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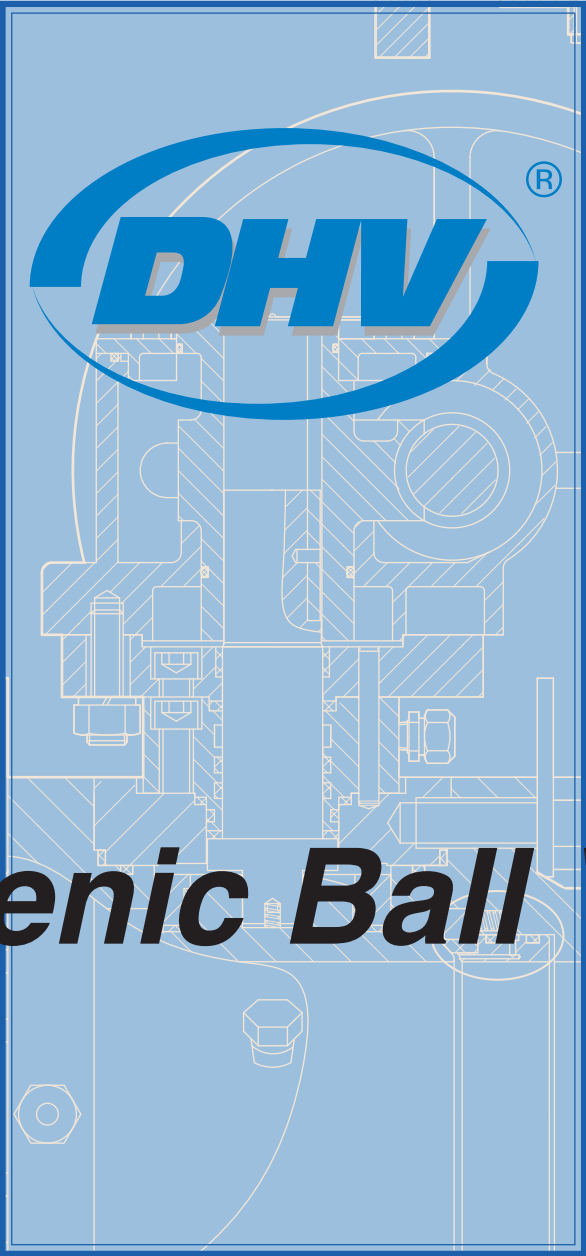
DHV Industries, Inc.
3451 Pegasus Drive, Bakersfield, CA 93308 USA
Call Toll Free: (877) DHV-USA1
Tel: (661) 392-8948 Fax: (661) 392-8947
E-mail: sales@dhvindustries.com
Website: www.dhvindustries.com

Your local DHV agent

DHV Valve & Foundry Co., Ltd
No. 666, Ganquan West Road,
Wujiang Economic Development Zone,
Suzhou, Jiangsu,
215200, China
Tel: 86-512-82079288
Fax: 86-512-82079860
E-mail: sales@dhvfoundry.com
Website: www.dhvfoundry.com

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Cryogenic Ball Valves



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Introduction

Quality is our commitment, while competitive price and timely delivery is our promise. **From** the beginning, the DHV name has become associated with quality in every step of our manufacturing process. For the past decades our customers worldwide have trusted us to provide them with consistent and reliable valve products in their most severe and critical service. **We** at DHV are proud of our ability to meet the stringent requirements of Refining, Gas/Oil, Pipeline, Petrochemical and Power Plant. **DHV** Ball Valves are designed, manufactured and tested to the latest manufacturing specifications of the American & International Standards Organizations. We welcome your challenges and look forward to serving your critical project needs.

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DHV Figure Numbers

Ball Valves

Type

1 = Floating Ball Split Body, Full Bore	C3 = Trunnion Ball Valve, Fully Welded, Two-Piece Body, Full Bore
2 = Floating Ball Split Body, Reduced Bore	C4 = Trunnion Ball Valve, Fully Welded, Two-Piece Body, Reduced Bore
3 = Trunnion Ball Two-Piece Body, Full Bore	C5 = Trunnion Ball Valve, Fully Welded, Three-Piece Body, Full Bore
4 = Trunnion Ball Two-Piece Body, Reduced Bore	C6 = Trunnion Ball Valve, Fully Welded, Three-Piece Body, Reduced Bore
5 = Trunnion Ball Three-Piece Body, Full Bore	D = Rising Stem Ball Valves, Full Bore
6 = Trunnion Ball Three-Piece Body, Reduced Bore	E = Rising Stem Ball Valves, Reduced Bore
7 = Floating Ball One-Piece Body, Reduced Bore	X = Special
8 = Small size Floating Ball valve. see*	
9 = Top Entry Trunnion Ball Valves	
0 = Three Way Ball Valves	

Note: *For valve bore type note designated, For valve bore type not designated, add R for reduce bore, F for full bore. 8R is reduce bore small size ball valve, 8F is full bore small size ball valve.

Code

B = Ball Valves
L = Cryogenic Ball Valves
M = Metal-to-Metal Seat Ball Valves

Body Material

0 = ASTM A216 WCB
1 = ASTM A105
2 = ASTM A352 LCB
3 = ASTM A350 LF2
4 = ASTM A351 CF8M
5 = ASTM A182 F316
6 = ASTM A351 CF8
7 = ASTM A182 F304
8 = ASTM A890 4A
9 = ASTM A182 F51
A = ASTM A352 LCC
B = Inconel
C = Monel
D = Super Duplex S.S.
E = ASTM A240 UNS N08926
F = ASTM A216 WCC
X = Special

Pressure Class

15 = Class 150
30 = Class 300
60 = Class 600
80 = Class 800
90 = Class 900
150 = Class 1500
250 = Class 2500
100=1000 WOG
200=2000 WOG
300=3000 WOG
500=5000 WOG
600=6000 WOG
1000=10000 WOG

6" Cryogenic Ball Valve, Trunnion Ball, Three-Piece Body, Full Bore, Class 900LB, ASTM A182 F316 Body & Adapter Raised Face Flanged End, with 316SS Trim and PCTFE+Lipseal / Graphite Seat and Seal, Gear Operated, Inconel 625 Overlay, Single Piston Seat.

Example: 6"-L5905F3C-GO-I-SPE

End Connections

F = Raised Face Flanged End
R = Ring Type Joint Flanged End
P = Plain Flat Face Flanged End
B = Butt-welded End
T = Threaded End
S = Socked-Welded End
X = Other Type End Connection
G = Grayloc Hub End
U = Pup Piece End

Trim Material

1 = C.S. + ENP	B = S.S.+ HCr
2 = 304SS	C = Super Duplex S.S.
3 = 316SS	D = S.S.+ T.C
4 = 13Cr / F6	E = C.S.+ T.C
5 = Duplex S.S.	F = C.S.+ Ni
6 = Monel	G = C.S.+ HCr
7 = Inconel	H = C.S.+ CCC
8 = B16	I = S.S.+ CCC
9 = B62	X = Special
A = S.S.+ Ni	

Seat Material

1 = PTFE
2 = R-PTFE
3 = NYLON
4 = VITON
5 = DEVLON
6 = NBR
7 = PEEK (HT4)
8 = Ni
9 = STL
A = CCC
B = T.C
M = NYLON-M
C = PCTFE
P = PAI
X = Special

Operator

NONE = Lever or Handwheel Operator
CO = Chain Wheel Operator
GO = Gear Operator
BS = Bare Stem
EM = Electric Motor Operator
PA = Pneumatic Actuator
HA = Hydraulic Actuator
PH = Pneumatic-Hydraulic Actuator

Internal Coating

None = No Coating
P=Plasite 7159
E = Enduro Bond
I = Inconel 625 Overlay
N = Inconel 825 Overlay
D = Duplex SS Overlay

Seat Function

None = Self Relieving Seat
SPE = Single Piston Effect
DIB-1 = DPE x DPE
DIB-2 = SPE x DPE
BB = Block and Bleed
DPE = Double Piston Effect



Cryogenic Floating Ball Valves

Design Features

ISO 5211 mounting pad for various actuators—lever, gearbox, pneumatic actuator, etc.

Adjustable packing gland

Fire-safe graphite

PTFE lip seal

Fire-safe gasket

PTFE lip seal

PCTFE/PAI seat provides excellent sealing performance in cryogenic service

Fire-safe design to API 607

Cavity relief hole is positioned upstream when the valve is in the closed position, preventing abnormal cavity pressure increase caused by temperature variation.

The live-loaded packing design allows the packing to maintain compression force compensation during drastic changes in temperature, pressure and packing wear. This ensures excellent sealing performance and extends the life of the packing.

Extended bonnet distances the stuffing box away from the cryogenic area, and aids in prevention of stem sealing failure due to low temperature.

Drip plate design for thermal transfer and containment of condensation.

Anti-static device

Fire-safe gasket

PTFE lip seal

Blowout proof stem

High-precision bearing prevents the stem from galling and also reduces operating torque.

Uni-directional design

General Note: Structure shown in the picture is only typical structure, we can provide a variety of structures according to customer requirements, such as metal seated structure.



Cryogenic Floating Ball Valves

Applicable Standards

Basic Design: **ISO 17292, API 608, ASME B16.34, MESG SPE 77/200**

Face to Face: **ASME B16.10**

Flange End: **ASME B16.5**

Butt Welding End: **ASME B16.25**

Test and Inspection: **API 598, BS 6364, MESG SPE 77/200, MSS SP-134**

Fire-safe Test: **API 607**

Manufacturing to NACE latest version on request

CSA Z245.15 latest version compliance is available

Specifications

Size Range: **1/2"~12"**

Pressure Range: **150LB~2500LB**

End Connection: **Flanged end / Butt welding end**

Bore: **Full bore / Reduced bore**

Body Construction: **Two-piece cast steel
Two-piece forged steel**

Valve Direction: **Uni-directional**

Temperature Range: **Down to -196°C**

Service: **LNG / LN₂ / LO₂ terminals, Air separation plants,
LNG / LN₂ / LO₂ transportation, and more**

