



## 3 PC DESIGN TRUNNION MOUNTED BALL VALVES





**VAHN-TECH International Inc.**, headquartered in Toronto, Canada is a unique company within the Flow Control Industry.

- ✳ 'vt' brand = high quality certified products (API, NSF, CSA, WRAS etc.)
- ✳ Valves, Actuators and Accessories – all 'vt' branded
- ✳ Width and Depth of Product Offerings
- ✳ Flexibility to customize products to customer needs
- ✳ Specialized user-friendly products including large sizes
- ✳ Quick Response
- ✳ Reduced Delivery times
- ✳ Efficient after sales service
- ✳ Competitive Pricing

**VAHN-TECH International Inc.** is a customer focused organization based on “Value-Add” and “Quality Service” principles. Achieving long term partnership with our customers and being their supplier of choice is our prime mission.

We develop, manufacture and market VAHN-TECH (vt) branded Valves, Actuators, Automatic Control Valves and Accessories for variety of Industrial Applications. Our product range includes:



Oil and Gas



Water and Sewage,  
Desalination



Chemicals



Paper and Pulp



Irrigation



Power Plants



Various  
Industrial Applications

We can supply all types of valves with following materials of construction like:

Ductile Iron, Cast Iron, Carbon Steel, Stainless Steel – SS304, SS304L, SS316, SS316L, Duplex Stainless Steel, Super Duplex, Alloy, Monel and Inconel with variety of seating and stem configurations.



## 1. Design & Certification

Applicable Standards	
Design:	API 608, API 6D, BS 5351, CSA Z245.15
Canada Certification:	CRN # OC 17300
Testing:	API 598, BS 6755, API 6D
Face-to-Face:	ASME B16.10
End Connection:	ASME B16.5 / ASME B16.47 / ASME B16.25
Wall Thickness:	ASME B16.34
Firesafe:	API 607, API 6FA
NACE:	MR 0175
Marking:	MSS SP 25

## 2. Product Range

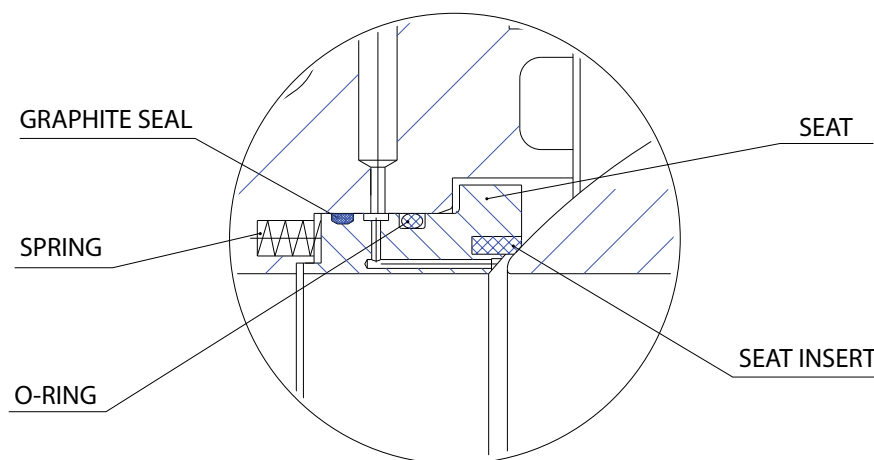
Product Range	
Nominal Pressure:	Class 150 to Class 2500
Size:	2" to 60"
Temperature Range:	-45°C to 220°C (higher temperature & cryogenic applications available on request)
Body Material:	Carbon Steel, Stainless Steel, Alloy Steel, Duplex Stainless Steel
Seat Material:	Soft Seat: RPTFE, Nylon, DEVLON, PEEK Metal Seat: STL, TC, HCr

## 3. Features

### Reliable Seat Sealing Structure

Two floating seat retainers are used for the seat sealing. They float axially to seal against the ball. High pressure sealing is realized by pressure assisted mechanism while a pre-loaded spring ensure tight sealing under very low differential pressure in both soft and metal seated configuration.

The seat insert for soft seated configuration is made of thermoplastic material with multiple options depending on the actual operating conditions.

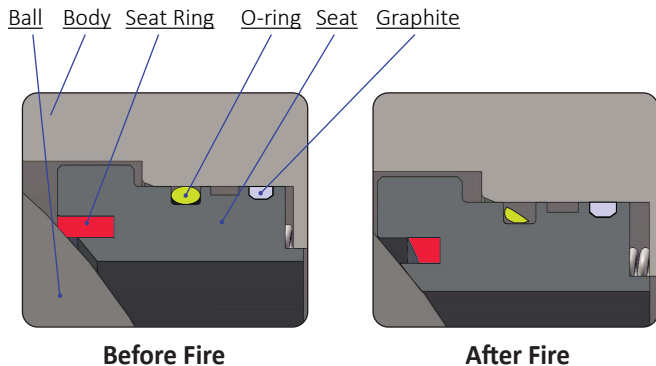


## Fire Safe

VAHN-TECH (vt) Ball Valves are designed and manufactured to meet the requirements of API 607 & API 6FA and to prevent both internal and external leakage in the event of a fire.

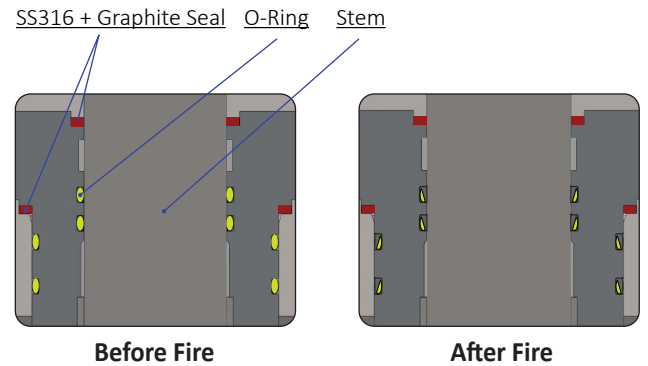
### Internal Leak Prevention:

In case of a fire destroying the thermoplastic sealing, the ball will seal against the metal face of the seat retainer, providing a secondary metal-to-metal seal and preventing leak through the burnt seat. Flexible graphite seat retainer seal prevents leakage past the seat retainer.



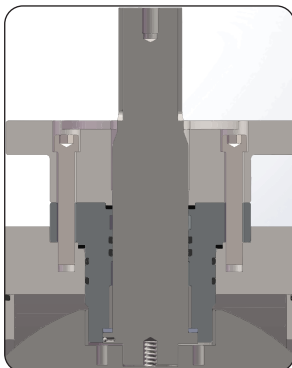
### External Leak Prevention:

Secondary seals, including packing, O-rings, in the stem area or valve body joints are coupled with flexible graphite packing rings. The high temperature resistance of the graphite material will prevent external leakage in case of fire.



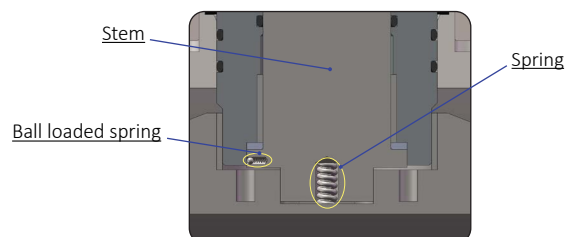
## Blow Out proof stem

The design of the one-piece stem includes a step preventing blow out, even during maintenance operation or incidental cavity pressure rise.



## Anti-static device

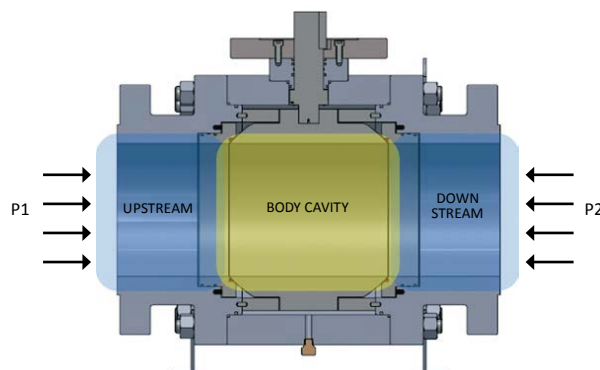
During on-off operations, friction between ball and non-metal seat can produce electro static charge that can accumulate on ball surface. To prevent static sparks - antistatic devices (ball loaded spring/springs) are assembled between stem and ball to permit electric conductivity through all metallic components.



