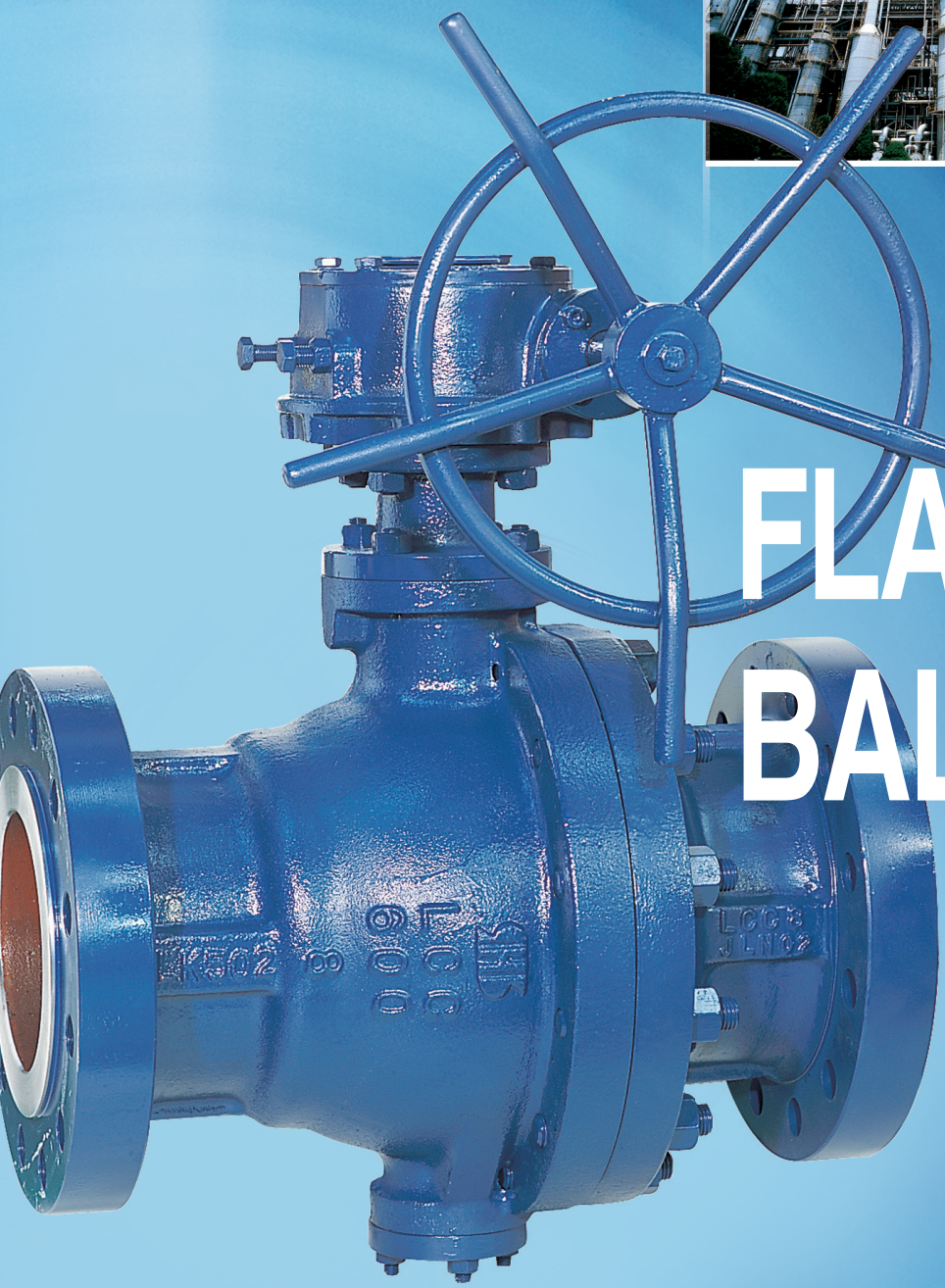
KOSDAQ
KOSDAQ Listed Company

API 6D ISO 9001 BV(API607) CE 0036
AUTHORIZED COMPANY



FLANGE END BALL VALVES

Floating & Trunnion
Full & Reduced Bore

HS VALVE CO., LTD

HS VALVE
will continue on self development....