Operation: **Lever, Gearbox, Pneumatic actuator, and more**

Material: **Body: A182 F316, A351 CF8M, and more**

**Trim: A182 F316, A182 FXM-19,
UNS N06625, UNS N07718, and more**





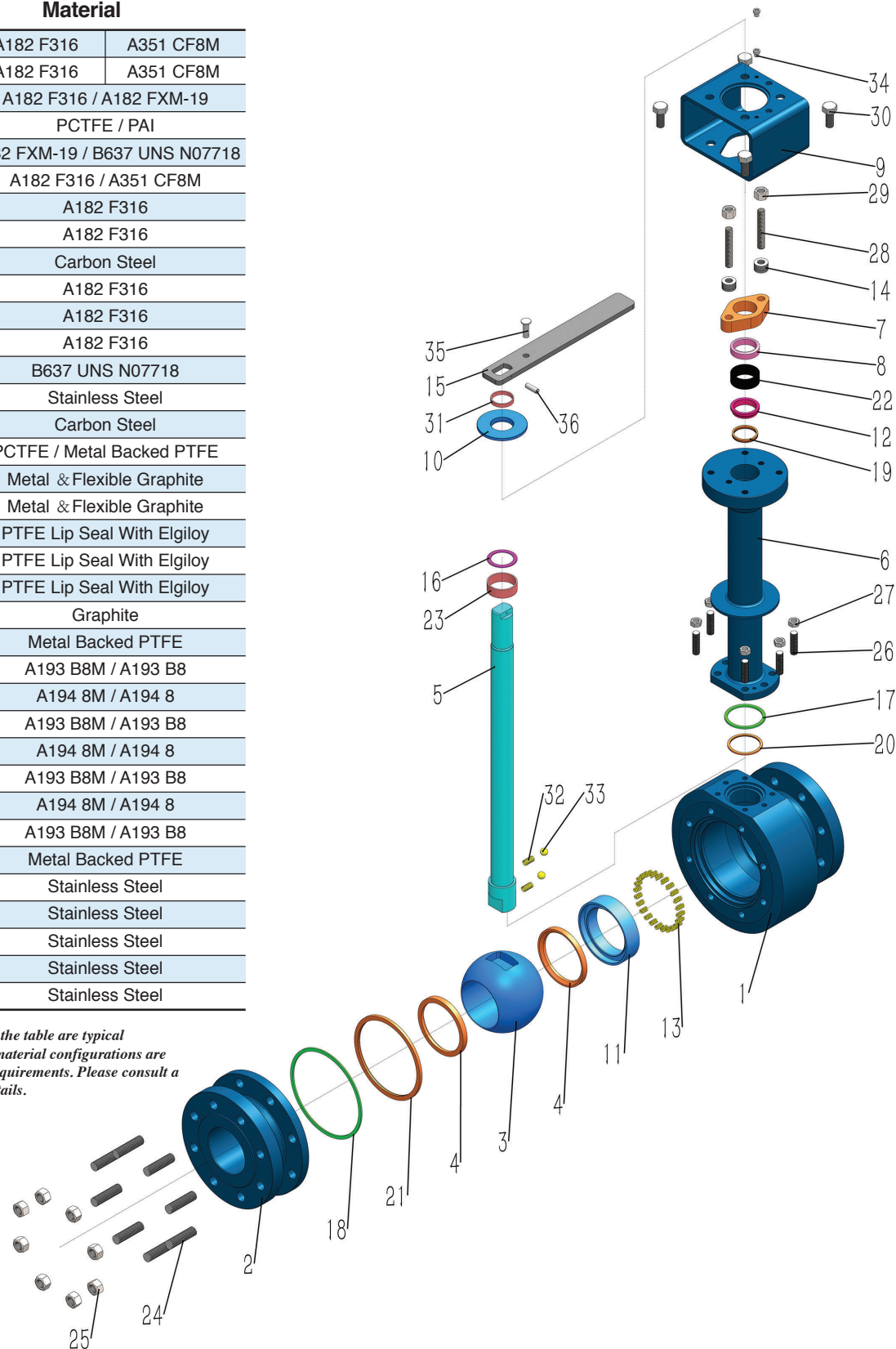
Cryogenic Floating Ball Valves

Two-piece Body Ball Valves

Material Specification

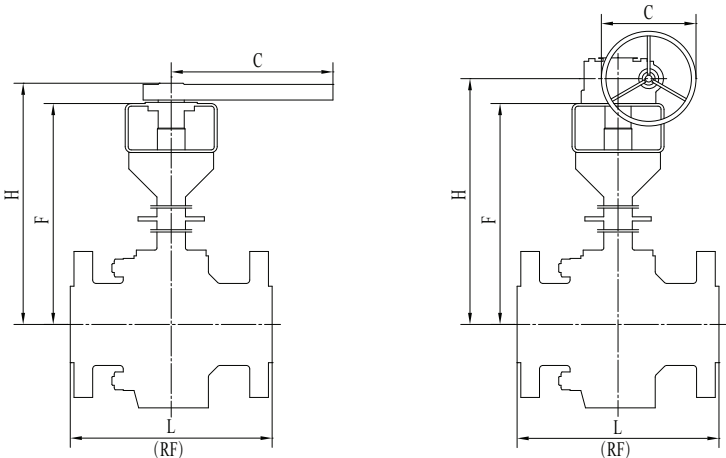
No.	Description	Material	
1	Body	A182 F316	A351 CF8M
2	Cap	A182 F316	A351 CF8M
3	Ball	A182 F316 / A182 FXM-19	
4	Seat	PCTFE / PAI	
5	Stem	A182 FXM-19 / B637 UNS N07718	
6	Extended Bonnet	A182 F316 / A351 CF8M	
7	Packing Gland	A182 F316	
8	Packing Ring	A182 F316	
9	Bracket	Carbon Steel	
10	Bushing	A182 F316	
11	Seat Retainer	A182 F316	
12	Backing Ring	A182 F316	
13	Spring	B637 UNS N07718	
14	Disc Spring	Stainless Steel	
15	Lever	Carbon Steel	
16	Thrust Washer	PCTFE / Metal Backed PTFE	
17	Fire-safe Seal	Metal & Flexible Graphite	
18	Fire-safe Seal	Metal & Flexible Graphite	
19	Primary Seal	PTFE Lip Seal With Elgiloy	
20	Primary Seal	PTFE Lip Seal With Elgiloy	
21	Primary Seal	PTFE Lip Seal With Elgiloy	
22	Fire-safe Seal	Graphite	
23	Bearing	Metal Backed PTFE	
24	Stud	A193 B8M / A193 B8	
25	Nut	A194 8M / A194 8	
26	Stud	A193 B8M / A193 B8	
27	Nut	A194 8M / A194 8	
28	Stud	A193 B8M / A193 B8	
29	Nut	A194 8M / A194 8	
30	Bolt	A193 B8M / A193 B8	
31	Bearing	Metal Backed PTFE	
32	Spring	Stainless Steel	
33	Steel Ball	Stainless Steel	
34	Bolt	Stainless Steel	
35	Locking Pin	Stainless Steel	
36	Pin	Stainless Steel	

General Note: Materials shown in the table are typical configurations, a variety of other material configurations are available according to customer requirements. Please consult a DHV representative for further details.



Cryogenic Floating Ball Valves

Two-piece Body Ball Valves



Class	Lever	Gear
150LB	≤ 2"	≥ 3"
300LB	≤ 2"	≥ 3"
600LB	≤ 1 1/2"	≥ 2"
900LB / 1500LB	≤ 1"	≥ 1 1/2"
2500LB	≤ 3/4"	≥ 1"

150LB

Description		Valve Size										
		1/2"	3/4"	1"	1 1/2"	2"	3"	4"	6"	8"	10"	12"
Flanged End L	in	4.25	4.62	5.00	6.50	7.00	8.00	9.00	15.50	18.00	21.00	24.00
	mm	108	117	127	165	178	203	229	394	457	533	610
Height F	in	15.51	15.75	16.06	18.15	18.82	22.60	24.65	30.47	34.80	37.95	41.97
	mm	394	400	408	461	478	574	626	774	884	964	1066
Height H	in	16.02	16.26	16.57	18.66	19.53	24.25	27.13	33.50	37.24	40.55	45.08
	mm	407	413	421	474	496	616	689	851	946	1030	1145
Handle Length / Handwheel Dia C	in	7.87	7.87	9.84	11.81	13.78	13.78	19.69	19.69	27.56	27.56	27.56
	mm	200	200	250	300	350	350	500	500	700	700	700

300LB

Description		Valve Size									
		1/2"	3/4"	1"	1 1/2"	2"	3"	4"	6"	8"	10"
Flanged End L	in	5.50	6.00	6.50	7.50	8.50	11.12	12.00	15.88	19.75	22.38
	mm	140	152	165	190	216	282	305	403	502	568
Height F	in	15.51	15.75	16.06	18.15	18.82	22.60	24.65	30.47	34.80	37.95
	mm	394	400	408	461	478	574	626	774	884	964
Height H	in	16.02	16.26	16.57	18.66	19.53	24.25	27.13	33.50	37.24	40.55
	mm	407	413	421	474	496	616	689	851	946	1030
Handle Length / Handwheel Dia C	in	9.84	11.81	11.81	13.78	15.75	13.78	19.69	19.69	27.56	27.56
	mm	250	300	300	350	400	350	500	500	700	700

600LB

Description		Valve Size						900LB / 1500LB					2500LB			
		1/2"	3/4"	1"	1 1/2"	2"	3"	1/2"	3/4"	1"	1 1/2"	2"	1/2"	3/4"	1"	1 1/2"
Flanged End L	in	6.50	7.50	8.50	9.50	11.50	14.00	8.50	9.00	10.00	12.00	14.50	10.38	10.75	12.12	15.12
	mm	165	190	216	241	292	356	216	229	254	305	368	264	273	308	384
Height F	in	15.51	15.75	16.06	18.15	18.98	23.46	15.79	16.02	16.30	18.62	21.54	15.91	16.18	16.57	18.82
	mm	394	400	408	461	482	596	401	407	414	473	547	404	411	421	478
Height H	in	16.02	16.26	16.57	18.66	20.63	25.94	16.30	16.54	16.81	20.28	24.02	16.42	16.69	18.23	20.47
	mm	407	413	421	474	524	659	414	420	427	515	610	417	424	463	520
Handle Length / Handwheel Dia C	in	11.81	11.81	15.75	17.72	9.84	19.69	15.75	15.75	19.69	9.84	19.69	19.69	19.69	9.84	9.84
	mm	300	300	400	450	250	500	400	400	500	250	500	500	500	250	250

Note: Data listed above is for reference only. For detailed product data, please refer to the order confirmation drawing.



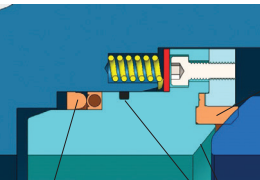
Cryogenic Trunnion Mounted Ball Valves— Side Entry Design Features

ISO 5211 mounting pad for various actuators—lever, gearbox, pneumatic actuator, etc.

Adjustable packing gland

Fire-safe graphite

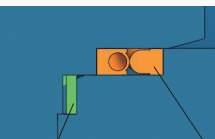
PTFE lip seal



Excellent PCTFE / PAI seat seal

PTFE lip seal
SPE seat only for example, DPE seat can be provided upon request

Bearing retainer, and trunnion for small size



Fire-safe gasket PTFE lip seal

The live-loaded packing design allows the packing to maintain compression force compensation during drastic changes in temperature, pressure and packing wear. This ensures excellent sealing performance and extends the life of the packing.

Extended bonnet distances the stuffing box away from the cryogenic area, and aids in prevention of stem sealing failure due to low temperature.

Drip plate design for thermal transfer and containment of condensation.

High-precision bearing prevents the stem from galling and also reduces operating torque.

Fire-safe gasket

PTFE lip seal

Blowout proof stem

Anti-static device

Drain plug

General Note: Structure shown in the picture is only typical structure, we can provide a variety of structures according to customer requirements, such as metal seated structure.