## Double Block & Bleed and Double Isolation and Bleed

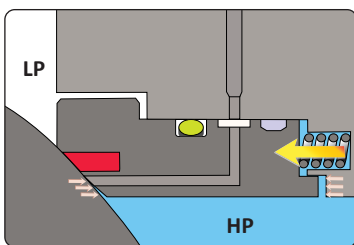
### Double Block and Bleed (DBB)

In the standard VAHN-TECH (vt) Trunnion Mounted Ball Valve, each seat ring provides tight shut-off sealing against pressure from both upstream and downstream ends of the valve. The seats are designed to provide venting/bleeding the cavity between the seating surfaces. This is a typical Double Block and Bleed (DBB) design. In DBB valves the seats are "Self Relieving" due to the "Single Piston Effect" (SPE - see below), that allows for any excessive pressure in the body cavity to be discharged in the line



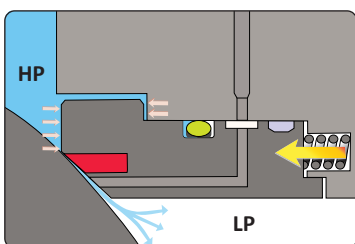
### Double Isolation & Bleed (DIB)

On request, VAHN-TECH (vt) can supply Trunnion Mounted Ball Valve with Double Isolation and Bleed (DIB) design, either DIB-1 or DIB-2. In DIB-1 design, both seats are designed for "Double Piston Effect", allowing each seat to provide a seal against pressure from a single source in both directions. This kind of configuration should have a body cavity relief valve that relieves the cavity pressure in case of over-pressurization due to seat leakage. In DIB-2 design, the upstream seat is SPE and the downstream seat is DPE. If the upstream seat leak in DIB-2, then the cavity pressure can relieve on the upstream side and the downstream seat will provide isolation due to double piston effect. It should be noted that the installation of DIB-2 valve is critical and SPE seat should be on the upstream / pressurized side.



### Single Piston Effect (SPE)

Standard seat design is "Self Relieving" thanks to "Single Piston Effect". Under normal working conditions, the resultant pressure force of the line pushes the seat against the ball, ensuring a tight sealing.



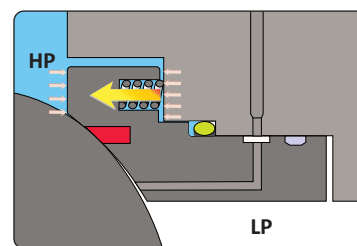
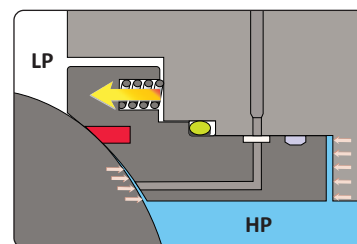
If the trapped pressure inside the body cavity builds up, it can overcome the pressure provided by the spring and push the seat away, relieving the cavity pressure in the line.

### Double Piston Effect (DPE)

The "Double Piston Effect", a unique unique seal design allows seat to seal in both directions under pressure from upstream and downstream of the line. The seal ring effectively works on similar principles as the Single Piston Effect Design. When the pressure is applied from the upstream line, the DPE seat works just like the SPE seat design, pushing the seat against the ball.

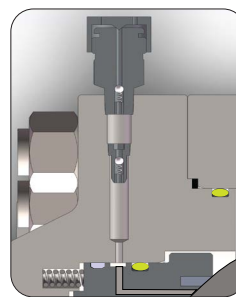
When the pressure is from the downstream or body cavity, the floating seat design allows the cavity pressure to push the seat against the ball, ensuring a tight sealing as well.

Note that DPE seat design does not have self relieving capability, therefore a pressure relief shall mandatorily be installed on the body cavity to prevent pressure build up inside the cavity.

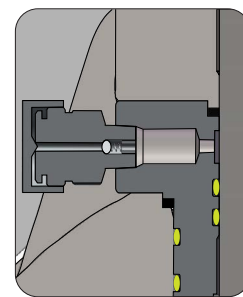


## Emergency Seal Restoration

In normal operating conditions, VAHN-TECH (vt) Trunnion Ball Valves do not require injection of sealant or lubricant. In the unlikely event, an accidental leakage from ball seats or stem sealing area occurs, sealant injection can temporarily prevent or reduce leakage in the affected area.



Emergency Seat  
Selant Injection



Emergency Stem Sealing  
& Sealant Injection

## Low Fugitive Emission

VAHN-TECH (vt) Trunnion Ball Valves are designed to meet the most stringent Low Fugitive Emission requirements. Our valves have been tested to meet ISO-154848 fugitive emission requirements.

## Different End Connection

VAHN-TECH (vt) offer various End Connection options for the Trunnion Ball Valves:

- ✦ ASME B16.5 & ASME B16.47 Raised Face Flange
- ✦ ASME B16.5 Ring Type Joint Flange
- ✦ ASME B16.36 Orifice Flange
- ✦ ASME B16.25 Butt-weld End Connection

## 4. Material Selection Example

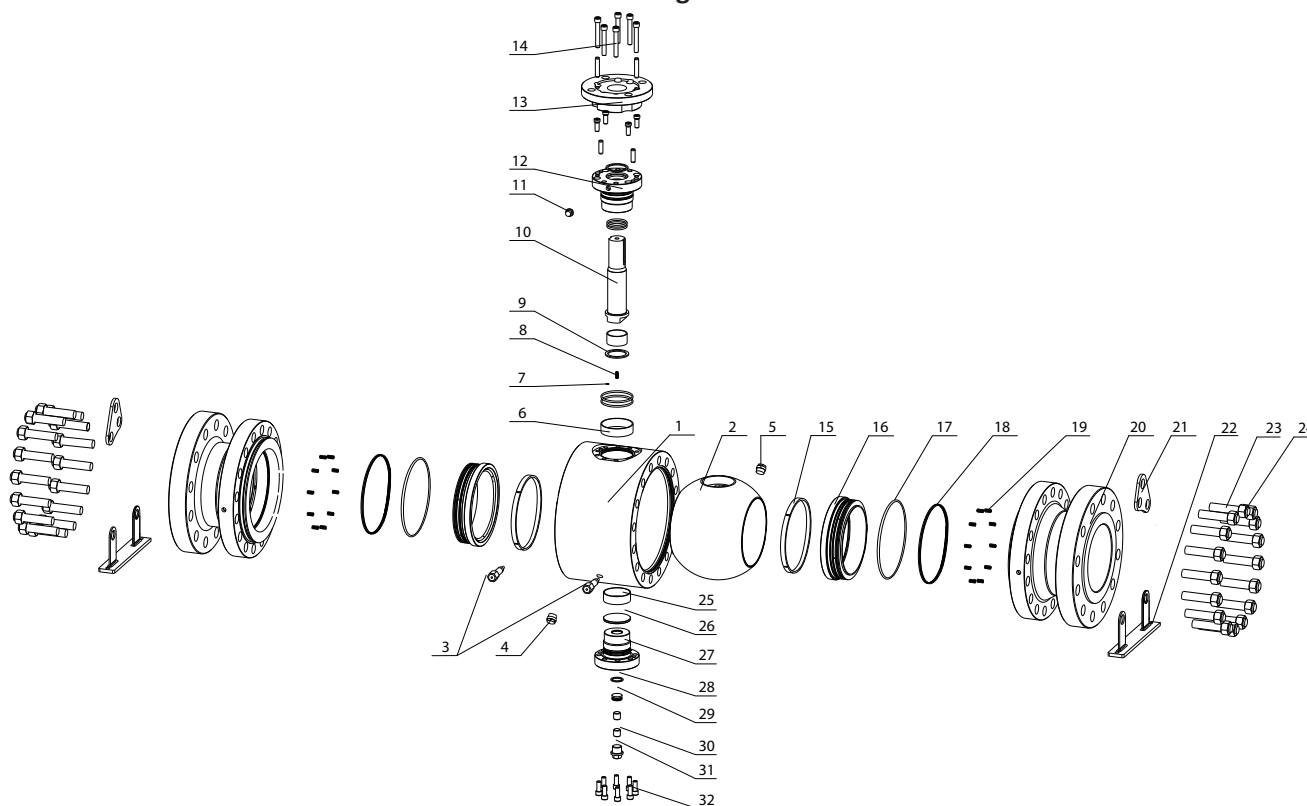
Below is some example of material selection and valve configuration based on different services applications. Contact us for support in selecting the most adequate configuration for your operations.