INTRODUCTION

HS Valve Co.,Ltd. founded in 1987 with a mandate to become a world class manufacturer of Ball, Gate, Globe and Check Valves to meet the high standards of the Oil and Gas. Chemical and Refined Petroleum markets

HS Valve is committed to excellence and our in house quality controls are in accordance with ISO 9001 and we thoroughly inspect and test every valve to ensure only 100% quality products leave our factory.

We have our valves working throughout the World from the Middle East to Canada.

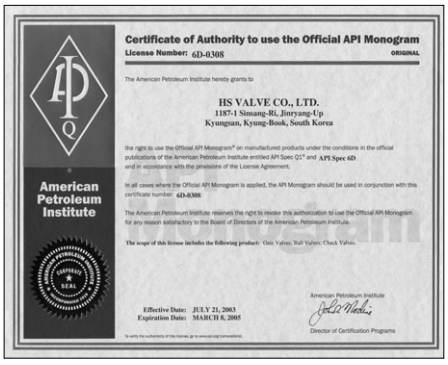
We look forward to working with you and the opportunity to earn your valued business.

Sincerely.

Won Gyu CHANG
President

COMPANY CERTIFICATES & PROFILE

- 1987. 3 Established HS Valve CO., Ltd.
- 1996. 7 Listed KOREAN STANDARD MARK 8759 (KS B 2308 Ball Valve Flange Type)
- 1996. 12 EM Mark Approval
- 1997. 6 Listed KOREAN STANDARD MARK 97-09-030 (KS B 2301 Bronze Valve)
- **1997. 11 Received President's Award**
- 1998. 11 Started to manufacture Welded Ball Valve
- **1999. 3 Approved Certificate of ISO9001 , API-6D**
- 1999. 8 Listed KOREAN STANDARD MARK 97-09-030 (KS B 2301 Screw Type 10K Globe Valve)
- **1999. 9 Venture Enterprise**
- **1999. 10 Received President's Award**
- 1999. 11 Received Mayor's Award
- 2000. 1 KS B 2301 Screw Type 10K Swing Check Valve
- **2000. 3 Listed in KOSDAQ'**
- 2000. 7 Started to manufacture PAN Check Valve
- 2000. 10 Started to manufacture Gas Filter
- **2001. 1 Listed KOREAN STANDARD MARK 01-1789 KS B 2361 Cast steel Flanged Type (10K, 20K Gate & Globe Valve)**
- **2001. 3 Received Certificate of Fire Safety Tests for Ball valve-BUREAU VERITAS (Class 150#, 300# & 600#)**


Certificate of Authority to use the Official API Monogram

License Number: 6D-0308 ORIGINAL

The American Petroleum Institute hereby grants to

HS VALVE CO., LTD.
1187-1 Sinsang-Ri, Jinryang-Up
Kyungsan, Kyung-Book, South Korea

the right to use the Official API Monogram® on manufactured products under the conditions in the official publications of the American Petroleum Institute entitled API Spec Q1® and API Spec 6D and in accordance with the provisions of the License Agreement.

In all cases where the Official API Monogram is applied, the API Monogram should be used in conjunction with this certificate number: 6D-0308

The American Petroleum Institute reserves the right to revoke this authorization to use the Official API Monogram for any reason satisfactory to the Board of Directors of the American Petroleum Institute.

The scope of this license includes the following product: Gate Valves, Ball Valves, Check Valves.