Cryogenic Trunnion Mounted Ball Valves— Side Entry

Applicable Standards

- Basic Design: **API 6D, API 608, ASME B16.34, MESC SPE 77/200**
- Face to Face: **ASME B16.10, API 6D**
- Flange End: **ASME B16.5**
- Butt Welding End: **ASME B16.25**
- Test and Inspection: **API 598, BS 6364, MESC SPE 77/200, MSS SP-134**
- Fire-safe Test: **API 6FA or API 607**
- Manufacturing to NACE latest version on request
CSA Z245.15 latest version compliance is available

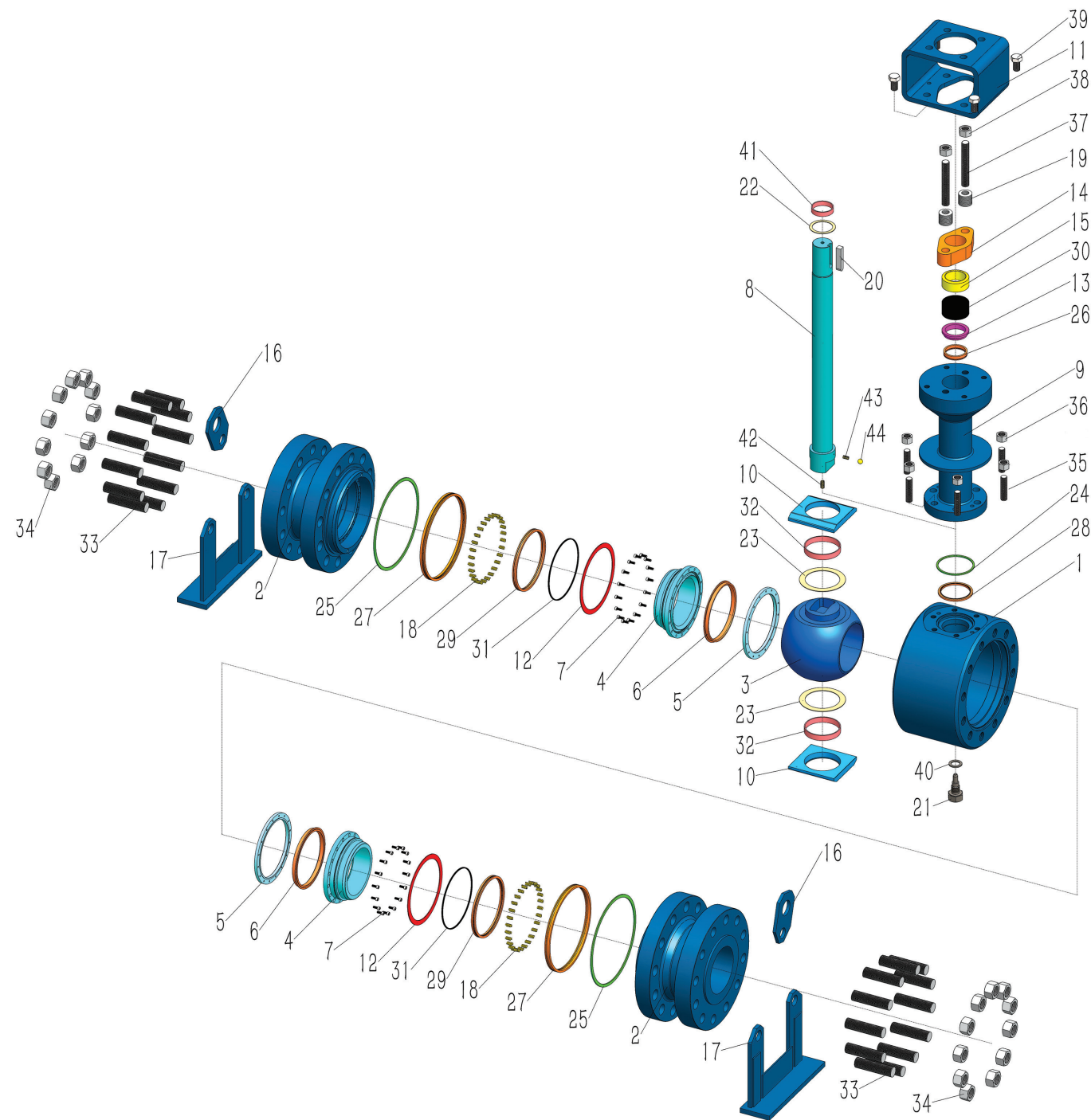
Specifications

- Size Range: **2"~24"**
- Pressure Range: **150LB~2500LB**
- End Connection: **Flanged end / Butt welding end**
- Bore: **Full bore / Reduced bore**
- Body Construction: **Two-piece cast steel
Three-piece forged steel**
- Seat Piston: **Single piston / Double piston**
- Valve Direction: **Bi-directional**
- Temperature Range: **Down to -196°C**
- Service: **LNG / LN₂ / LO₂ terminals, Air separation plants, LNG / LN₂ / LO₂ transportation, and more**
- Operation: **Lever, Gearbox, Pneumatic actuator, and more**
- Material: **Body: A182 F316, A351 CF8M, and more
Trim: A182 F316, A182 FXM-19, UNS N06625, UNS N07718, and more**
- Isolation Valve Features: **DBB: Two SPE (Single Piston Effect) seats
DIB-1: Two DPE (Double Piston Effect) seats
DIB-2: One SPE seat and one DPE seat**

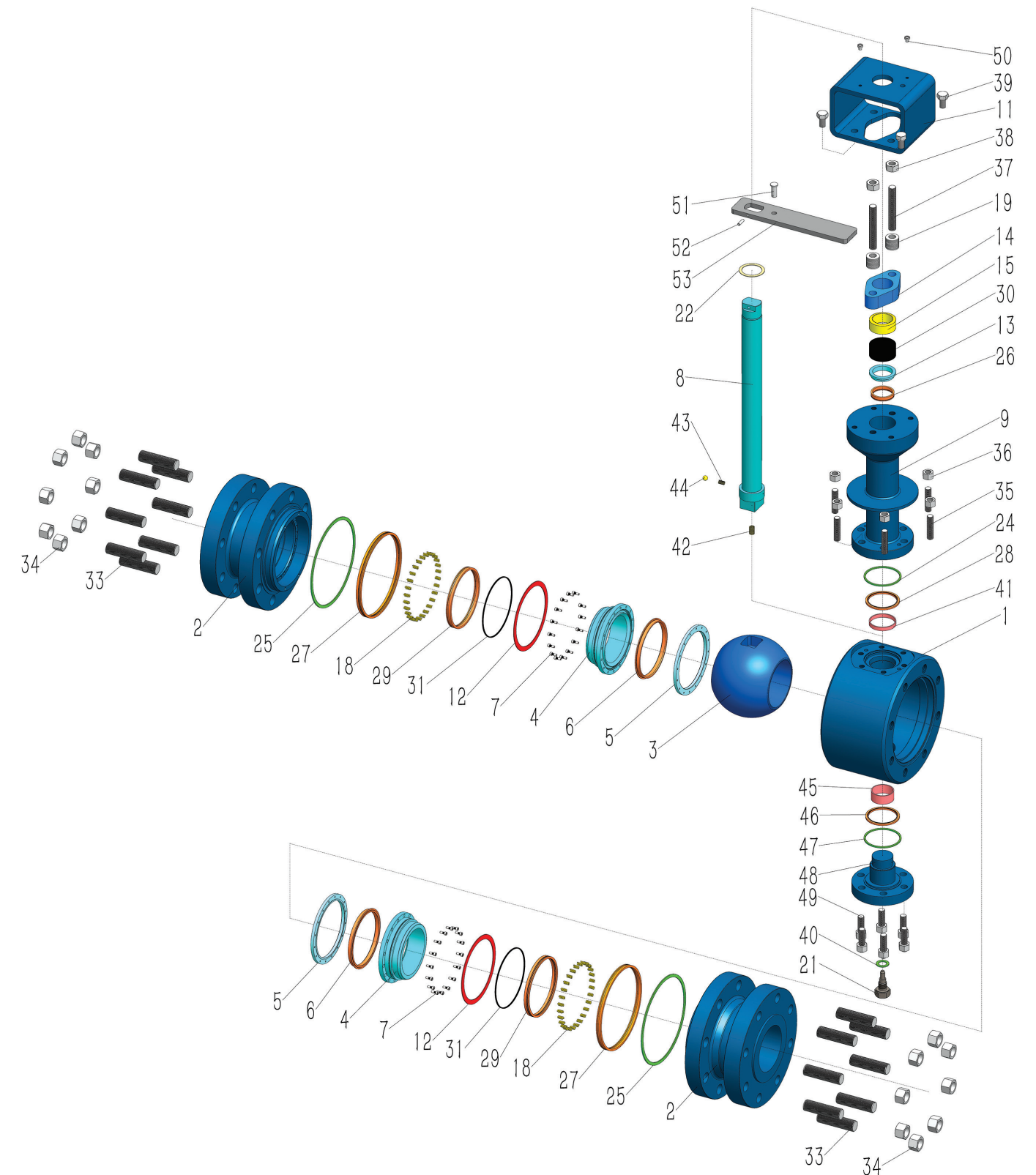




Cryogenic Trunnion Mounted Ball Valves — Side Entry Three-piece Forged Steel Body, Bearing Retainer, Actuator Operation



Cryogenic Trunnion Mounted Ball Valves — Side Entry Three-piece Forged Steel Body, Trunnion, Lever Operation





Cryogenic Trunnion Mounted Ball Valves— Side Entry

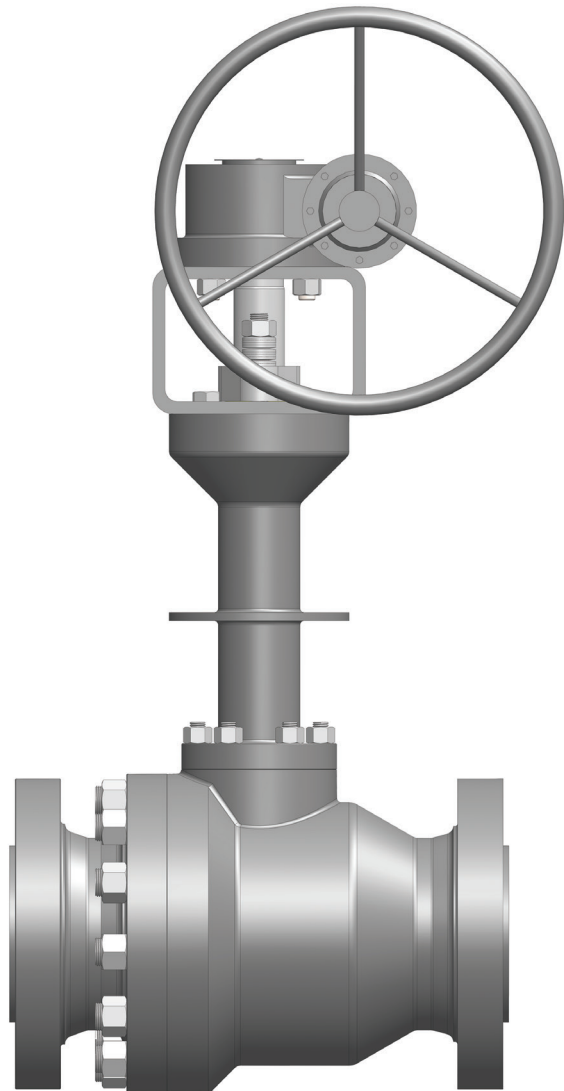
Material Specification

No.	Description	Material	
1	Body	A182 F316	A351 CF8M
2	Cap	A182 F316	A351 CF8M
3	Ball	A182 F316 / A182 FXM-19	
4	Seat	A182 F316 / A182 FXM-19	
5	Junk Ring	A182 F316 / A182 FXM-19	
6	Seat Insert	PCTFE / PAI	
7	Bolt	A193 B8M / A193 B8	
8	Stem	A182 FXM-19 / B637 UNS N07718	
9	Extended Bonnet	A182 F316 / A351 CF8M	
10	Bearing Retainer	A182 F316	
11	Bracket	Carbon Steel	
12	Backup Ring	A182 F316	
13	Backing Ring	A182 F316	
14	Packing Gland	A182 F316	
15	Packing Ring	A182 F316	
16	Lifting Lug	Stainless Steel	
17	Support Leg	Stainless Steel	
18	Spring	B637 UNS N07718	
19	Disc Spring	Stainless Steel	
20	Key	Carbon Steel	
21	Plug	A182 F316	
22	Thrust Washer	PCTFE / Metal Backed PTFE	
23	Thrust Washer	PCTFE	
24	Fire-Safe Seal	Metal & Flexible Graphite	
25	Fire-Safe Seal	Metal & Flexible Graphite	
26	Primary Seal	PTFE Lip Seal With Elgiloy	
27	Primary Seal	PTFE Lip Seal With Elgiloy	
28	Primary Seal	PTFE Lip Seal With Elgiloy	
29	Primary Seal	PTFE Lip Seal With Elgiloy	
30	Fire-Safe Seal	Graphite	
31	Fire-Safe Seal	Graphite	
32	Bearing	Metal Backed PTFE	
33	Stud	A193 B8M / A193 B8	
34	Nut	A194 8M / A194 8	
35	Stud	A193 B8M / A193 B8	
36	Nut	A194 8M / A194 8	
37	Stud	A193 B8M / A193 B8	
38	Nut	A194 8M / A194 8	
39	Bolt	A193 B8M / A193 B8	
40	Fire-Safe Seal	Metal & Flexible Graphite	
41	Bearing	Metal Backed PTFE	
42	Spring	Stainless Steel	
43	Spring	Stainless Steel	
44	Steel Ball	Stainless Steel	
45	Bearing	Metal Backed PTFE	