Service	Non-corrosive	Low Temperature	Corrosive	Sour	
Body/Cap	ASTM A105	ASTM A350 LF2	ASTM A182 F316	ASTM A182 F51, S31803	ASTM A182 F55, S32760
Stem	ASTM 182 F6a	ASTM 182 F316	ASTM 182 F316	ASTM A182 F51, S31803	ASTM A182 F55, S32760
Ball	ASTM A105 + ENP	ASTM A350 LF2 + ENP, ASTM A694 F60 + ENP (CLASS 900/1500)	ASTM 182 F316, ASTM A182 F51, S31803 or (CLASS 900/1500)	ASTM A182 F51, S31803	ASTM A182 F55, S32760
Seat Retainer	ASTM A105 + ENP	ASTM A350 LF2 + ENP	ASTM A182 F316	ASTM A182 F51, S31803	ASTM A182 F55, S32760
Seat	RPTFE (CLASS 150 to 600) and NYLON (CLASS 900 and over)				
Spring	INCONEL X750				
O-Ring	HNBR	FKM	FKM	FKM	FKM
Bolt	ASTM A193 B7M	ASTM A193 B8M	ASTM A193 B8M	ASTM A193 B8M	ASTM A193 B8M
Nut	ASTM A192 2HM	ASTM A192 8M	ASTM A192 8M	ASTM A192 8M	ASTM A192 8M

## 5. Material of Construction

VAHN-TECH (vt) manufactures both Soft seated and Metal seated Trunnion Mounted Ball Valves. For both type of valves, VAHN-TECH (vt) can provide Trunnion Design and Trunnion Plate Design. In case of Trunnion Plate Design, trunnions are integral part of ball and are positioned in a hole on a steel plate to maintain ball position centered in the valve body. In case of Trunnion Design, external trunnions are inserted inside the ball through the body to position the ball in centre of valve body.

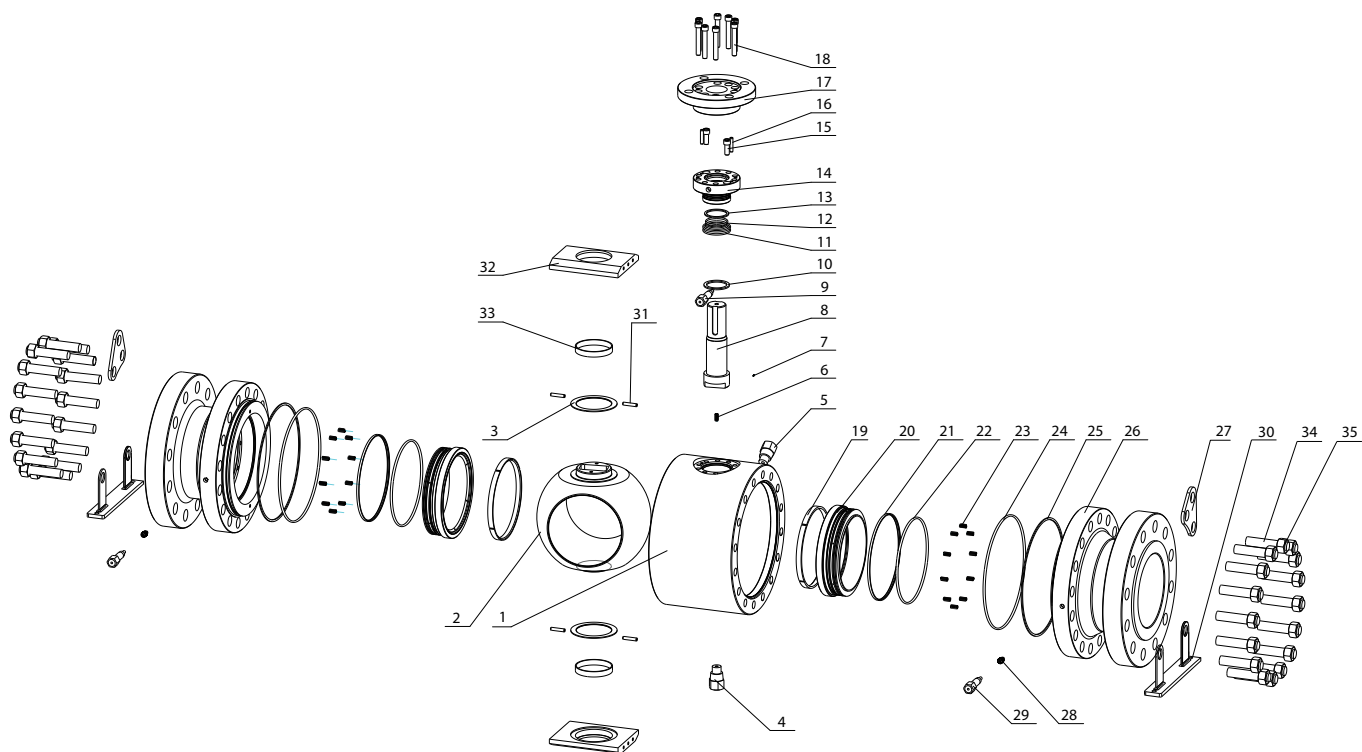
### Soft Seated Trunnion Mounted Ball Valves - Trunnion Design



No.	Parts
1	Body
2	Ball
3	Sealant Injection
4	Drain Valve
5	Vent Valve
6	Bushing
7	Anti-Static Spring
8	Anti-Static Spring
9	Washer
10	Stem
11	Sealant Injection
12	Upper Stem Seat
13	Gland Flange
14	Screw
15	Seat Ring
16	Seat

No.	Parts
17	O-Ring
18	Gasket
19	Seat Spring
20	Bonnet
21	Eyebolt
22	Support
23	Stud
24	Nut
25	Bearing
26	Block
27	Lower Stem Trunnion
28	O-Ring
29	Top Block
30	Adjusting Screw
31	Flange Bolt
32	Cap Screw