American Petroleum Institute

Effective Date: JULY 21, 2003
Expiration Date: MARCH 8, 2005

Director of Certification Programs


CERTIFICATE

The Certification Body of
TÜV Süddeutschland Bau und Betrieb GmbH
(a Pressure Equipment Directive Notified Body)

certifies that

HS VALVE CO., LTD.

1187-1 Sinsang-Ri, Jinryang-Up, Kyungsan-Si,
Kyungsangbook-Do, Korea

has implemented, operates and maintains a quality assurance system as described in the Pressure Equipment Directive (97/23/EC) Annex III, Module H

for the scope

Design, Development and Manufacturing of Industrial Valves
(Ball Valve, Gate Valve, Check Valve and Globe Valve)

Evidence that the quality system satisfies the PED requirements is documented in Assessment Report No.: KOR-PQ-002(H)

The manufacturer is authorised to provide the pressure equipment manufactured within the scope of the assessed quality assurance system with the below listed Notified Body identification number (following the product's CE marking as illustrated):

CE 0036

Certificate No.: DGR-0036-QS-290-04
valid until January 18, 2007

Mannheim, January 19, 2004

TÜV Süddeutschland Bau und Betrieb GmbH
Dudenstr. 28
D-68167 Mannheim

Tel.: (0049) 621 39 52 33
Fax: (0049) 621 39 55 94

Notified Body No.: 0036

Member of CONFEDERATION EUROPEENNE CECO D'ORGANISMES DE CONTROLE


Certificate of Registration

Awarded to

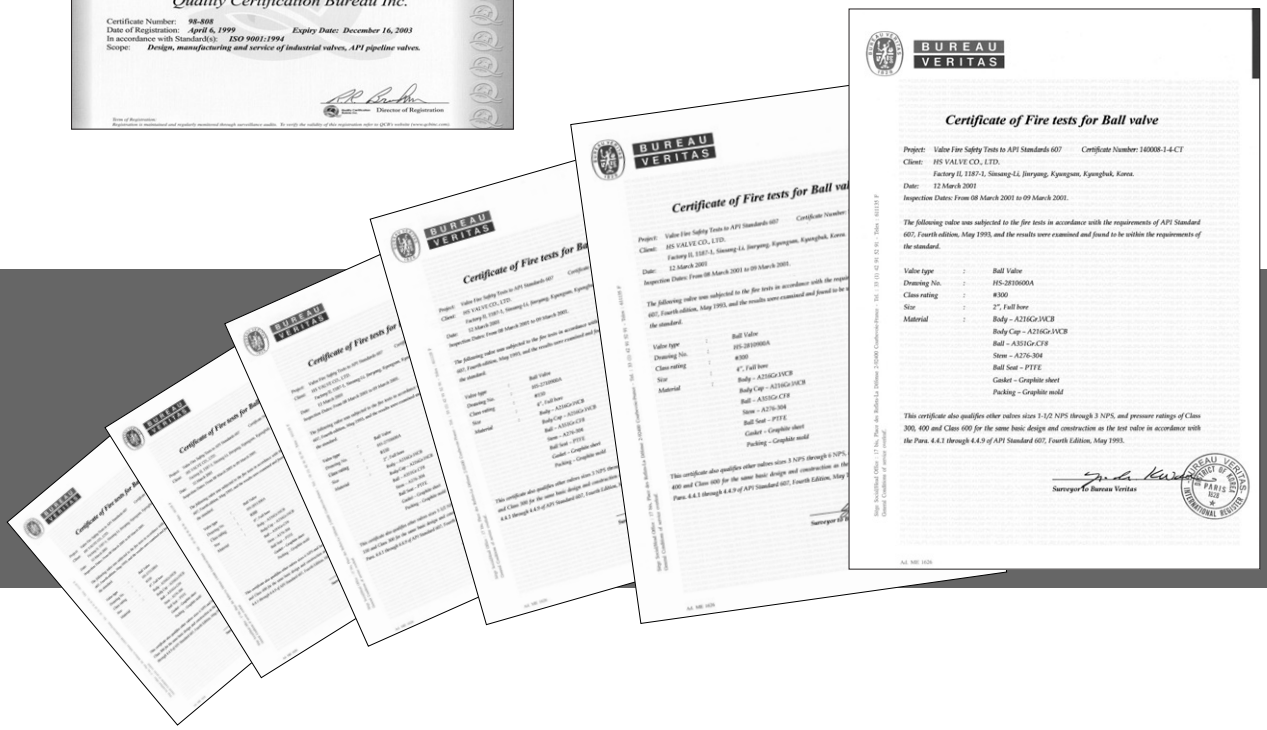
HS Valve Co., Ltd.

