H3	S	E	G	Q	W	P	Y	D	WEIGHT (Lb)
	16"	15.25	18.50	21.25	23.50	1.13	16	30.00	1.44	19.17	5.71	4.25	3.346	0.945	2.583	10.00	M16	8	11.42	7.05	1,947
	18"	17.25	20.98	22.76	25.00	1.25	16	34.02	1.56	20.91	6.69	5.31	3.937	1.102	3.150	10.00	M16	8	11.42	7.48	2,548
	20"	19.25	22.99	25.00	27.48	1.25	20	35.98	1.68	22.13	7.09	5.71	4.331	1.260	3.307	11.73	M20	8	13.78	8.27	3,190
	24"	23.19	27.24	29.51	32.01	1.38	20	42.01	1.87	25.59	7.87	6.30	4.724	1.260	4.291	14.02	M30	8	16.34	9.06	4,466

300	SIZE	A	F	H	K	M	N	L	T	H1	H2	H3	S	E	G	Q	W	P	Y	D	WEIGHT (Lb)
	16"	15.25	18.50	22.50	25.51	1.38	20	32.99	2.25	19.17	5.71	4.25	3.346	0.945	2.583	10.00	M16	8	11.42	7.05	2,640
	18"	17.25	20.98	24.75	27.99	1.38	24	35.98	2.37	20.91	6.69	5.31	3.937	1.102	3.150	10.00	M16	8	11.42	7.48	3,463
	20"	19.25	22.99	27.01	30.51	1.38	24	39.02	2.50	22.13	7.09	5.71	4.331	1.260	3.307	11.73	M20	8	13.78	8.27	4,325
	24"	23.19	27.24	32.01	35.98	1.63	24	45.00	2.75	25.59	7.87	6.30	4.724	1.260	4.291	14.02	M30	8	16.34	9.06	5,914

600	SIZE	A	F	H	K	M	N	L	T	H1	H2	H3	S	E	G	Q	W	P	Y	D	WEIGHT (Lb)
	16"	15.25	18.50	23.74	27.01	1.63	20	39.02	3.25	19.17	5.71	4.25	3.346	0.945	2.583	14.02	M30	8	16.34	7.05	3,659
	18"	17.25	20.98	25.75	29.25	1.75	20	42.99	3.50	20.91	6.69	5.31	3.937	1.102	3.150	14.02	M30	8	16.34	8.27	4,708
	20"	19.25	22.99	28.50	32.01	1.75	24	47.01	3.75	22.13	7.09	5.71	4.331	1.260	3.307	14.02	M30	8	16.34	8.27	5,731
	24"	23.19	27.24	32.99	37.01	2.00	24	55.00	4.25	25.59	7.87	6.30	4.724	1.260	4.291	14.02	M30	8	16.34	9.06	7,830

TM3 SERIES

METAL SEAT

3-PC Metal Seated Valve Torques



TORQUES: 3-Piece Metal Seat Ball Valve for TC Ball & Seat

SIZE (NPS)	Break to OPEN Torques (In-Lbs)		
	Class 150	Class 300	Class 600
2"	1,681	2,810	5,841
3"	2,158	4,259	11,151
4"	4,758	7,335	15,554
6"	10,510	22,889	41,994
8"	21,028	43,169	85,486
10"	25,165	52,826	106,186
12"	32,190	69,840	143,381
14"	50,021	113,684	240,000
16"	62,274	143,258	304,544
18"	94,370	213,594	449,840
20"	124,100	283,179	599,209
24"	200,516	461,685	981,960

Note: Torques include a 15% safety factor based on water at full differential pressure.

TORQUES: 3-Piece Metal Seat Ball Valve for HCr Ball & Stellite® Seat

SIZE (NPS)	Break to OPEN Torques (In-Lbs)		
	Class 150	Class 300	Class 600
2"	1,529	2,555	5,310
3"	1,961	3,873	10,138
4"	4,325	6,668	14,140
6"	9,554	20,808	38,176
8"	19,410	39,848	78,910
10"	23,229	48,763	98,019
12"	29,714	64,468	132,353
14"	46,173	104,939	221,539
16"	57,483	132,238	281,118
18"	87,111	197,164	415,238
20"	114,554	261,396	553,116
24"	185,091	426,170	906,424

Note: Torques include a 15% safety factor based on water at full differential pressure.



How To Order

TRUNNION MOUNTED BALL VALVES PART NUMBER MATRIX

Fire Safe Designation *(must be included)*

- X Non-Firesafe
- F Firesafe *(standard)*

Port

- F Full Port
- R Regular Port

Valve Series

- TS2 Soft seat Trunnion, 2 pc design (cast)
- TS3 Soft seat Trunnion, 3 pc design (forged)
- TSW Soft seat Trunnion, seal welded
- TM3 Metal seat Trunnion, 3 pc design (cast)
- TMW Metal seat Trunnion, seal welded

Body Material

- C A216 WCB (-20°F to 800°F)
 - 5 A352 LCB (-50°F to 800°F)
 - 8 A352 LCC (-50°F to 650°F)
 - X CF8M 316 SST (-450°F to 1200°F)
 - L CF3M 316L SST (-450°F to 800° F)
 - 7 A105N Forged Steel (-20°F to 800°F)
 - D CD3MN Duplex SST (-50°F to 550°F)
 - G CE3MN Super Duplex SST (-50°F to 550°F)
 - 6 WC6, A217 (-20° F to 1100° F)
 - 9 WC9, A217 (-20° F to 1100° F)
 - F A350 LF2 (-50° F to 800° F)
 - 4 A182 F316 (-450°F to 1200°F)
- (other options: consult factory)*