## Soft Seated Trunnion Mounted Ball Valves - Trunnion Plate Design

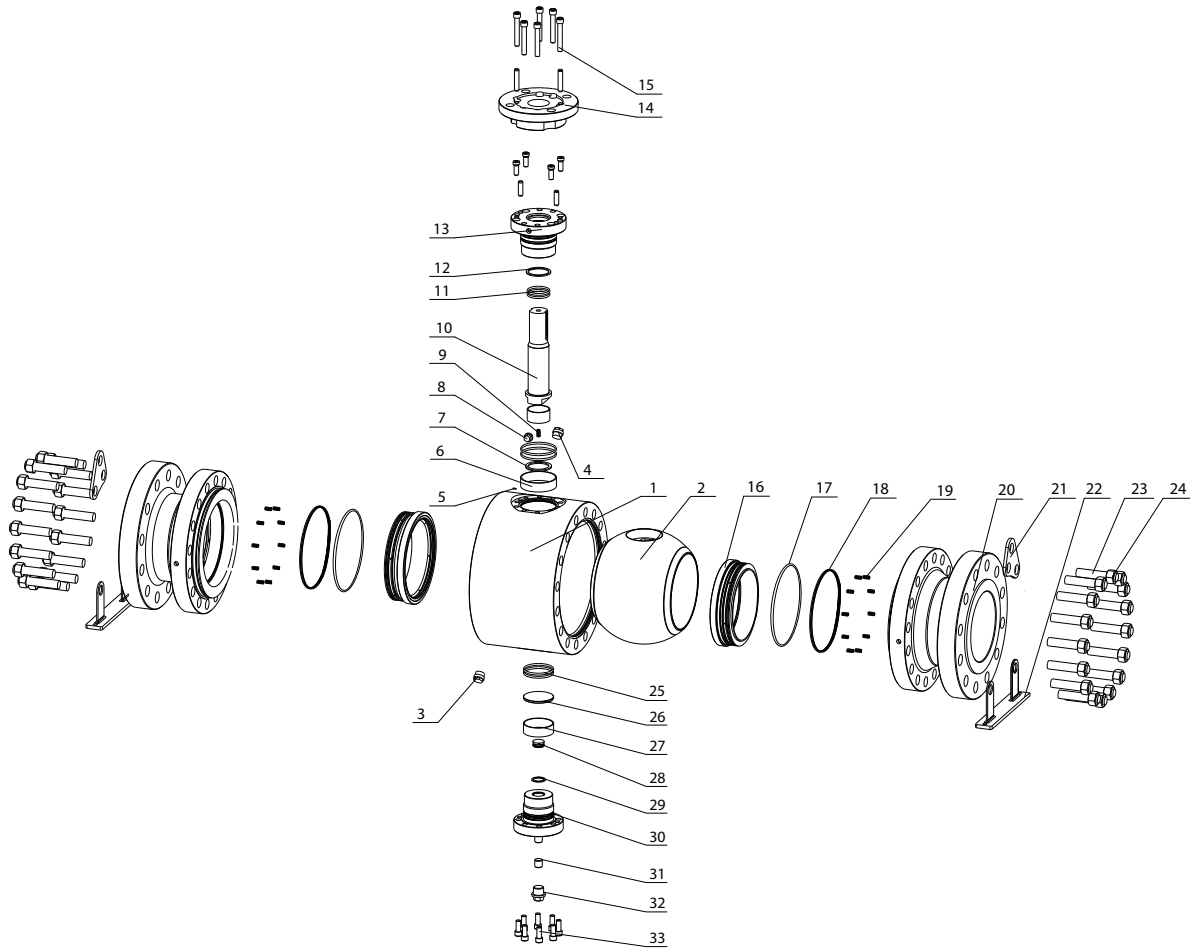


No.	Parts
1	Body
2	Ball
3	Flat Bushing
4	Drain Valve
5	Vent Valve
6	Anti-Static Spring
7	Anti-Static Spring
8	Stem
9	Sealant Injection
10	Washer
11	O-Ring
12	O-Ring
13	Gasket
14	Upper Stem Seat
15	Screw
16	Locating Pin
17	Gland Flange
18	Screw

No.	Parts
19	Seat Ring
20	Seat
21	O-Ring
22	Gasket
23	Seat Spring
24	O-Ring
25	Gasket
26	Bonnet
27	Eyebolt
28	Grease Fitting
29	Sealant Injection
30	Support
31	Pin
32	Trunnion Plate
33	Bushing
34	Stud
35	Nut



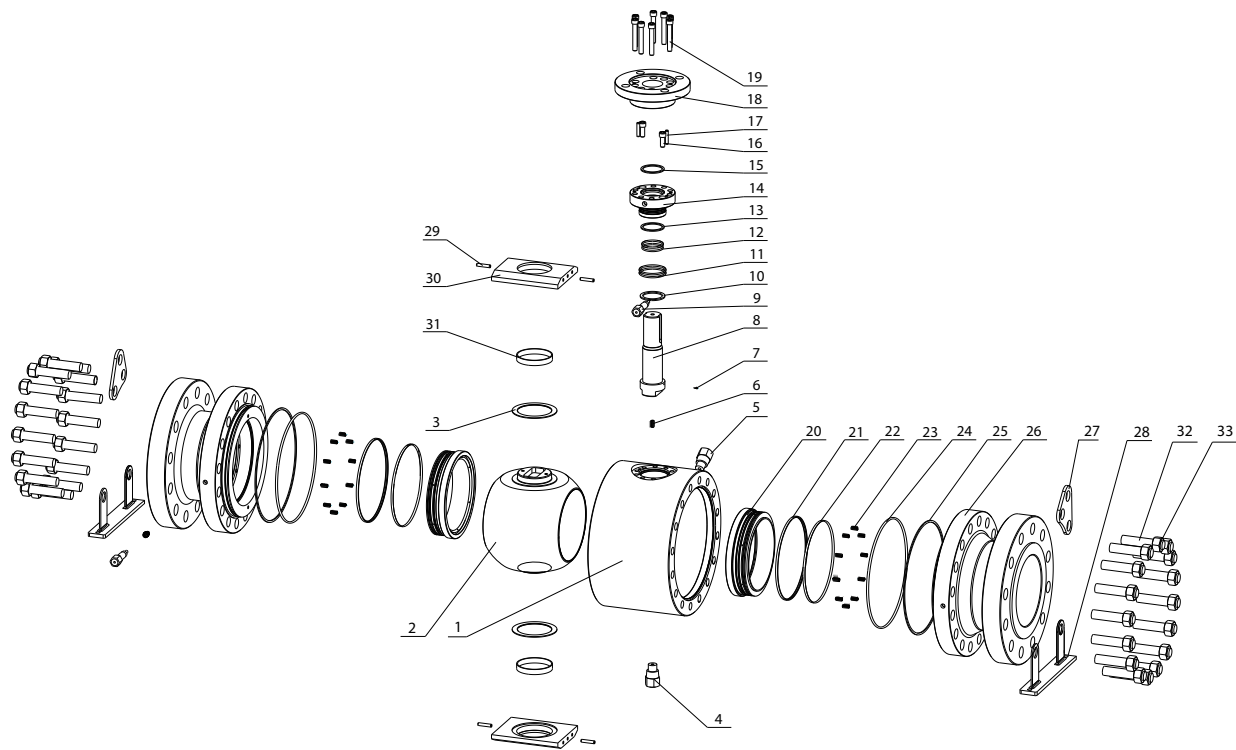
## Metal Seated Trunnion Mounted Ball Valves - Trunnion Design



No.	Parts
1	Body
2	Ball
3	Drain Valve
4	Vent Valve
5	Anti-Static Spring
6	Bushing
7	Washer
8	Sealant Injection
9	Anti-Static Spring
10	Stem
11	O-Ring
12	Gasket
13	Upper Stem Seat
14	Gland Flange
15	Screw
16	Seat
17	O-Ring

No.	Parts
18	Gasket
19	Seat Spring
20	Bonnet
21	Eyebolt
22	Support
23	Stud
24	Nut
25	O-Ring
26	Block
27	Bearing
28	Top Block
29	O-Ring
30	Lower Stem Trunnion
31	Adjusting Screw
32	Flange Bolt
33	Cap Screw

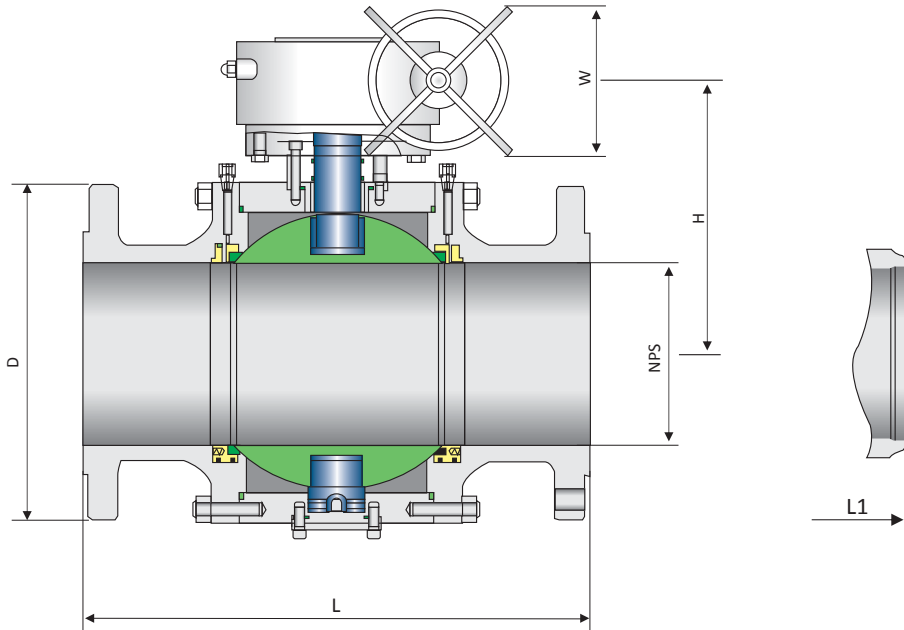
## Metal Seated Trunnion Mounted Ball Valves - Trunnion Plate Design