Material Specification

No.	Description	Material
46	Primary Seal	PTFE Lip Seal With Elgiloy
47	Fire-Safe Seal	Metal & Flexible Graphite
48	Trunnion	A182 F316
49	Bolt	A193 B8M / A193 B8
50	Bolt	Stainless Steel
51	Locking Pin	Stainless Steel
52	Pin	Stainless Steel
53	Lever	Carbon Steel

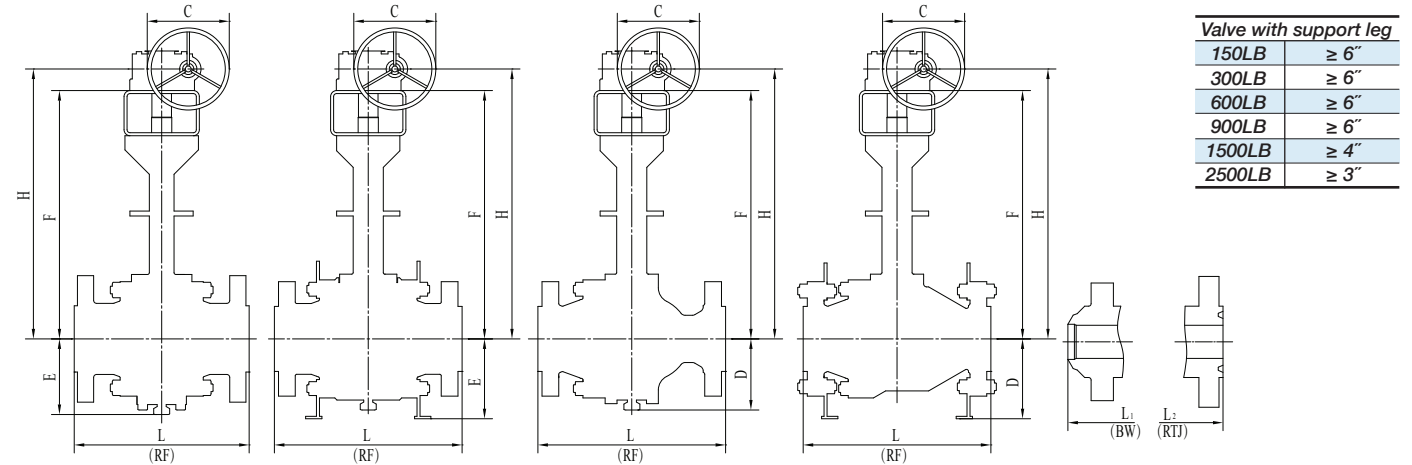
General Note: Materials shown in the table are typical configurations, a variety of other material configurations are available according to customer requirements. Please consult a DHV representative for further details.



Two-piece cast steel body structure



Cryogenic Trunnion Mounted Ball Valves — Side Entry Two-piece or Three-piece Body Ball Valves



Three-piece Forged Steel Body

Two-piece Cast Steel Body

150LB

Description		Valve Size											
		2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"
Flanged End L	in	7.00	8.00	9.00	15.50	18.00	21.00	24.00	27.00	30.00	34.00	36.00	42.00
	mm	178	203	229	394	457	533	610	686	762	864	914	1067
Weld End L ₁	in	8.50	11.13	12.00	18.00	20.50	22.00	25.00	30.00	33.00	36.00	39.00	45.00
	mm	216	283	305	457	521	559	635	762	838	914	991	1143
Height F	in	19.29	23.19	24.13	28.90	33.35	36.61	39.45	42.91	45.87	49.53	50.67	55.91
	mm	490	589	613	734	847	930	1002	1090	1165	1258	1287	1420
Height H	in	20.94	25.67	26.61	31.93	35.79	39.06	42.56	46.02	51.18	54.84	55.98	63.35
	mm	532	652	676	811	909	992	1081	1169	1300	1393	1422	1609
Handle Length / Handwheel Dia C	in	9.84	19.69	19.69	19.69	27.56	27.56	27.56	27.56	27.56	27.56	27.56	27.56
	mm	250	500	500	500	700	700	700	700	700	700	700	700
Height D	in	5.20	6.34	7.13	7.48	8.70	10.47	12.24	14.37	15.35	17.95	18.31	23.27
	mm	132	161	181	190	221	266	311	365	390	456	465	591
Height E	in	4.84	5.94	6.81	9.41	10.55	14.21	15.75	17.68	18.94	20.71	21.54	33.46
	mm	123	151	173	239	268	361	400	449	481	526	547	850

300LB

Description		Valve Size											
		2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"
Flanged End L	in	8.50	11.13	12.00	15.88	19.75	22.38	25.50	30.00	33.00	36.00	39.00	45.00
	mm	216	283	305	403	502	568	648	762	838	914	991	1143
Weld End L ₁	in	8.50	11.13	12.00	18.00	20.50	22.00	25.00	30.00	33.00	36.00	39.00	45.00
	mm	216	283	305	457	521	559	635	762	838	914	991	1143
Height F	in	19.29	23.19	24.13	28.90	33.35	36.61	39.45	42.91	45.87	49.53	50.67	56.14
	mm	490	589	613	734	847	930	1002	1090	1165	1258	1287	1426
Height H	in	20.94	25.67	26.61	31.93	35.79	39.06	42.56	46.02	51.18	54.84	55.98	63.58
	mm	532	652	676	811	909	992	1081	1169	1300	1393	1422	1615
Handle Length / Handwheel Dia C	in	9.84	19.69	19.69	19.69	27.56	27.56	27.56	27.56	27.56	27.56	27.56	27.56
	mm	250	500	500	500	700	700	700	700	700	700	700	700
Height D	in	5.20	6.34	7.13	8.07	9.09	11.46	12.13	13.74	14.65	18.03	18.39	23.98
	mm	132	161	181	205	231	291	308	349	372	458	467	609
Height E	in	4.84	5.94	6.81	9.41	10.71	14.33	16.22	17.68	18.98	20.59	21.81	33.82
	mm	123	151	173	239	272	364	412	449	482	523	554	859

Note: Data listed above is for reference only. For detailed product data, please refer to the order confirmation drawing.



Cryogenic Trunnion Mounted Ball Valves — Side Entry Two-piece or Three-piece Body Ball Valves

600LB

Description		Valve Size											
		2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"
Flanged End L	in	11.50	14.00	17.00	22.00	26.00	31.00	33.00	35.00	39.00	43.00	47.00	55.00
	mm	292	356	432	559	660	787	838	889	991	1092	1194	1397
Weld End L ₁	in	11.50	14.00	17.00	22.00	26.00	31.00	33.00	35.00	39.00	43.00	47.00	55.00
	mm	292	356	432	559	660	787	838	889	991	1092	1194	1397
RTJ L ₂	in	11.63	14.13	17.13	22.13	26.13	31.13	33.13	35.13	39.13	43.13	47.25	55.38
	mm	295	359	435	562	664	791	841	892	994	1095	1200	1407
Height F	in	18.86	23.50	25.55	31.93	34.53	38.07	41.50	44.76	48.07	52.13	53.50	56.73
	mm	479	597	649	811	877	967	1054	1137	1221	1324	1359	1441
Height H	in	20.51	25.98	28.58	34.37	37.64	41.18	46.81	50.08	55.51	59.57	60.94	64.17
	mm	521	660	726	873	956	1046	1189	1272	1410	1513	1548	1630
Handle Length / Handwheel Dia C	in	9.84	19.69	19.69	27.56	27.56	27.56	27.56	27.56	27.56	27.56	27.56	27.56
	mm	250	500	500	700	700	700	700	700	700	700	700	700
Height D	in	5.51	6.77	7.05	8.58	9.92	11.73	13.11	15.47	17.05	18.43	19.76	24.49
	mm	140	172	179	218	252	298	333	393	433	468	502	622
Height E	in	4.72	6.38	7.05	9.72	11.34	14.84	16.77	18.15	19.45	21.73	23.19	34.57
	mm	120	162	179	247	288	377	426	461	494	552	589	878

900LB

Description		Valve Size											
		2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"
Flanged End L	in	14.50	15.00	18.00	24.00	29.00	33.00	38.00	40.50	44.50	48.00	52.00	61.00
	mm	368	381	457	610	737	838	965	1029	1130	1219	1321	1549
Weld End L ₁	in	14.50	15.00	18.00	24.00	29.00	33.00	38.00	40.50	44.50	48.00	52.00	61.00
	mm	368	381	457	610	737	838	965	1029	1130	1219	1321	1549
RTJ L ₂	in	14.63	15.13	18.13	24.13	29.13	33.13	38.13	40.88	44.88	48.50	52.50	61.75
	mm	371	384	460	613	740	841	968	1038	1140	1232	1334	1568
Height F	in	21.65	25.04	26.73	32.44	35.28	40.87	42.44	47.28	48.98	52.48	56.22	59.37
	mm	550	636	679	824	896	1038	1078	1201	1244	1333	1428	1508
Height H	in	24.13	28.07	29.76	34.88	38.39	46.18	47.76	54.72	56.42	59.92	65.79	68.94
	mm	613	713	756	886	975	1173	1213	1390	1433	1522	1671	1751
Handle Length / Handwheel Dia C	in	19.69	19.69	19.69	27.56	27.56	27.56	27.56	27.56	27.56	27.56	27.56	27.56
	mm	500	500	500	700	700	700	700	700	700	700	700	700
Height D	in	6.69	7.17	7.80	9.13	10.98	13.11	14.21	15.47	16.85	18.31	19.25	26.61
	mm	170	182	198	232	279	333	361	393	428	465	489	676
Height E	in	6.38	6.77	7.48	10.47	11.85	15.87	17.80	18.98	20.75	22.01	32.13	35.31
	mm	162	172	190	266	301	403	452	482	527	559	816	897