End Connection

- | | |
|-------------|--------------|
| F1 150 RF | R1 150 RTJ |
| F3 300 RF | R3 300 RTJ |
| F6 600 RF | R6 600 RTJ |
| F9 900 RF | R9 900 RTJ |
| F15 1500 RF | R15 1500 RTJ |
| F25 2500 RF | R25 2500 RTJ |
- WE Weld End *(*please see chart)*
 - X Special Configuration *(BW x Flanged, etc.)*

Configurable End Connection

- SB Schedule B Flanges
 - *XX Standard Bevel or not applicable
- *See chart below for various options*

* Weld End Connections Chart for ordering

Pipe Schedule	ANSI Class						
	150	300	600	900	1500	2500	Special
10	AA	AB	AC	AD	AE	AF	AY
20	BA	BB	BC	BD	BE	BF	BY
30	CA	CB	CC	CD	CE	CF	CY
40	DA	DB	DC	DD	DE	DF	DY
60	EA	EB	EC	ED	EE	EF	EY
80	FA	FB	FC	FD	FE	FF	FY
XH	GA	GB	GC	GD	GE	GF	GY
100	HA	HB	HC	HD	HE	HF	HY
120	JA	JB	JC	JD	JE	JF	JY
140	KA	KB	KC	KD	KE	KF	KY
160	LA	LB	LC	LD	LE	LF	LY
XXH	MA	MB	MC	MD	ME	MF	MY
Spec	YA	YB	YC	YD	YE	YF	YY

Valve Size

- | | | | |
|------|-----|------|-----|
| 0200 | 2" | 1600 | 16" |
| 0300 | 3" | 1800 | 18" |
| 0400 | 4" | 2000 | 20" |
| 0600 | 6" | 2400 | 24" |
| 0800 | 8" | 3000 | 30" |
| 1000 | 10" | 3600 | 36" |
| 1200 | 12" | 4200 | 42" |
| 1400 | 14" | 4800 | 48" |

Ball

- S 316 SS
- 9 LF2 / ENP
- 7 A105N / ENP
- 2 Tungsten Carbide Coated 316SST
- 3 316SST / HCr
- 4 Chrome Carbide Coated 316SST
- C A182 F51 Duplex SST

Stem

- H 4140 / ENP
- A 17-4 PH
- B XM-19
- S 316SST
- D Inconel® 718
- C A182 F51 Duplex SST
- 9 A350 LF2 / ENP
- 7 A105N / ENP

Seat

- R1 RTFE (Single Piston)
- R2 RTFE (Double Piston)
- V1 Devlon® (Single Piston)
- V2 Devlon® (Double Piston)
- Z1 PEEK (Single Piston)
- Z2 PEEK (Double Piston)
- 3 316/Stellite®
- 2 Tungsten Carbide Coated 316SS
- 4 Chrome Carbide Coated 316SS

Packing

- G Graphite packing *(standard)*
- P TFE packing

Seals

- E EPDM
- B HNBR
- N HNBR AED
- W FKM
- V FKM AED
- L Low Temp FKM (-40°F to 400°F)
- F Low Temp FKM AED (-40°F to 400°F)
- A Aflas
- X Custom Material/Compound

Paint

- X Standard
- S Special *(Customer Specified Coating)*

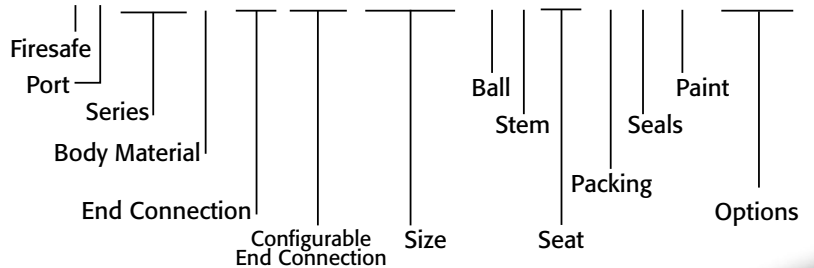
Options

- H Wrench Operated to 4"
 - G Gear Operator
 - L Gear Operator w/ Locking Plate
 - X Bare Stem
 - E Extended Bonnet *(specify extension length required)*
 - B Bypass Piping w/ 2-way valve
 - F Factory Acceptance Test
 - C Customer to specify custom testing
 - S Spool Piece Mounting Kit for Automation
 - M Channel Design Mounting Kit for Automation
 - A API 641 Certified (Fugitive Emissions)
- (other options: consult factory)*

HOW TO ORDER

A-T Trunnion Mounted Ball Valves:

FFTS37-F1XX-0600-7HR1GWX-GBF



FFTS37-F1XX-0600-7HR1GWX-L

6", 3-Piece, Full Port Trunnion Forged Ball Valve, ANSI Class 150 RFF, API 6D, API-607 Firesafe, A105N Body, A105N/3mil ENP Ball, 4140/1mil ENP Stem, RTFE (Single Piston) Seat, Graphite Packing/Seals, FKM Seals, NACE MR-0175, Gear Operator with Locking Plate

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Inconel® is a registered trademark of Inco Alloys/Special Metals Corporation.



TRUNNION MOUNTED BALL VALVES

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