No.	Parts
1	Body
2	Ball
3	Flash Bushing
4	Drain Valve
5	Vent Valve
6	Anti-Static Spring
7	Anti-Static Spring
8	Stem
9	Sealant Injection
10	Washer
11	O-Ring
12	O-Ring
13	Gasket
14	Upper Stem Seat
15	Gasket
16	Screw
17	Locating Pin

No.	Parts
18	Gland Flange
19	Screw
20	Seat
21	O-Ring
22	Gasket
23	Seat Spring
24	O-Ring
25	Gasket
26	Bonnet
27	Eyebolt
28	Support
29	Pin
30	Trunnion Plate
31	Bushing
32	Stud
33	Nut

## 6. Dimensions



### Class 150

Size		Dimension (inch)					Dimension (mm)					Weight (kg)	
NPS	DN	L (RF)	L1 (BW)	H	W	D*	L (RF)	L1 (BW)	H	W	D*	RF	BW
2"	50	7.0	8.5	7.0	14	6.0	178	216	177	350	152	15	13.5
2 1/2"	65	7.5	9.5	7.5	16	7.0	190	241	190	400	178	19	15.5
3"	80	8.0	11.1	8.3	20	7.5	203	283	210	500	190	27	24.5
4"	100	9.0	12.0	9.3	20	9.0	229	305	235	500	229	38	32.5
6"	150	15.5	18.0	20.9	24	11.0	394	457	530	600	279	81	76
8"	200	18.0	20.5	24.6	24	13.5	457	521	625	600	343	140	132
10"	250	21.0	22.0	25.6	24	16.0	533	559	650	600	406	160	147
12"	300	24.0	25.0	30.8	24	19.0	610	635	780	600	483	205	182
14"	350	27.0	30.0	31.0	32	21.0	686	762	790	800	533	260	241
16"	400	30.0	33.0	36.3	32	23.5	762	838	920	800	597	390	370
18"	450	34.0	36.0	38.3	32	25.0	864	914	970	800	635	510	495
20"	500	36.0	39.0	43.4	32	27.5	914	991	1100	800	699	750	726
24"	600	42.0	45.0	45.3	32	32.0	1067	1143	1150	800	813	1200	1125
26"	650	45.0	49.0	50.8	32	-	1143	1245	1290	800	-	1400	1250
28"	700	49.0	53.0	55.1	32	-	1245	1346	1400	800	-	1860	1640
30"	750	51.0	55.0	64.1	32	-	1295	1397	1630	800	-	2100	1930
32"	800	54.0	60.0	70.9	32	-	1372	1524	1840	800	-	2530	2390
36"	900	60.0	68.0	80.8	32	-	1524	1727	2050	800	-	2970	2760

\*per ASME B16.5

## Class 300

Size		Dimension (inch)					Dimension (mm)					Weight (kg)	
NPS	DN	L (RF)	L1 (BW)	H	W	D	L (RF)	L1 (BW)	H	W	D	RF	BW
2"	50	8.5	8.5	7.0	14	6.5	216	216	177	350	165	19	14
2 1/2"	65	9.5	9.5	7.5	16	7.5	241	241	190	400	191	24	16
3"	80	11.1	11.1	8.3	20	8.3	283	283	210	500	210	34	25
4"	100	12.0	12.0	9.3	20	10.0	305	305	235	500	254	48	34
6"	150	15.9	18.0	20.9	24	15.5	403	403	530	600	394	101	82
8"	200	19.8	20.5	24.6	24	15.0	502	502	625	600	381	175	145
10"	250	22.4	22.0	25.6	24	17.5	568	568	650	600	445	200	155
12"	300	25.5	25.0	30.8	24	20.5	648	648	780	600	521	255	185
14"	350	30.0	30.0	31.0	32	23.0	762	762	790	800	584	325	238
16"	400	33.0	33.0	36.3	32	25.5	838	838	920	800	648	485	375
18"	450	36.0	36.0	38.3	32	28.0	914	914	970	800	711	635	516
20"	500	39.0	39.0	43.4	32	30.5	991	991	1100	800	775	935	782
24"	600	45.0	45.0	45.3	32	36.0	1143	1143	1150	800	914	1500	1280
26"	650	49.0	49.0	50.8	32	-	1245	1245	1290	800	-	1750	1375
28"	700	53.0	53.0	55.1	32	-	1346	1346	1400	800	-	2225	1825
30"	750	55.0	55.0	64.1	32	-	1397	1397	1630	800	-	2450	2180
32"	800	60.0	60.0	70.9	32	-	1524	1524	1800	800	-	2870	2260

## Class 600

Size		Dimension (inch)					Dimension (mm)					Weight (kg)	
NPS	DN	L (RF)	L1 (BW)	H	W	D	L (RF)	L1 (BW)	H	W	D	RF	BW
2"	50	11.5	11.5	7.1	14	6.5	292	292	180	350	165	26	19
2 1/2"	65	13.0	13.0	7.6	16	7.5	330	330	193	400	191	35	25
3"	80	14.0	14.0	8.5	20	8.3	356	356	215	500	210	58	42
4"	100	17.0	17.0	9.5	20	10.8	432	432	241	500	273	81	51
6"	150	22.0	22.0	21.3	24	14.0	559	559	540	600	356	142	85
8"	200	26.0	26.0	25.0	24	16.5	660	660	635	600	419	287	200
10"	250	31.0	31.0	26.1	24	20.0	787	787	665	600	508	540	395
12"	300	33.0	33.0	31.1	24	22.0	838	838	790	600	559	780	610
14"	350	35.0	35.0	31.9	32	23.7	889	889	810	800	603	1000	805
16"	400	39.0	39.0	36.4	32	27.0	991	991	925	800	686	1300	1010
18"	450	43.0	43.0	38.8	32	29.3	1092	1092	985	800	743	1700	1350
20"	500	47.0	47.0	44.5	32	32.0	1194	1194	1130	800	813	2100	1656
24"	600	55.0	55.0	46.6	32	37.0	1397	1397	1185	800	940	3400	2775
26"	650	57.0	57.0	52.5	32	-	1448	1448	1335	800	-	3800	3125
28"	700	61.0	61.0	57.0	32	-	1549	1549	1450	800	-	4500	3790

### Class 900

Size		Dimension (inch)					Dimension (mm)					Weight (kg)	
NPS	DN	L (RF)	L1 (BW)	H	W	D	L (RF)	L1 (BW)	H	W	D	RF	BW
2"	50	14.5	14.5	8.6	20	8.5	368	368	219	500	216	31	23
2 1/2"	65	16.5	16.5	9.3	20	9.6	419	419	235	500	244	43	31
3"	80	15.0	15.0	10.3	20	9.5	381	381	260	500	241	68	51
4"	100	18.0	18.0	15.4	24	11.5	457	457	390	600	292	98	61
6"	150	24.0	24.0	25.8	24	15.0	610	610	655	600	381	171	102
8"	200	29.0	29.0	30.3	24	18.5	737	737	770	600	470	345	240
10"	250	33.0	33.0	31.8	24	21.5	838	838	805	600	545	650	480
12"	300	38.0	38.0	38.0	32	24.0	965	965	965	800	610	940	735
14"	350	40.5	40.5	38.5	32	25.3	1029	1029	980	800	641	1205	965
16"	400	44.5	44.5	45.0	32	27.8	1130	1130	1145	800	705	1565	1215
18"	450	48.0	48.0	47.0	32	31.0	1219	1219	1195	800	787	2050	1625
20"	500	52.0	52.0	53.5	32	33.8	1321	1321	1360	800	857	2535	1995
24"	600	61.0	61.0	56.0	32	41.0	1549	1549	1425	800	1041	3950	3335