1500LB

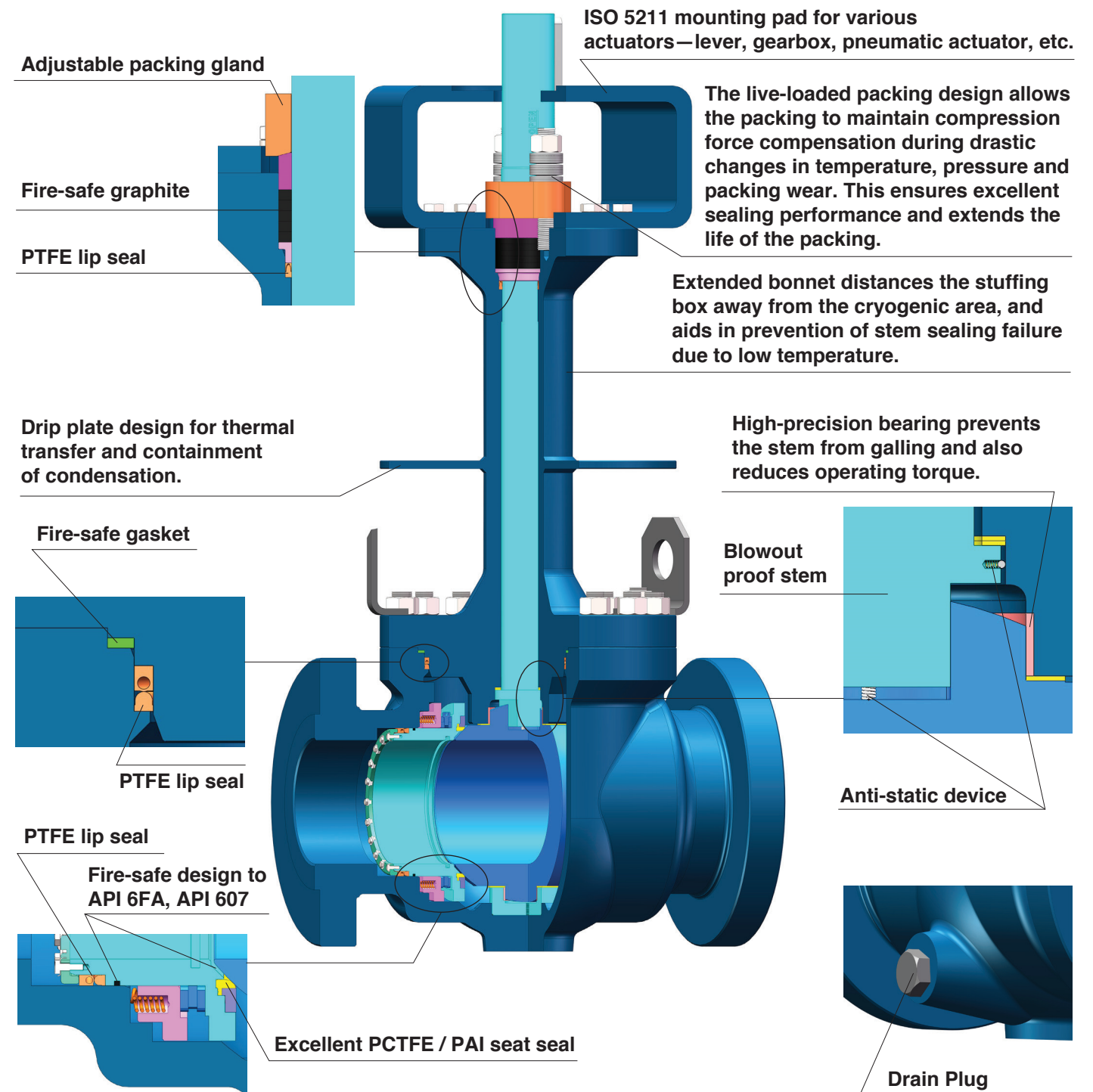
Description		Valve Size												2500LB							
		2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"	2"	3"	4"	6"	8"	10"	12"	
Flanged End L	in	14.50	18.50	21.50	27.75	32.75	39.00	44.50	49.50	54.50	60.50	65.50	76.50	17.75	22.75	26.50	36.00	40.25	50.00	56.00	
	mm	368	470	546	705	832	991	1130	1257	1384	1537	1664	1943	451	578	673	914	1022	1270	1422	
Weld End L ₁	in	14.50	18.50	21.50	27.75	32.75	39.00	44.50	49.50	54.50	60.50	65.50	76.50	17.75	22.75	26.50	36.00	40.25	50.00	56.00	
	mm	368	470	546	705	832	991	1130	1257	1384	1537	1664	1943	451	578	673	914	1022	1270	1422	
RTJ L ₂	in	14.63	18.63	21.63	28.00	33.13	39.38	45.13	50.25	55.38	61.38	66.38	77.63	17.88	23.00	26.88	36.50	40.88	50.88	56.88	
	mm	371	473	549	711	841	1000	1146	1276	1407	1559	1686	1972	454	584	683	927	1038	1292	1445	
Height F	in	21.65	26.93	29.33	34.13	37.99	43.94	45.91	48.98	50.71	56.22	57.48	63.23	23.82	28.94	30.20	35.98	42.09	46.42	48.07	
	mm	550	684	745	867	965	1116	1166	1244	1288	1428	1460	1606	605	735	767	914	1069	1179	1221	
Height H	in	24.13	29.96	31.77	37.24	43.31	51.38	53.35	56.42	58.15	65.79	67.05	69.76	26.85	31.38	32.64	39.09	49.53	53.86	55.51	
	mm	613	761	807	946	1100	1305	1355	1433	1477	1671	1703	1772	682	797	829	993	1258	1368	1410	
Handle Length / Handwheel Dia C	in	19.69	19.69	27.56	27.56	27.56	27.56	27.56	27.56	27.56	27.56	27.56	39.37	19.69	27.56	27.56	27.56	27.56	27.56	27.56	
	mm	500	500	700	700	700	700	700	700	700	700	700	1000	500	700	700	700	700	700	700	
Height D	in	6.69	7.64	10.39	11.38	16.02	16.26	16.93	17.76	19.37	21.26	21.93	29.29	8.50	9.84	11.06	13.58	17.83	18.70	21.93	
	mm	170	194	264	289	407	413	430	451	492	540	557	744	216	250	281	345	453	475	557	
Height E	in	6.38	7.48	9.06	10.79	13.11	17.32	19.45	20.83	22.64	24.37	33.94	40.24	8.19	9.33	10.43	12.99	15.43	19.96	21.65	
	mm	162	190	230	274	333	440	494	529	575	619	862	1022	208	237	265	330	392	507	550	

Note: Data listed above is for reference only. For detailed product data, please refer to the order confirmation drawing.



Cryogenic Trunnion Mounted Ball Valves— Top Entry Design Features

DHV cryogenic trunnion mounted ball valves have two seals- PTFE and graphite in both stem seal and body seal, makes the valve in compliance with ISO 15848-1 and MESC SPE 77/200 minimized fugitive emissions(class AH), and also in compliance with API 6FA, API 607 fire-safe test.



SPE seat only for example, DPE seat can be provided upon request

General Note:
Structure shown in the picture is only typical structure, we can provide a variety of structures according to customer requirements, such as metal seated structure.



Cryogenic Trunnion Mounted Ball Valves— Top Entry

Applicable Standards

Basic Design: **API 6D, API 608, ASME B16.34, MESG SPE 77/200**

Face to Face: **ASME B16.10, API 6D**

Flange End: **ASME B16.5**

Butt Welding End: **ASME B16.25**

Test and Inspection: **API 598, BS 6364, MESG SPE 77/200, MSS SP-134**

Fire-safe Test: **API 6FA or API 607**

Manufacturing to NACE latest version on request

CSA Z245.15 latest version compliance is available

Specifications

Size Range: **2"~24"**

Pressure Range: **150LB~2500LB**

End Connection: **Flanged end / Butt welding end**

Bore: **Full bore / Reduced bore**

Body Construction: **One-piece cast steel**

Seat Piston: **Single piston / Double piston**

Valve Direction: **Bi-directional**

Temperature Range: **Down to -196°C**

Service: **LNG / LN₂ / LO₂ terminals, Air separation plants, LNG / LN₂ / LO₂ transportation, and more**

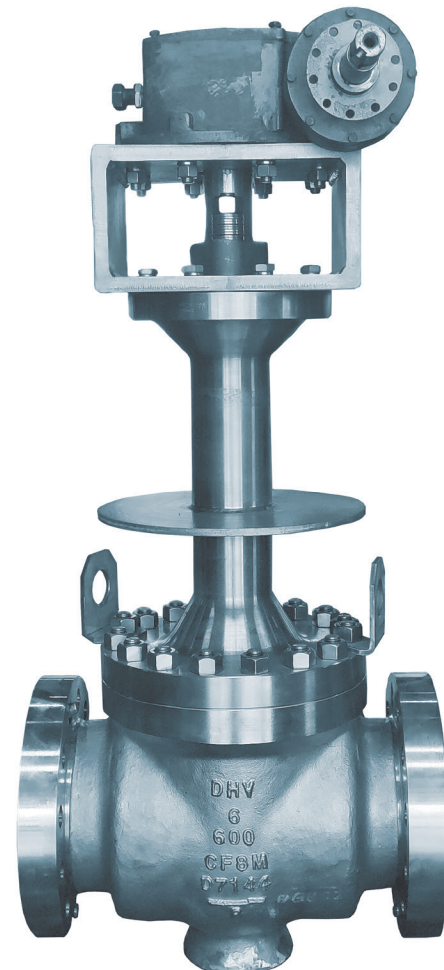
Operation: **Lever, Gearbox, Pneumatic actuator, and more**

Material: **Body: A351 CF8M, and more**

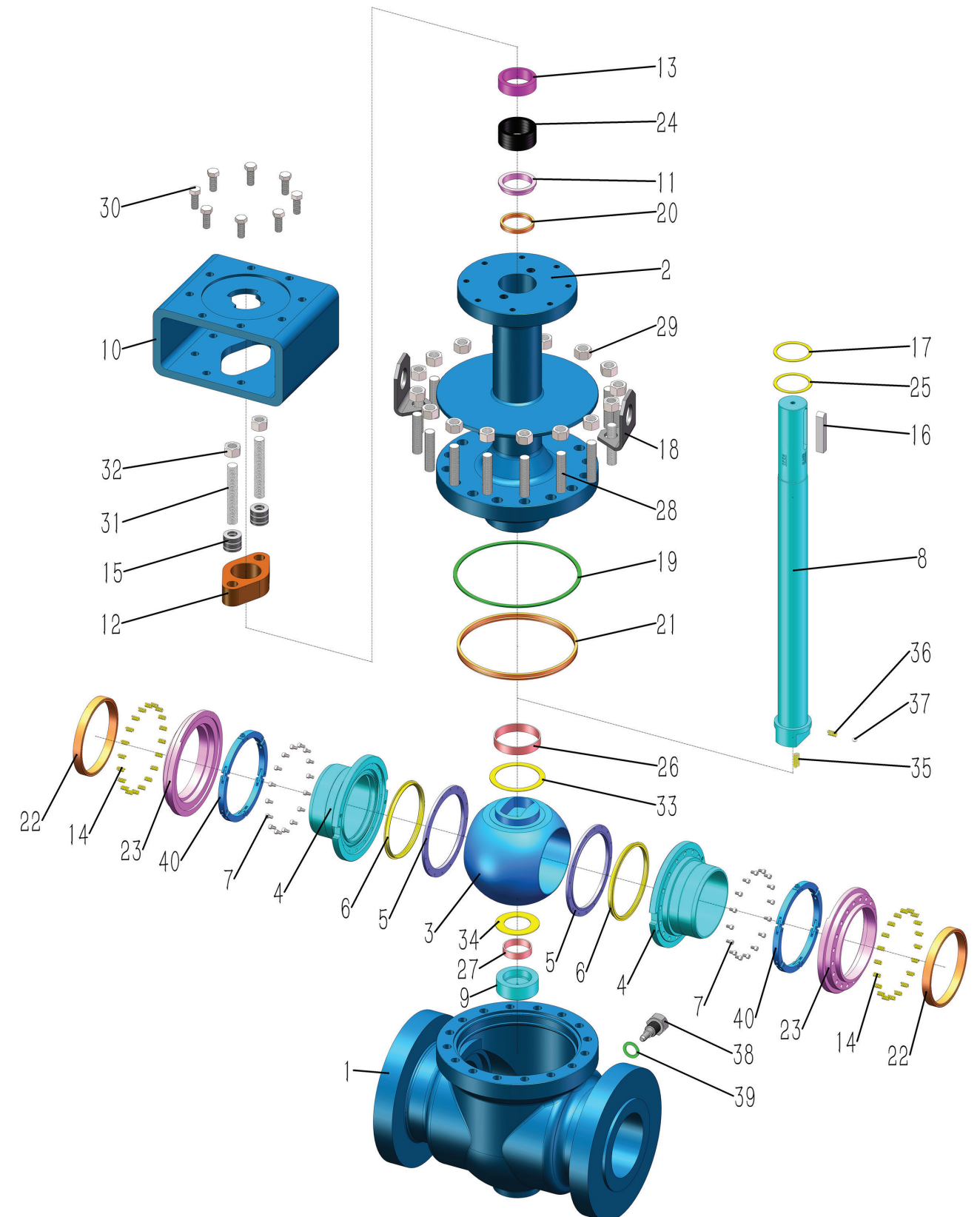
Trim: A182 F316, A182 FXM-19,

UNS N06625, UNS N07718, and more

Isolation Valve Features: **DBB: Two SPE (Single Piston Effect) seats**
DIB-1: Two DPE (Double Piston Effect) seats
DIB-2: One SPE seat and one DPE seat