#1187-1, Shinsang-Ri, Jinliang-Eup, Kyungsan, Kyungbuk, Korea

for the successful implementation of a quality management system, registered by Quality Certification Bureau Inc.

Certificate Number: 98-808
Date of Registration: April 6, 1999 Expiry Date: December 16, 2003
In accordance with Standard(s): ISO 9001:1994
Scope: Design, manufacturing and service of industrial valves, API pipeline valves.

Director of Registration


BUREAU VERITAS

Certificate of Fire tests for Ball valve

Project: Valve Fire Safety Tests to API Standards 607 Certificate Number: 140008-1-4-CT
Client: HS VALVE CO., LTD.
Factory II, 1187-1, Sinsang-Li, Jinryang, Kyungsan, Kyungbuk, Korea.
Date: 12 March 2001
Inspection Dates: From 08 March 2001 to 09 March 2001.

The following valve was subjected to the fire tests in accordance with the requirements of API Standard 607, Fourth edition, May 1993, and the results were examined and found to be within the requirements of the standard.

Valve type	:	Ball Valve
Drawing No.	:	HS-2010600A
Class rating	:	#300
Size	:	2", Full bore
Material	:	Body – A216Gr.WCB
		Body Cap – A216Gr.WCB
		Ball – A351Gr.CF8
		Stem – A276-304
		Ball Seat – PTFE
		Gasket – Graphite sheet
		Packing – Graphite mold

This certificate also qualifies other valves sizes 1-1/2 NPS through 3 NPS, and pressure ratings of Class 300, 400 and Class 600 for the same basic design and construction as the test valve in accordance with the Para. 4.4.1 through 4.4.9 of API Standard 607, Fourth Edition, May 1993.

Surveyor to Bureau Veritas

BUREAU VERITAS INTERNATIONAL REGISTER

General Design Information

Description	Specification American STD´	Remark
Basic Design	API 6D & 607 ISO 5221	BS 5351 6755
Wall Thickness	ASME B16-34	
Face to Face & End to End Dimension	ASME B16-10	
Flange & Welding End Dimension	ASME B16-5 B16-25	
Flange Finish	MSS SP-6	
Test and Inspection	API - 6D 598	

Standard Product Range

class	size	15~40	50	65	80	100	150	200	250	300	350	400	450	500	600
	type	½~1 ½	2	2 ½	3	4	6	8	10	12	14	16	18	20	24
150 psi	Floating	○	●	●	●	●	●	●							
	Trunnion	-	-	-	-	-	-	← Requirement (8″& Larger)							
300 psi	Floating	○	●	●	●	●	●	●							
	Trunnion	-	-	-	-	-	-	← Requirement (8″& Larger)							
600 psi	Floating	○	●	●	●										
	Trunnion	-	○	○	○	●	●	●							
900 psi	Floating	○	○	○	○										
	Trunnion	-	← Requirement (4″& OVER)												
1500 psi															
	Trunnion	-	← Requirement (4″& OVER)												

1) ●Standard Product Range(stock item)
   - Ball valve Class 150, 300, 600(2" to 8") / LCC(Nace) / 316SS TRIM FB, RB
   ○Special Order
2) The Standard Contact of end flange is RF-flange With serrated on Gasket Surface
3) For special Shell materials, Refer to "Valve shell material" on page 5

* Specification is subject to change without prior notice due to improvements.