### Class 1500

Size		Dimension (inch)					Dimension (mm)					Weight (kg)	
NPS	DN	L (RF)	L1 (BW)	H	W	D	L (RF)	L1 (BW)	H	W	D	RF	BW
2"	50	14.5	14.5	11.3	20	8.5	368	368	285	500	216	49	33
2 1/2"	65	16.5	16.5	12.0	20	9.6	419	419	305	500	244	67	44
3"	80	18.5	18.5	13.3	24	10.5	470	470	338	600	267	106	73
4"	100	21.5	21.5	20.0	24	12.3	546	546	506	600	311	153	87
6"	150	27.8	27.8	33.5	24	15.5	705	705	852	600	394	268	145
8"	200	32.8	32.8	39.4	32	19.0	832	832	1000	800	483	540	345
10"	250	39.0	39.0	41.1	32	23.0	991	991	1045	800	585	1020	685
12"	300	44.5	44.5	49.4	32	26.5	1130	1130	1255	800	673	1475	1050
14"	350	49.5	49.5	50.0	32	29.5	1257	1257	1270	800	749	1885	1385
16"	400	54.5	54.5	58.5	32	32.5	1384	1384	1485	800	826	2455	1735

### Class 2500

Size		Dimension (inch)					Dimension (mm)					Weight (kg)	
NPS	DN	L (RF)	L1 (BW)	H	W	D	L (RF)	L1 (BW)	H	W	D	RF	BW
2"	50	17.8	17.8	12.0	20	9.3	451	451	304	500	235	55	41
2 1/2"	65	20.0	20.0	12.9	24	10.5	508	508	327	600	267	76	55
3"	80	22.8	22.8	14.3	24	12.0	578	578	362	600	305	120	91
4"	100	26.5	26.5	21.3	24	14.0	673	673	540	600	356	173	110
6"	150	36.0	36.0	35.9	32	19.0	914	914	911	800	483	302	182
8"	200	40.3	40.3	42.1	32	21.8	1022	1022	1070	800	552	612	430
10"	250	50.0	50.0	44.0	32	26.5	1270	1270	1120	800	673	1150	855
12"	300	56.0	56.0	53.0	32	30.0	1422	1422	1345	800	762	1665	1315

## 7. Engineering Support and Special Applications

VAHN-TECH (vt) offers advanced engineering services to help customize the Trunnion Mounted Ball Valve to match specific operating conditions. We are able to design and select appropriate Material of Construction to suit unique challenges faced at different locations/applications.

### 7.1 Extended Bonnet and Cryogenic Application

VAHN-TECH (vt) can provide any size of ball valves with extended bonnet for special installation requirements such as buried service and low temperature and cryogenic applications. The extended bonnet provides for a fully enclosed pressurized column with all stem seals located at the top of the bonnet, away from the cold area and preventing the valve from malfunctioning due to freezing. The length of the extensions is defined according to installation requirements and temperature requirements to ensure the stem packing is maintained at a temperature high suitable for an optimized sealing performance. Extension stem are fitted with the necessary piping to facilitate drain, vent and sealant injection or lubrication as required.



VAHN-TECH (vt) cryogenic ball valves are suitable for LNG storage, tank applications, cryogenic pumps, pipelines or low-pressure trailers. The valves provide high flow capacity, tight shutoff and long service-free life in extreme environmental conditions.

Cryogenic ball valves are available in all sizes and pressure classes for operating temperatures from  $-196^{\circ}\text{C}$  to  $+120^{\circ}\text{C}$ . Typical material of construction is Stainless Steel SS316. Valves are designed with rigid body construction to reduce impact of thermal shock. Contact us for more information.

### 7.2 High Temperature Design

VAHN-TECH (vt) provides metal seated ball valve design for high temperature and hot gas applications up to  $550^{\circ}\text{C}$  /  $1022^{\circ}\text{F}$ . Special trims are selected to provide optimized resistance and sealing in aggressive environment.

We offer Tungsten Carbide/Chrome Carbide and Hard Graphite seated options. All gasket and seals are metal and graphite-based type suitable for high temperature service. Precise machining and lapping of ball and seat ensures best in class leakage tightness, solving the problem of inner leakage and outer leakage, including with high pressure and abrasive media.

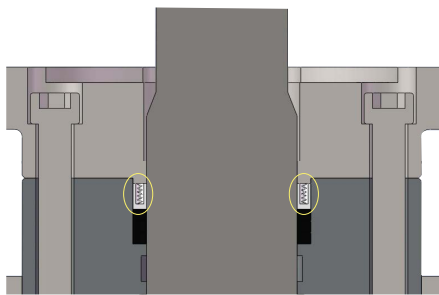
### 7.3 Fully Welded Ball Valves

VAHN-TECH (vt) provides a complete range of ball valves with fully welded body construction. Welded body construction eliminates body flanges, reducing the potential leak path at the flange sealing and making them the ideal solutions for low fugitive emission and vacuum applications. The increased resistance to pipeline stresses of this design as well as its compactness and lightweight in comparison to bolted bonnet design make them suitable for buried applications.

Fully welded ball valves are fitted with sealant injection fittings with access directly to each of the seat rings. Valve cleaner can also be injected into these fittings to flush out the old grease in the valve and to clean critical seal faces on the ball.



### 7.4 Live Loaded Packing Structure



On request, VAHN-TECH (vt) can provide live loaded design stem packing. Packing is compressed with springs to prevent stress relaxation. This live loaded packing system provides high sealing performance eliminating need to tighten packing from time to time.

### 7.5 Anti-explosive Decompression O-Ring

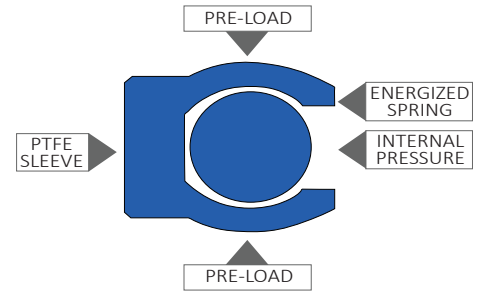
All elastomer compounds present a permeability of gases at different levels. Under high pressure, the gas in the media penetrates below the O-ring surface forming air pockets in the intermolecular spaces. The quantity of gas absorbed depends on the type of compound and of the gas in contact with it, as well as the temperature and pressure. Explosive Decompression (also known as Rapid Gas Decompression or RGD) is the failure mechanism of elastomer seals and O-rings caused by a rapid reduction in pressure of the gaseous media. The gas that has permeated into the elastomer seal expands violently when the pressure is released, which in turn rapidly causes fissuring or laceration of the O-ring surface and ultimately seal failure. This seal damage is not always visible because small bubbles form on the inside of the elastomer seal.



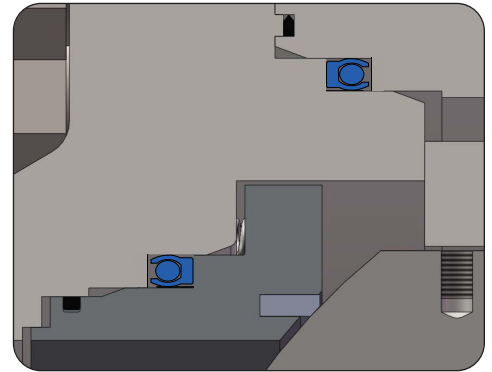
VAHN-TECH (vt) can provide high-pressure, high-temperature O-ring specially formulated to resist this type of failure and withstand rapid gas decompression. These O-rings are commonly referred to as AED (Anti-Explosive Decompression) O-rings. The O-ring are certified NORSOK standard M-710 and made of Viton® or FKM. Additionally, AED O-rings can be made from HNBR, AFLAS® and FFKM materials.

## 7.6 Lip Seal

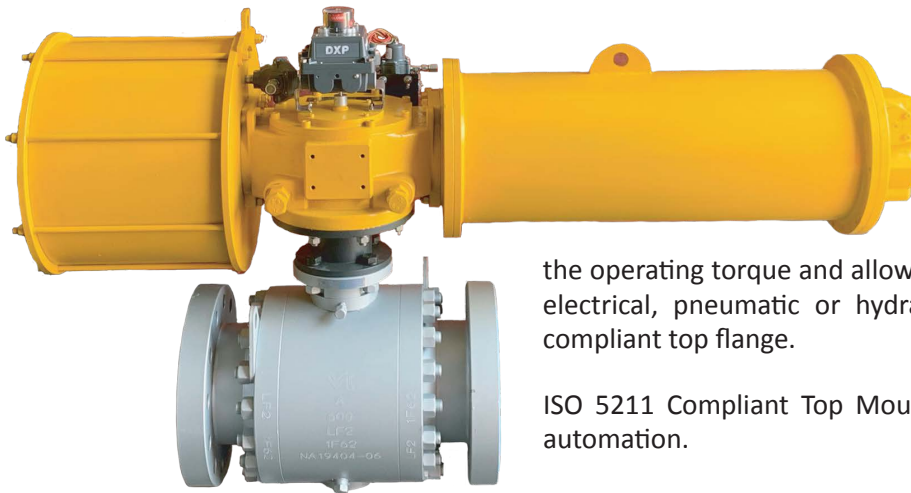
The term lip seal is generally used to refer to rotary shaft seals or radial shaft seal. Lip seals are self energized seal systems, made of an external component called sleeve, usually in fluorinated polymer (e.g. PTFE), which corresponds to the seal, and an internal spring that makes the system elastic. Once the seal is mounted in its seat, the spring is compressed due to the interaction of the seal with the groove, thus exerting a force which, along with that generated by the system under pressure, ensures that the seal holds.