Cryogenic Trunnion Mounted Ball Valves— Top Entry One-piece Cast Steel Body, Actuator Operation

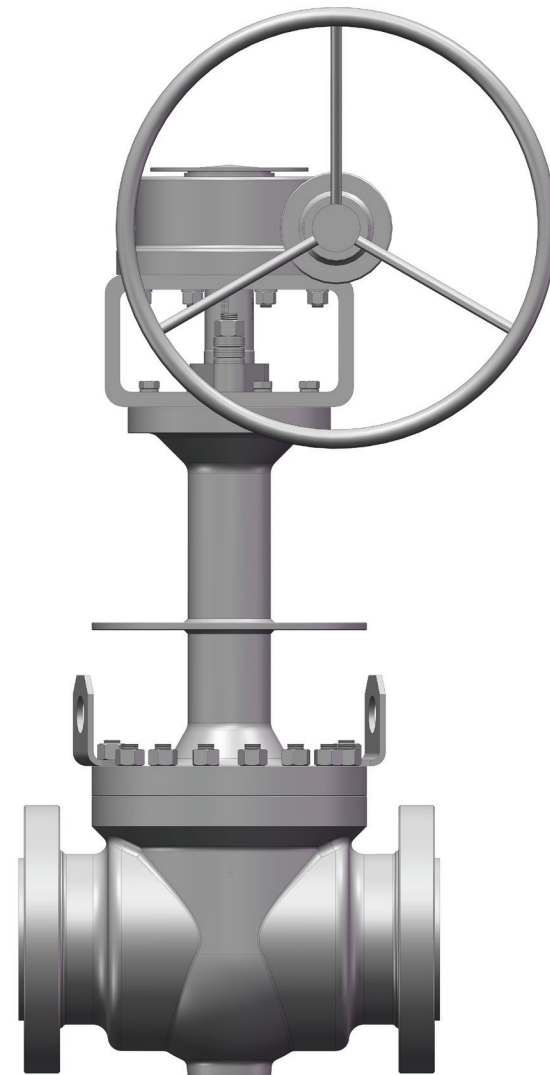




Cryogenic Trunnion Mounted Ball Valves— Top Entry

Material Specification

No.	Description	Material
1	Body	A351 CF8M
2	Extended Bonnet	A182 F316 / A351 CF8M
3	Ball	A182 F316 / A182 FXM-19
4	Seat	A182 F316 / A182 FXM-19
5	Junk Ring	A182 F316 / A182 FXM-19
6	Seat Insert	PCTFE / PAI
7	Bolt	A193 B8M / A193 B8
8	Stem	A182 FXM-19 / B637 UNS N07718
9	Trunnion	A182 F316
10	Bracket	Carbon Steel
11	Backing Ring	A182 F316
12	Packing Gland	A182 F316
13	Packing Ring	A182 F316
14	Spring	B637 UNS N07718
15	Disc Spring	Stainless Steel
16	Key	Carbon Steel
17	Thrust Washer	PCTFE / Metal Backed PTFE
18	Lifting Lug	Stainless Steel
19	Fire-Safe Seal	Metal & Flexible Graphite
20	Primary Seal	PTFE Lip Seal With Elgiloy
21	Primary Seal	PTFE Lip Seal With Elgiloy
22	Primary Seal	PTFE Lip Seal With Elgiloy
23	Seat Ring	A182 F316
24	Fire-Safe Seal	Graphite
25	Thrust Washer	Metal Backed PTFE
26	Bearing	Metal Backed PTFE
27	Bearing	Metal Backed PTFE
28	Stud	A193 B8M / A193 B8
29	Nut	A194 8M / A194 8
30	Bolt	A193 B8M / A193 B8
31	Stud	A193 B8M / A193 B8
32	Nut	A194 8M / A194 8
33	Thrust Washer	PCTFE
34	Thrust Washer	PCTFE
35	Spring	Stainless Steel
36	Spring	Stainless Steel
37	Steel Ball	Stainless Steel
38	Plug	A182 F316
39	Fire-Safe Seal	Metal & Flexible Graphite
40	Support Ring	A182 F316

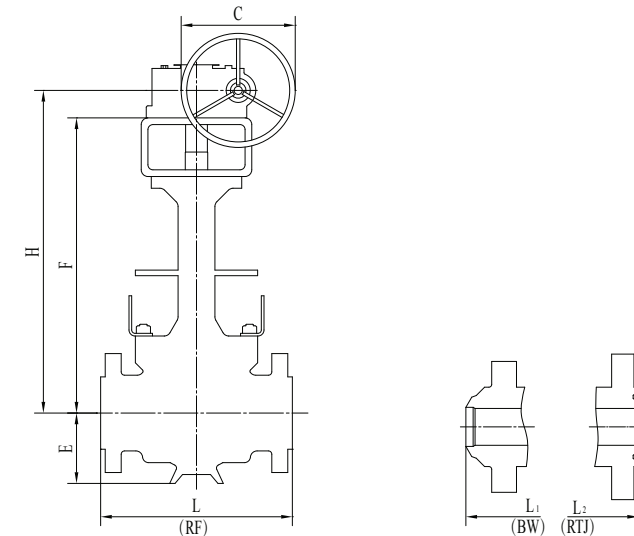


One-piece cast steel body structure

General Note: Materials shown in the table are typical configurations, a variety of other material configurations are available according to customer requirements. Please consult a DHV representative for further details.



Cryogenic Trunnion Mounted Ball Valves— Top Entry



150LB / 300LB

Description		Valve Size											
		2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"
Flanged End L	in	11.50	14.00	17.00	22.00	26.00	31.00	33.00	35.00	39.00	43.00	47.00	55.00
	mm	292	356	432	559	660	787	838	889	991	1092	1194	1397
Weld End L ₁	in	11.50	14.00	17.00	22.00	26.00	31.00	33.00	35.00	39.00	43.00	47.00	55.00
	mm	292	356	432	559	660	787	838	889	991	1092	1194	1397
Height F	in	19.41	23.54	24.84	28.98	34.02	36.97	39.53	42.68	45.31	48.66	50.04	54.96
	mm	493	598	631	736	864	939	1004	1084	1151	1236	1271	1396
Height H	in	21.06	26.02	27.32	32.01	36.46	39.41	42.64	45.79	50.63	53.98	55.35	62.40
	mm	535	661	694	813	926	1001	1083	1163	1286	1371	1406	1585
Handle Length / Handwheel Dia C	in	9.84	19.69	19.69	19.69	27.56	27.56	27.56	27.56	27.56	27.56	27.56	27.56
	mm	250	500	500	500	700	700	700	700	700	700	700	700
Height E	in	3.54	4.53	5.51	7.48	8.86	10.24	12.40	13.58	14.76	16.34	17.72	21.65
	mm	90	115	140	190	225	260	315	345	375	415	450	550

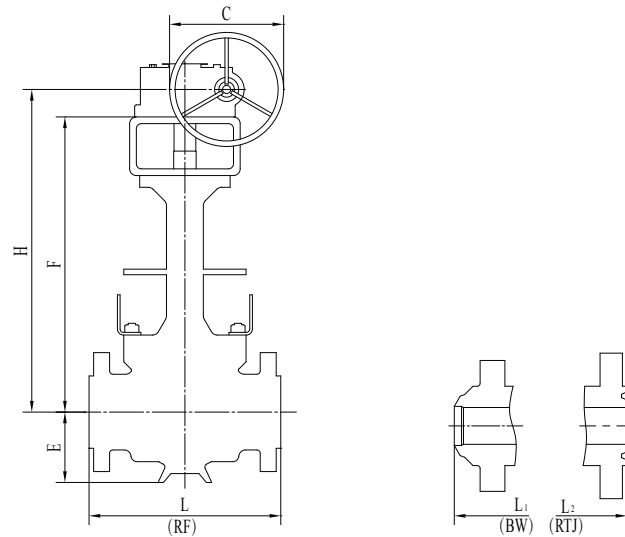
600LB

Description		Valve Size											
		2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"
Flanged End L	in	11.50	14.00	17.00	22.00	26.00	31.00	33.00	35.00	39.00	43.00	47.00	55.00
	mm	292	356	432	559	660	787	838	889	991	1092	1194	1397
Weld End L ₁	in	11.50	14.00	17.00	22.00	26.00	31.00	33.00	35.00	39.00	43.00	47.00	55.00
	mm	292	356	432	559	660	787	838	889	991	1092	1194	1397
RTJ L ₂	in	11.61	14.13	17.13	22.13	26.13	31.13	33.13	35.13	39.13	43.13	47.25	55.38
	mm	295	359	435	562	664	791	841	892	994	1095	1200	1407
Height F	in	19.41	23.54	26.02	31.85	35.20	38.15	41.18	44.33	47.28	50.63	52.01	54.96
	mm	493	598	661	809	894	969	1046	1126	1201	1286	1321	1396
Height H	in	21.06	26.02	29.06	34.29	38.31	41.26	46.50	49.65	54.72	58.07	59.45	62.40
	mm	535	661	738	871	973	1048	1181	1261	1390	1475	1510	1585
Handle Length / Handwheel Dia C	in	9.84	19.69	19.69	27.56	27.56	27.56	27.56	27.56	27.56	27.56	27.56	27.56
	mm	250	500	500	700	700	700	700	700	700	700	700	700
Height E	in	3.74	4.53	5.91	8.27	9.65	11.22	12.40	13.98	15.35	17.72	19.29	22.64
	mm	95	115	150	210	245	285	315	355	390	450	490	575

Note: Data listed above is for reference only. For detailed product data, please refer to the order confirmation drawing.