Shell Materials

ASTM Specification	Material Designation	Hardness/ NACE	Remarks
A 216 Gr WCB	High-Temperature cast carbon steel	HRC 22	
A 352 Gr LCB	Low-Temperature cast carbon steel	〃	
LCC	〃	〃	
A 351 Gr CF8	Corrosion resistant cast	-	
CF8M	〃	-	
A 105	High-Temperature Forged steel	HRC 22 Max.	
A 350 Gr LF2	Low-Temperature Forged steel	〃	

Gasket Materials

Material Construction	7) Body MTL´		6) Pressure					
	A.W.C.L	10.10 C.D	01	03	06	09	15	25
Spiral wound metal 304 + Graphite filled	●	○	Customer Requirement					
〃 + PTFE filled	○	○						
Spiral wound metal 316 + Graphite filled	●	○	●	●	●	●	●	●
〃 + PTFE filled	○	●	●	●	●	●	●	●
PTFE Sheet	○	●	○	○				
Graphite Sheet	●	○	○	○				
Rubber O -Ring (VITON or HSN)	Customer Requirment							

● : Standard ○ : Option
Note
7), 6) : Refer to Page 7.

Seal Materials

Material	7) Body Material(FIG A)	6) Pressure(FIG B)
(a) NBR O-Ring	A.W.C.L	all classes
VITON or HSN O-Ring	A.W.C.L	
RTFE Seat Ring (Glass)	10.10 C.D	
RPTFE Seat Ring (Graphite or Carbon)	A.W.C.L	
Graphite Mold Packing	All Material	
Nylon	All Material	Class 900 & 1500 Only

NOTE
a : Option
7), 6) : Refer to Page 7.

HS Ball Valve Figure Number

EX) : 4” A352 LCC Nace 600# 2-Piece, Raised Face, Full Port, 316SS Trim Lever

1)Valve Style

Code	Style
T	Trunnion
Blank	Floating

2)Body Style

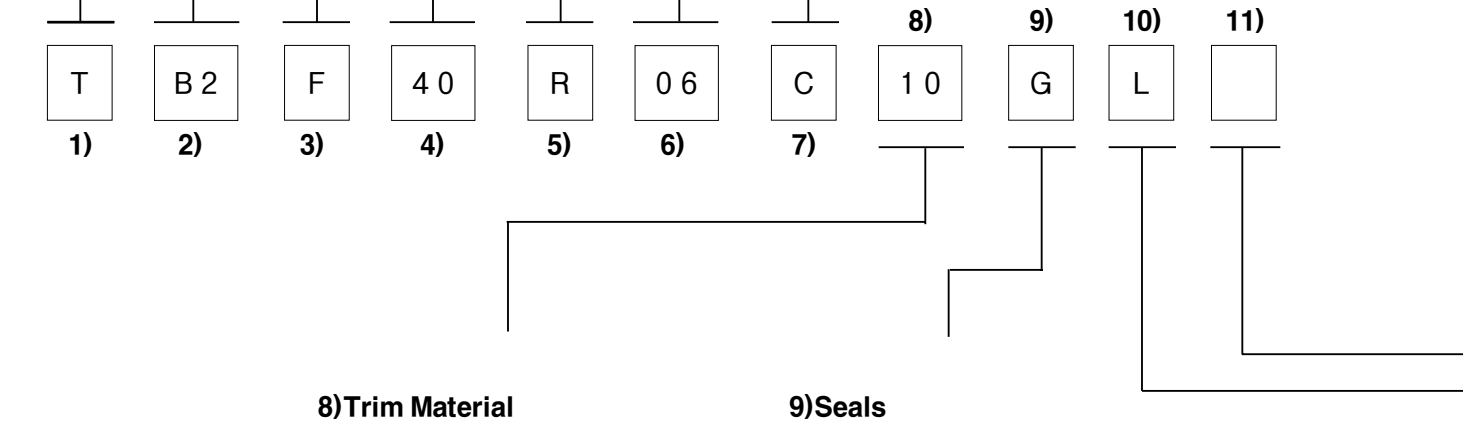
Code	Style
C1	Cast 1 Piece
H1	Hex Bar 1 Piece
B2	Bolted 2 Piece
B3	Bolted 3 Piece
T2	Threded 2 Piece
T3	Threded 3 Piece
W2	Weled 2 Piece
W3	Weled 3 Piece