For applications where elastomer seals are not reliable, VAHN-TECH (vt) can offer lip-seal. They can be used for the stem seal, the seat back seal and the body seals. VAHN-TECH (vt) offers a wide range of design and of material selection for both the sleeves and the springs. Sleeve are typically made of PTFE or modified PTFE, however other polymers are available such as PEEK, Kel-F, etc. The springs can be in Hastelloy, Inconel or Elgiloy. Lip Seal temperature range is -200°C to +315°C. Lip Seal selection is based multiple parameters, such as temperature, pressure, chemical compatibility, type of seal (static or dynamic), etc.



## 7.7 Actuation and Operation



VAHN-TECH (vt) Trunnion Mounted Ball Valves are designed for both manual operation with lever or gearbox and automatic operation. Our valves are designed to minimize

the operating torque and allow for easy mounting of valve automation, electrical, pneumatic or hydraulic. All our valves include ISO 5211 compliant top flange.

ISO 5211 Compliant Top Mounting Flange for ease of standardized automation.

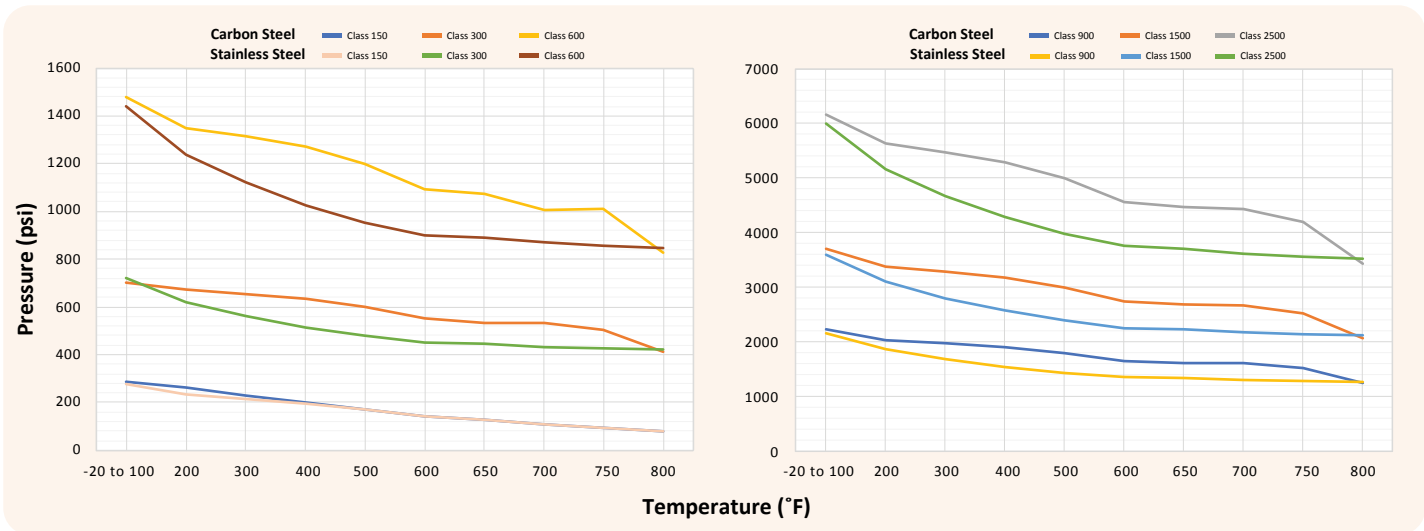
VAHN-TECH (vt) can provide complete automated valve and ESD valves as a single package. We manufacture a full range of CSA certified quarter-turn and failsafe/spring return electrical actuators as well as rack and pinion pneumatic actuator and scotch and yoke actuators. We can install and test all automation accessories, Limit Switch, Air filter, Solenoid Valve, Fire fusible, Quick exhaust, etc.

Contact us for your tailor-made automation solution.

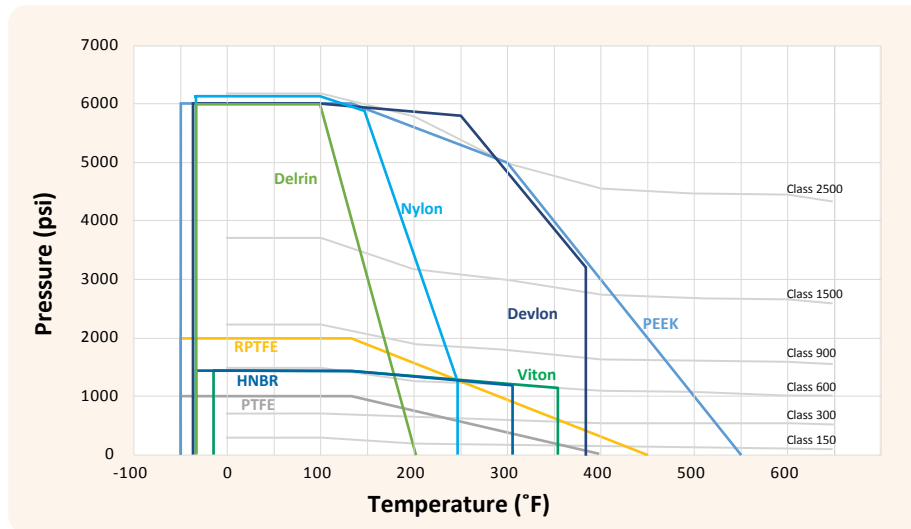


## 8. Engineering Data

### 8.1 Temperature Pressure Curve



### 8.2 Sealing Material Selection



Materials	Temperature	Application
PTFE	-50°F to 400°F -46°C to 204°C	Made from Virgin Teflon, Polytetrafluoroethylene (PTFE) is a thermoplastic fluoropolymer that consists of Carbon and Fluorine. PTFE structure is compatible to most chemicals and is suitable for almost all media.
RPTFE	-50°F to 450°F -46°C to 232°C	15% glass reinforced PTFE, RPTFE has improved wear and abrasion resistance over PTFE and higher temperature resistance. Chemical resistance is equivalent to virgin PTFE. RPTFE is the standard seat material for Ball Valves up to Class 600.
Devlon	-58°F to 375°F -50°C to 191°C	Devlon, a polyamide, is one of the toughest and hardest wearing thermoplastics available. It provides wear resistance, impact strength, and low moisture absorption properties.
PEEK	-50°F to 550°F -46°C to 288°C	PEEK (Polyether Ether Ketone) is best suited for high temperature and pressure service while exhibiting good chemical resistance.
UHMWPE (Delrin)	-40°F to 180°F -40°C to 82°C	UHMWPE (Ultra High Molecular Weight Polyethylene) is a semi-crystalline material that possesses superior wear and pressure tolerances. UHMWPE is ideal for abrasive, slurry services or low temperature applications that require no PTFE.
Viton (FKM)	-20°F to 356°F -29°C to 180°C	Viton is the best elastomer seal for higher temperature applications. It has good large temperature range and good mechanical properties. It is suitable to halocarbons, aromatics, oils and solvents, but it should not be used on steam.
Nylon	-40°F to 248°F -40°C to 120°C	Nylon (polyamide) seats are offered for higher pressure and lower temperature service. They can be used in high temperature air, oil and other gas media but are not suited for strong oxidizing.
HNBR	-40°F to 302°F -40°C to 150°C	HNBR has recently been developed to meet higher temperatures than standard NBR while retaining resistance to petroleum based oils.