Cryogenic Trunnion Mounted Ball Valves— Top Entry



900LB

Description		Valve Size											
		2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"
Flanged End L	in	14.50	15.00	18.00	24.00	29.00	33.00	38.00	40.50	44.50	48.00	52.00	61.00
	mm	368	381	457	610	737	838	965	1029	1130	1219	1321	1549
Weld End L ₁	in	14.50	15.00	18.00	24.00	29.00	33.00	38.00	40.50	44.50	48.00	52.00	61.00
	mm	368	381	457	610	737	838	965	1029	1130	1219	1321	1549
RTJ L ₂	in	14.63	15.13	18.13	24.13	29.13	33.13	38.13	40.88	44.88	48.50	52.50	61.75
	mm	371	384	460	613	740	841	968	1038	1140	1232	1334	1568
Height F	in	21.65	25.67	27.60	32.44	35.28	40.63	42.01	47.13	47.72	51.26	54.80	59.13
	mm	550	652	701	824	896	1032	1067	1197	1212	1302	1392	1502
Height H	in	24.13	28.70	30.63	34.88	38.39	45.94	47.32	54.57	55.16	58.70	64.37	68.70
	mm	613	729	778	886	975	1167	1202	1386	1401	1491	1635	1745
Handle Length / Handwheel Dia C	in	19.69	19.69	19.69	27.56	27.56	27.56	27.56	27.56	27.56	27.56	27.56	27.56
	mm	500	500	500	700	700	700	700	700	700	700	700	700
Height E	in	4.72	5.31	6.69	9.06	10.83	12.40	14.17	14.96	16.14	18.31	19.69	25.39
	mm	120	135	170	230	275	315	360	380	410	465	500	645

1500LB

Description		Valve Size												2500LB							
		2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"	2"	3"	4"	6"	8"	10"	12"	
Flanged End L	in	14.50	18.50	21.50	27.75	32.75	39.00	44.50	49.50	54.50	60.50	65.50	76.50	17.75	22.75	26.50	36.00	40.25	50.00	56.00	
	mm	368	470	546	705	832	991	1130	1257	1384	1537	1664	1943	451	578	673	914	1022	1270	1422	
Weld End L ₁	in	14.50	18.50	21.50	27.75	32.75	39.00	44.50	49.50	54.50	60.50	65.50	76.50	17.75	22.75	26.50	36.00	40.25	50.00	56.00	
	mm	368	470	546	705	832	991	1130	1257	1384	1537	1664	1943	451	578	673	914	1022	1270	1422	
RTJ L ₂	in	14.63	18.63	21.63	28.00	33.13	39.38	45.13	50.25	55.38	61.38	66.38	77.63	17.88	23.00	26.88	36.50	40.88	50.88	56.88	
	mm	371	473	549	711	841	1000	1146	1276	1407	1559	1686	1972	454	584	683	927	1038	1292	1445	
Height F	in	21.65	26.73	29.57	33.90	38.46	43.39	44.76	47.91	48.70	54.02	55.79	62.09	23.82	29.69	30.55	35.08	41.61	44.57	45.94	
	mm	550	679	751	861	977	1102	1137	1217	1237	1372	1417	1577	605	754	776	891	1057	1132	1167	
Height H	in	24.13	29.76	32.01	37.01	43.78	50.83	52.20	55.35	56.14	63.58	65.35	68.62	26.85	32.13	32.99	38.19	49.06	52.01	53.39	
	mm	613	756	813	940	1112	1291	1326	1406	1426	1615	1660	1743	682	816	838	970	1246	1321	1356	
Handle Length / Handwheel Dia C	in	19.69	19.69	27.56	27.56	27.56	27.56	27.56	27.56	27.56	27.56	27.56	39.37	19.69	27.56	27.56	27.56	27.56	27.56	27.56	
	mm	500	500	700	700	700	700	700	700	700	700	700	1000	500	700	700	700	700	700	700	
Height E	in	4.72	5.71	6.89	9.25	11.02	13.19	15.55	16.93	18.70	20.87	22.24	25.98	5.12	6.50	7.48	11.22	12.60	14.96	16.93	
	mm	120	145	175	235	280	335	395	430	475	530	565	660	130	165	190	285	320	380	430	

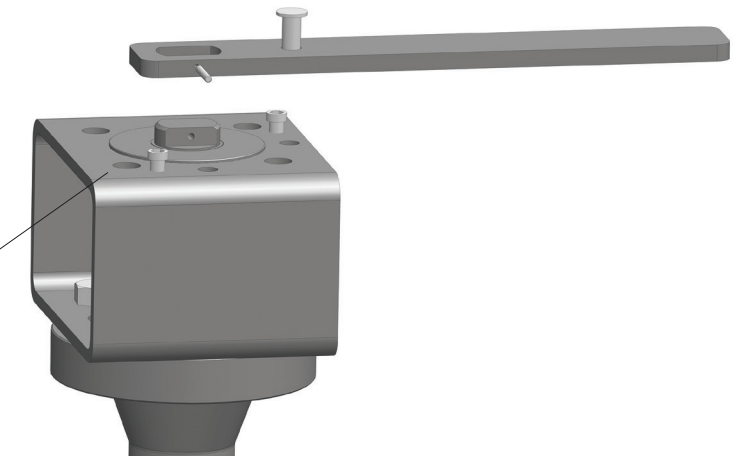
Note: Data listed above is for reference only. For detailed product data, please refer to the order confirmation drawing.



Interchangeability of Operation Structure All DHV Cryogenic Ball Valves

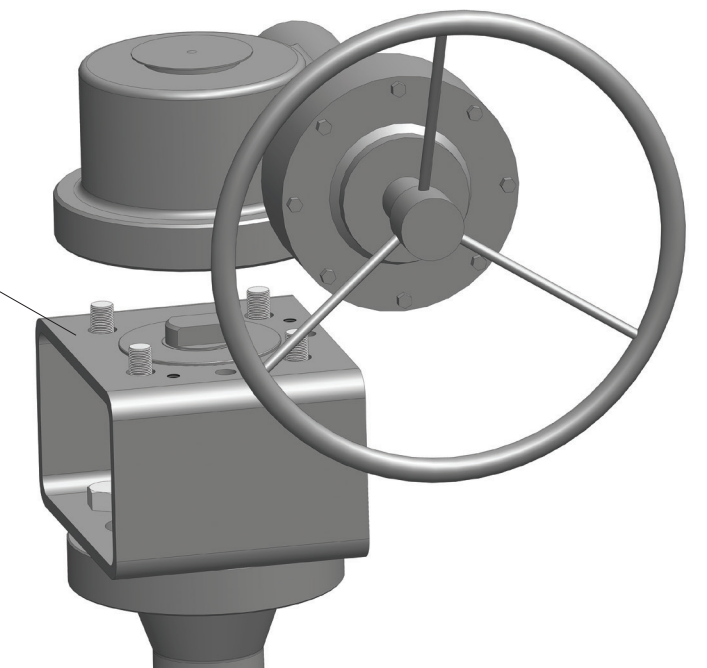
All DHV cryogenic ball valves are designed with an ISO 5211 compliant mounting bracket for both lever and other actuation as shown. This allows for easy interchangeability and replacement.

Standard lever operated DHV cryogenic ball valve designed with an ISO 5211 compliant mounting bracket. Can be easily adapted for use with other actuation devices with minor part changes.



Lever Operator

Standard gear operated DHV cryogenic ball valve designed with an ISO 5211 compliant mounting bracket. Can be easily adapted to lever operation with minor part changes.



Gearbox Operator



Terms & Conditions

1. DEFINITIONS

(a) “The CONTRACT” - The General Conditions of Orders together with COMPANY’S quote and any exhibits, attachments and other documents incorporated by reference.

(b) “The PRODUCT’S” - valves and related products and services as well as their packaging that form the subject-matter of the CONTRACT.

(c) “The COMPANY” – DHV Industries, Inc. or DHV Valve Company, Inc. or alternatively any affiliated company named in COMPANY’S quotation.

(d) “The CUSTOMER” - The individual, firm, partnership, company or other party with whom the Company contracts.

(e) “FORCE MAJEURE” - Any cause or circumstances (including but not limited to, act of God, fire, storm, flood, drought, earthquake, malicious damage, shortage of material, manufacturer’s inability to provide the Product, embargo, riot, strike, look-out, trade dispute, civil disturbance, war, compliance with any law or government order, rule or direction or any other event or accident) beyond the reasonable and direct control of COMPANY.

2. SCOPE

(a) These General Conditions set out the standard terms on which the COMPANY supplies PRODUCTS to the CUSTOMER. Accordingly, these General Conditions apply to all quotations and sales unless otherwise agreed in writing.

(b) The legality, validity, and enforceability of other clauses in these General Conditions will not be affected if one of the clauses is, or becomes illegal, invalid, or unenforceable.

(c) We reserve the right to institute changes in material, design and specification without notice.

3. QUOTATIONS AND ORDERS

(a) Unless otherwise expressly stipulated, all of the COMPANY’S quotations and prices are subject to change without notice, and to availability. Prices are valid only for the duration indicated in the quotation and are subject to change without notice.

(b) Any written or oral purchase order received from the CUSTOMER by the COMPANY (“Order”) shall be interpreted as a written acceptance of the COMPANY’S offer to sell, and shall be filled in accordance with the terms and conditions of the sale set forth herein. The terms and conditions of the Company’s proposal (if at all any) shall prevail over any conflicting or different terms in CUSTOMER’S orders unless the CUSTOMER notifies the COMPANY in writing of its objections thereto within the earlier of the date of shipment of the Product or fifteen (15) days from receipt of COMPANY’S General Conditions. CUSTOMER’S standard terms of purchase will not be considered as a counter-offer to COMPANY’S terms and conditions of sale. The COMPANY will not be bound by conflicting purchasing conditions or reservations made by the CUSTOMER even if the COMPANY does not explicitly contradict the conditions or reservations.

(c) No order in pursuance of any quotation or otherwise shall be binding on the COMPANY unless and until such an order is accepted by the COMPANY. The COMPANY may reject any order in whole or part. A contract between the COMPANY and CUSTOMER is finalized once the COMPANY issues a telephonic, electronic, or written order confirmation to the CUSTOMER or ships the Product to the CUSTOMER. Except as otherwise specifically provided herein, the Order is the final and complete expression of the agreement between the parties, setting forth the entire agreement between the parties regarding this transaction and including all promises and representations both express and implied. Any matters not contained herein, or otherwise referenced or incorporated herein, are not part of the Order.

(d) Subject to the specific procedures for changes to the Order, none of the terms and conditions contained herein may be added to, modified, superseded, or otherwise altered except by a written instrument specifically referencing the affected provision of the Order signed by the President or Vice President of the COMPANY.

4. PRICES

(a) All prices shown are in U.S. dollars and are F.O.B. COMPANY’S shipping point, unless otherwise expressly agreed to by COMPANY.

(b) Prices exclude any duties, federal, state or local taxes or other government charges and delivery costs, which the CUSTOMER must pay unless the law specifically provides that the COMPANY must make such payment in which case the CUSTOMER shall reimburse the COMPANY for such payments as part of the purchase price. All prices include the COMPANY’S

standard packing, but not pallets or crating for export goods.

5. PAYMENTS AND LICENSES

(a) Payment must be made in the currency specified in COMPANY’S invoice.

(b) The CUSTOMER must pay the full invoice amount before the shipment from the date of the invoice unless otherwise agreed in writing. The COMPANY is entitled to charge interest on overdue payments at the greater of the following two rates: (a) 1.5% monthly or (b) 2% annually above the current monthly base rate of the COMPANY’S bank. In no event shall the interest rate be higher than the maximum rate permitted by applicable law.

(c) In addition to exercising its rights at common law or under statute, the COMPANY is entitled to terminate the CONTRACT by written notice to the CUSTOMER if the CUSTOMER is in material breach of its obligations under the CONTRACT or any other agreements with the COMPANY. The CUSTOMER is in material breach:

- If it fails to meet its liabilities when they fall due;
- If it seeks a composition with its creditors;
- If all or part of its property is subject to receivership; or
- If a petition for liquidation, winding-up or administration is filed in respect of the CUSTOMER.