3)Port

Code	Style
F	Full Port
R	Reduced

4)Size

Code	Size	Code	Size
20	2”	140	14”
25	2 1/2”	160	16”
30	3”	180	18”
40	4”	200	20”
60	6”	240	24”
80	8”		
100	10”		
120	12”		



8)Trim Material

Code	Material
E1	1 Mil ENP
E3	3 Mil ENP
D	Duplex
	A182 F51
2	A182 F304
10	A182 316
2C	A351 CF8
10C	A351 CF8M
S	Special

9)Seals

Code	Material
B	Buna
G	Grafoil / Graphite
H	Highly Saturated Nitrel
RT	Reinforced Teflon
T	Teflon
V	Viton
S	Special

Operated Trunnion Ball Valve

5)End Conn.

Code	Style
NPT	Female Thread
SW	Female Socket Weld
MNPT	Male Thread
MSW	Male Socket Weld
R	Raised Face
J	Ring Joint
W4	Butt Weld Sch. 40
W8	Butt Weld Sch. 80
W12	Butt Weld Sch. 120
W16	Butt Weld Sch. 160
WXX	Butt Weld Sch. XXH
G4	Greyloc Sch. 40
G8	Greyloc Sch. 80
G12	Greyloc Sch. 120
G16	Greyloc Sch. 160
GXX	Greyloc Sch. XXH

6)Pressure Rating

Code	Rating
01	150 ANSI
03	300 ANSI
06	600 ANSI
09	900 ANSI
15	1500 ANSI
25	2500 ANSI
A3	API 3000
A5	API 5000
10	1000 WOG
20	2000 WOG
30	3000 WOG
40	4000 WOG
50	5000 WOG

7)Body Material

Code	Material
A	A105N
W	A216 WCB
L	A350 LF2
C	A352 LCC
D	Duplex
	A182 F51
10	A182 316
10C	A351 CF8M
S	Special

10)Operator

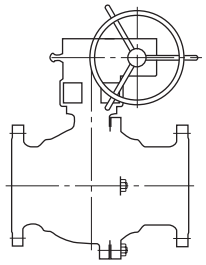
Code	Style
L	Lever
G	Gear
P	Pnuematic
M	Electric Motor

11)Special

Code	

Construction and Function

ISO 5210/1 Actuator Mounting Pad Flange

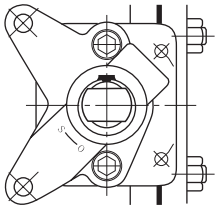


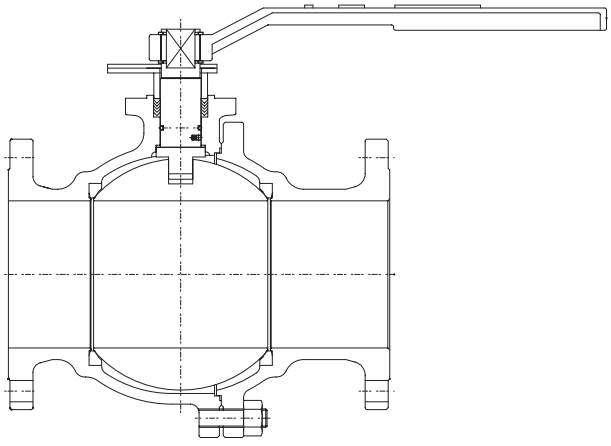
All HS VALVES have an ISO 5211 actuator mounting pad.