### 8.3 Cv Value

The Cv's valve property and id defined as follows: "The Flow Coefficient Cv states the flow capacity of a valve in U.S. gallons per minute of water at standard temperature of 60°F (15.6°C) that will flow through the valve with a pressure loss of one pound per square inch at a specific opening position". For the metric system the analog value is Kv where measure unit Bar, Kg and metres. For the same bore opening, the higher the Cv value, the lower the pressure loss.

$$Q = C_v \sqrt{\frac{\Delta p}{s}}$$

Flow Rate

Pressure Drop

$$\Delta p = s \left( \frac{Q}{C_v} \right)^2$$

For liquids other than water:

- $\Delta p$  Pressure drop (psi).
- Q Liquid flow in gallons per minuetete (GPM).
- s Specific gravity of liquid (60°F).
- Cv Valves flow coefficient.

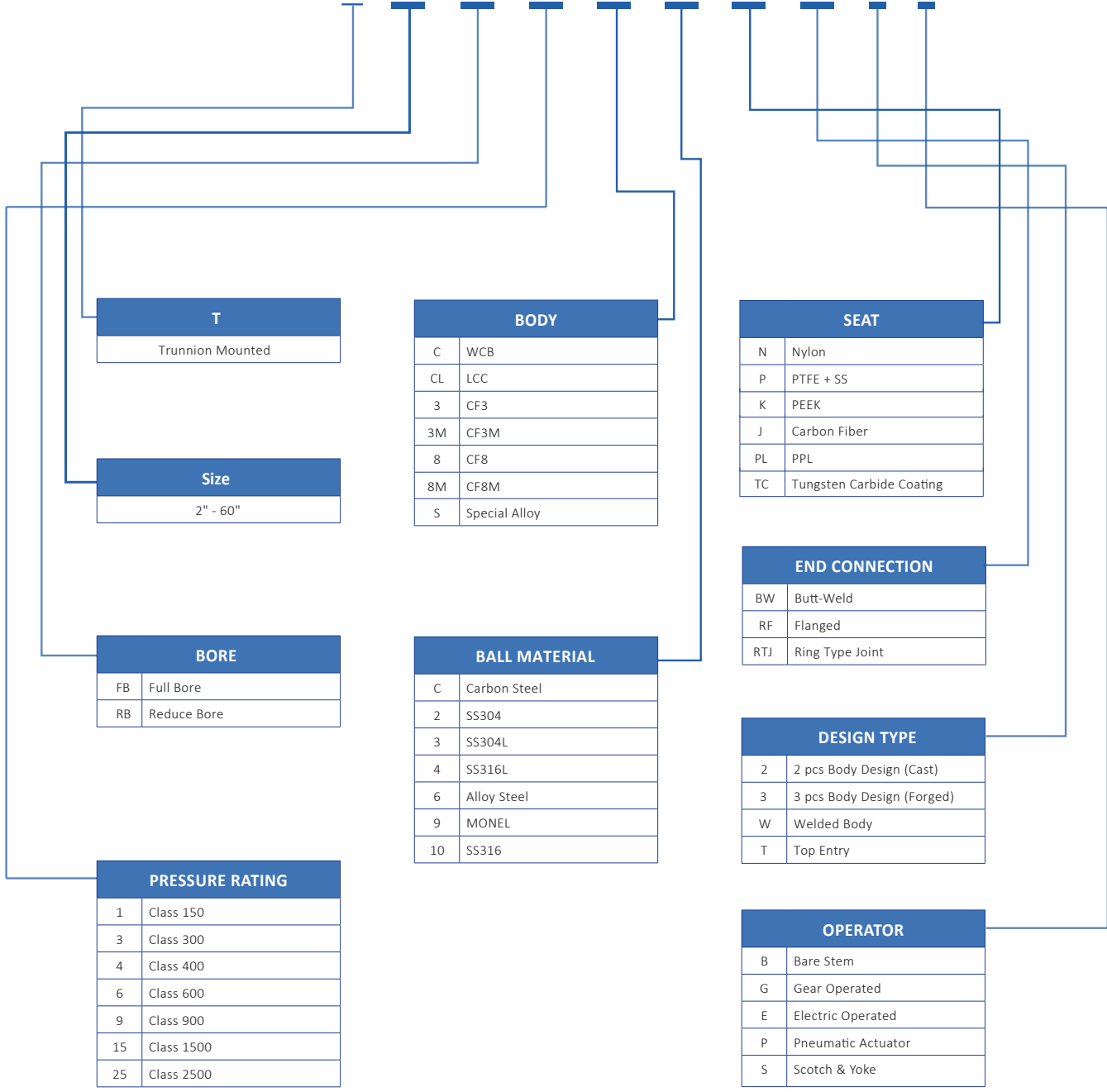
Conversion Table to Metric Kv

Coefficient	Cv	Kv
Cv	1	0.865
Kv	1.156	1

API 6D						
Bore (in)	150LB	300LB	600LB	900LB	1500LB	2500LB
2"	420	420	400	330	330	250
2 1/2"	690	690	610	520	510	320
3x2"	200	200	200	190	180	200
3"	1200	1050	1000	910	820	500
4x3"	600	600	600	590	550	560
4"	2200	2100	1850	1800	1700	1100
6x4"	800	800	790	790	780	745
6"	5150	2100	4600	4380	3800	2500
8x6"	2150	2150	2150	2150	2150	2150
8"	9500	9400	9000	8500	7400	5300
10x8"	4300	4200	4300	450	450	4100
10"	15000	15000	14700	14500	11500	8300
12x10"	7550	7550	7550	8000	9000	7550
14x10"	6000	6000	6000	6100	6100	-
12"	23000	23000	23000	21100	18000	13000
14x12"	14000	14000	14000	12800	12000	-
16x12"	9100	9100	9100	8900	8900	-
14"	28000	28000	28000	25000	21000	-
16x14"	15000	15000	15000	14200	14100	-
16"	37200	37200	37200	34500	27500	-
18x16"	21000	21000	21000	19200	19000	-
20x16"	15300	15300	15300	13800	12000	-
18"	49000	49000	49000	45000	37000	-
20x18"	28400	28400	28400	35000	25000	-
20"	59000	59000	59000	55200	47900	-
24x20"	28200	28200	28200	25100	20600	-
22"	68200	68200	68200	62000	54000	-
24"	92000	92000	92000	83800	70000	-
20x24"	35000	35000	35000	32900	-	-
26"	111000	111000	111000	98500	-	-
28"	121000	121000	121000	112000	-	-
30"	165000	165000	165000	120000	-	-
36x30"	64000	64000	64000	61500	-	-
32"	170000	170000	170000	15100	-	-
36x32"	87000	87000	87000	69500	-	-
36"	210000	210000	210000	198200	-	-
40"	267500	267500	267500	-	-	-
42x36"	96700	96700	96700	-	-	-
42"	280000	280000	280000	-	-	-
48"	284000	284000	284000	-	-	-
56x42"	89000	89000	89000	-	-	-
56"	521000	521000	521000	-	-	-

## PRODUCT SELECTION

**VT - BV - T - XX - XX - XX - XX - XX - XX - XX - X - X**



T
Trunnion Mounted

Size
2" - 60"

BORE
FB Full Bore
RB Reduce Bore

PRESSURE RATING
1 Class 150
3 Class 300
4 Class 400
6 Class 600
9 Class 900
15 Class 1500
25 Class 2500

BODY
C WCB
CL LCC
3 CF3
3M CF3M
8 CF8
8M CF8M
S Special Alloy

BALL MATERIAL
C Carbon Steel
2 SS304
3 SS304L
4 SS316L
6 Alloy Steel
9 MONEL
10 SS316

SEAT
N Nylon
P PTFE + SS
K PEEK
J Carbon Fiber
PL PPL
TC Tungsten Carbide Coating

END CONNECTION
BW Butt-Weld
RF Flanged
RTJ Ring Type Joint

DESIGN TYPE
2 2 pcs Body Design (Cast)
3 3 pcs Body Design (Forged)
W Welded Body
T Top Entry

OPERATOR
B Bare Stem
G Gear Operated
E Electric Operated
P Pneumatic Actuator
S Scotch & Yoke



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