(d) The CUSTOMER is not entitled to withhold, set off or deduct claims against the COMPANY from an amount that it owes the COMPANY under the CONTRACT or other agreement with the COMPANY.

(e) The COMPANY is obligated to deliver a PRODUCT only if the CUSTOMER has made due payment of all amounts that it owes to the COMPANY at the date of delivery under the CONTRACT or other agreement with the COMPANY. The COMPANY is entitled to suspend delivery of a PRODUCT if the CUSTOMER is in default without this affecting the COMPANY’S other rights under the CONTRACT or other agreement with the CUSTOMER. The COMPANY is not obligated to resume deliveries until the CUSTOMER has paid all overdue amounts, including all expenses and accrued interest.

(f) It is the CUSTOMER’S exclusive responsibility to obtain all licenses, exchange control documents and other consents needed for the import and use of the PRODUCTS as well as for payment of the PRODUCTS. The CUSTOMER will not be discharged from his obligations under these General Conditions because he fails to obtain a license or other consents.

6. DELIVERY AND FORCE MAJEURE

(a) While the COMPANY will endeavor to deliver the PRODUCTS by any date or within any period agreed upon, such dates and periods are estimates only given in good faith and the COMPANY will not be liable for any failure to deliver by such date or within such a period. Time for delivery shall not be of the essence of the CONTRACT.

(b) Should the COMPANY be delayed in or prevented from making the delivery of the PRODUCTS due to Force Majeure, the COMPANY may terminate the CONTRACT or suspend the Order without incurring any liability for any loss or damage arising there from, but without prejudice in any such case to rights accrued to the COMPANY for deliveries already made.

(c) Unless otherwise agreed to in writing by the COMPANY, the COMPANY shall deliver the PRODUCTS by the means most convenient to the COMPANY to the address or addresses specified by the CUSTOMER at the time of placing the Order or (in the event that the CUSTOMER fails so to specify an address) to an address at which the CUSTOMER resided or carries on business. The PRODUCTS are considered to be delivered when they are physically handed over to 1) the CUSTOMER, 2) the CUSTOMER’S agent or a person that the CUSTOMER has authorized to take delivery, or (3) the carrier, regardless of who pays shipping costs. The COMPANY shall be entitled to add to the contract price a reasonable charge for packaging, delivery and insurance. Off-loading will be at CUSTOMER’S expense.

(d) The CUSTOMER is obligated to pay all costs that the COMPANY incurs because of the CUSTOMER’S failure to take delivery either 1) on the date stated in the invoice or the COMPANY’S confirmation, or 2) when the PRODUCTS are ready, if the COMPANY has notified the CUSTOMER in writing of their readiness and the CUSTOMER has not taken delivery within seven days or any period to which the parties agree.

(e) If the COMPANY is responsible for delivery, the CUSTOMER must thoroughly inspect the PRODUCTS sent at the COMPANY’S risk. The CUSTOMER is to notify the COMPANY in writing immediately of loss, damage or shortage of PRODUCTS. If the CUSTOMER does not receive the PRODUCTS on the agreed date of delivery, it is to notify the COMPANY within 48 hours of the agreed date of delivery. The COMPANY disclaims all liability, and the CUSTOMER waives its rights of recovery, under this provision unless the CUSTOMER’S information is sufficient to



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allow the COMPANY to make a valid claim against the carrier of the PRODUCTS for their loss or damage.

(f) If the CUSTOMER is responsible for delivery, the COMPANY will not be responsible for delays or failure to deliver by the carrier set up by the CUSTOMER or due to causes beyond the COMPANY control. Delivery of material to a common carrier shall be considered delivery to the Buyer. Claims for loss or any damage to material in transit shall be filed by the Buyer direct with the carrier. Claims for any shortage, corrections or deductions must be made in writing within 48 hours after receipt of goods.

7. PASSING OF RISK AND TITLE, CANCELLATION AND RETURNS

The COMPANY’S liability for the PRODUCTS passes from the COMPANY to the CUSTOMER on the earlier of the following two dates: 1) the date when the PRODUCTS are delivered to the CUSTOMER, the CUSTOMER’S agent, or a person that the CUSTOMER has authorized to accept delivery, or 2) the agreed date of delivery, if the CUSTOMER fails to take delivery as required.

(a) Under the CONTRACT.

(b) The COMPANY remains the owner of the PRODUCTS until it receives full payment for all PRODUCTS whether or not the PRODUCTS are delivered to the CUSTOMER. If the CUSTOMER sells the PRODUCTS to a third party before the COMPANY receives full payment, the proceeds of the sale shall first apply to pay all amounts due to the COMPANY. The COMPANY or its representative is entitled to recover or resell the PRODUCTS and to enter the CUSTOMER’S premises for that purpose, without this affecting its other rights; if the CUSTOMER has not paid the full purchase price or if insolvency proceedings are commenced against the CUSTOMER.

(c) Purchase Orders once placed by CUSTOMER and accepted by COMPANY can be cancelled only with COMPANY’S written consent and upon terms which will save COMPANY from loss. No PRODUCTS may be returned for credit or adjustment without written permission from COMPANY’S officer authorized to issue such permission.

(d) All sales are final. This means that the CUSTOMER is not entitled to credit for returned PRODUCTS whether or not the CUSTOMER has made a complaint or a claim. If the Company expressly agrees in writing that the COMPANY will credit the CUSTOMER for returned PRODUCTS, the CUSTOMER must return the PRODUCTS promptly, carriage-paid, and in the COMPANY’S opinion in good condition to receive the credit. If the COMPANY expressly agrees in writing that the CUSTOMER can return the PRODUCTS, cancel order or change order, the CUSTOMER will be charged for work performed, based on the following schedule. All freight for return or cancelled/changed goods shall be prepaid by CUSTOMER.

- Twenty Five (25%) percent of price on stock items.
- Fifty (50%) percent of price of stock items ordered in quantities which exceed normal inventory levels.
- Twenty Five (25%) percent of price prior to drawing submittal on made to order items.
- Forty (40%) percent on drawing approval, but prior to start of castings.
- Seventy (70%) percent during casting cycle, dependent on the state of completion.
- One Hundred (100%) percent on castings that are not standard materials used by COMPANY in daily sales; i.e. Stainless Steel, Duplex, Nickel, etc.
- Eighty (80%) during machining and assembly operations, this is dependent on the state of completion.
- One Hundred (100%) percent after final assembly and test.
- Special Product Orders: or non standard products are not subject to any schedule level of cancellation, except on such terms as COMPANY may specify on application only.

8. WARRANTY AND LIMITATIONS OF LIABILITY

(a) As to all PRODUCTS sold hereunder, the COMPANY expresses no warranties whatsoever but only assigns to CUSTOMER all transferable warranties and remedies granted by the manufacturer of such PRODUCTS to which COMPANY is entitled and CUSTOMER agrees to look solely to such manufacturers with regard to claims and remedies relating to such PRODUCTS. THE COMPANY SPECIFICALLY DISCLAIMS ALL WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND SATISFACTORY QUALITY. THE COMPANY MAKES NO WARRANTIES AND REPRESENTATIONS, AS TO QUALITY, CAPABILITIES, OPERATIONS, NONINFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS, PERFORMANCE AND SUITABILITY OF THE PRODUCTS.

(b) LIMITATION OF LIABILITY. CUSTOMER’S EXCLUSIVE REMEDY AGAINST COMPANY FOR DEFECTS IN THE PRODUCTS IS THE MANUFACTURER’S WARRANTY SET FORTH IN SECTION 8 (a). THE PARTIES AGREE THAT UNDER NO CIRCUMSTANCE SHALL THE

COMPANY HAVE ANY LIABILITY WHATSOEVER FOR ANY CLAIM ARISING FROM OR RELATING TO THE ORDERS OR THE PRODUCTS FOR AN AGGREGATE AMOUNT IN EXCESS OF THE INVOICED PRICE FOR THE PRODUCTS.

(c) The COMPANY shall not be liable for any damage resulting from delays, failure of the PRODUCTS, loss of profit or revenues, loss of time or loss of use, cost of capital, diminution of goodwill, or claims of CUSTOMER’S customers.

(d) IN NO CIRCUMSTANCES WILL THE COMPANY BE LIABLE FOR ANY CONSEQUENTIAL, SPECIAL, PUNITIVE OR INDIRECT LOSS OR DAMAGE WHATSOEVER.

(e) The COMPANY is not liable if the CUSTOMER’S use of the PRODUCTS infringes on a third party’s patent rights.

(f) Any exclusions or limitations of liability in this CONTRACT in favor of the COMPANY are agreed to be extended for the benefit of all COMPANY’S and/or individuals within the COMPANY’S group of COMPANIES. The CUSTOMER agrees in the appointment of the COMPANY as its agent or trustee solely for the extension of the benefit of the exclusions and limitations of liability. All duties, liabilities and obligations that would otherwise result from this agency are expressly excluded.

(g) The COMPANY warrants the PRODUCTS provided to the original CUSTOMER, not any third party, for a period of one year after date of shipment, that PRODUCTS will be free from defects in materials and workmanship under proper and normal installation and use. Any claim for defect goods should be by written notice to the COMPANY immediately upon discovery. NO warranty shall apply to PRODUCTS which has been modified or changed in design or function, misused, or improperly maintained. The COMPANY shall be able to inspect claimed defects at original CUSTOMER’s facility to determine its obligation. Without written authorization of COMPANY, any repair labor or material is not allowed. No PRODUCTS may be returned without written permission from COMPANY.

9. SPECIFICATION, INSTRUCTIONS AND/OR DESIGN

If PRODUCTS are modified to a specification, instruction or design supplied by CUSTOMER or any third party on behalf of CUSTOMER, then:

(a) The suitability and accuracy of that specification, instruction and/or design will be CUSTOMER’S responsibility.

(b) The CUSTOMER will indemnify COMPANY against any infringement or alleged infringement of any third party’s intellectual property rights including but not limited to patent, design right, registered design, trademark, trade name or copyright and any loss, damage or expense which it may incur by reason of any such infringement or alleged infringement in any county, and

(c) The CUSTOMER will indemnify COMPANY against any loss, damage or expense in respect of any liability arising in any country by reasons of the PRODUCTS being made to such specification, instruction or design.

10. CHOICE OF LAW AND JURISDICTION

(a) The laws of the State of California, including the Uniform Commercial Code, shall govern this CONTRACT. Jurisdiction and venue shall be the Superior Court of Kern County, Bakersfield, California. However, the CUSTOMER expressly agrees that the COMPANY may take action in another jurisdiction to obtain security for the COMPANY’S claims under the CONTRACT.

(b) The CONTRACT constitutes the entire agreement between the COMPANY and the CUSTOMER concerning the supply of the PRODUCTS. The CUSTOMER agrees that he has no other rights of recourse to the COMPANY other than those expressly stated in these General Conditions. The General Conditions apply whether or not the CUSTOMER has a cause of action because the COMPANY or its representative has acted negligently.

11. ATTORNEY’S FEES

In the event of any litigation or arbitration or any quasi-judicial or administrative proceeding involving the parties hereto to enforce any provision of this Agreement, to enforce any remedy available upon default hereunder, or seeking a declaration of the rights of either party hereunder, the prevailing party shall be entitled to recover from the other such attorney’s fees and costs as may be reasonably incurred, including the costs of reasonable investigation, preparation and professional or expert consultation incurred by reason of such litigation, arbitration or proceeding. Sums actually expended in the prosecution or defense of any litigation, arbitration or proceeding within the meaning of the foregoing sentence shall be prima facie evidence of reasonable attorneys’ fees, costs and disbursements.