ISO type	PCD	n x hØ	PRESSURE				
			150	300	600	900	1500
F05	50	4–8	1 1/2 Below size				
F07	70	4–10	2	2	2	–	–
F10	102	4–12	3–4	3–4	3	2–3	2
F12	125	4–14	6	6	4	4	3
F14	140	4–18	8	8	6	6	4
F16	165	4–22	10–14	10–14	8–10	8	6
F25	254	8–18	16–18	12–14	10–12	8–10	
F30	298	8–22	20	20	16–18	14	12
F35	356	8–33	24	24	20	16	14
F40	406	8–39			24		16
F48	483	12–39					

Locking Device

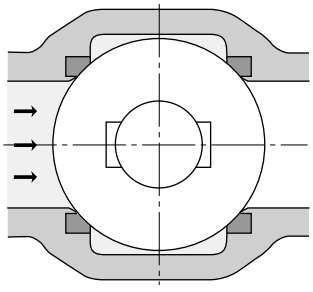
All HS VALVES are lockable in either full open or closed position



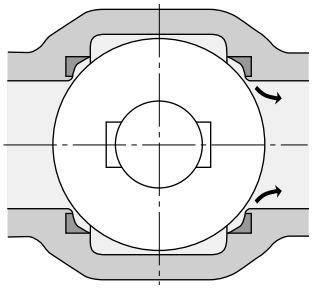


Fire Safe Metal Seating

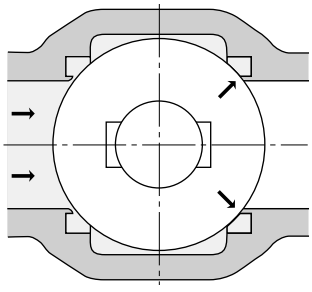
HS VALVE API 607 ball valves are designed so the ball seats against the internal metal housing in case the seats burn out during



Pre–Burning

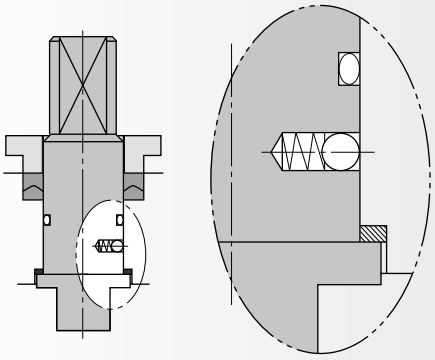


Burning



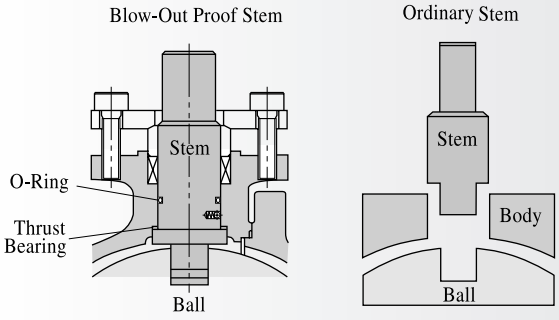
Post – Burning

* Specification is subject to change without prior notice due to improvements.



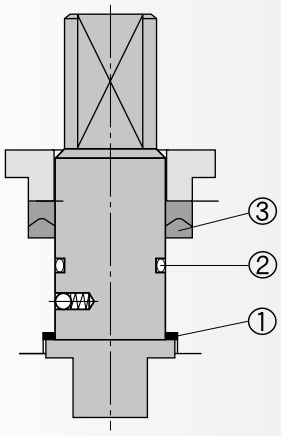
Antistatic-Stem

HS ball valves have an antistatic stem to ensure there is a constant bond between the stem and body to prevent electrostatic build up during operation.



Blow-Out Proof Stem

All HS Valve's have an anti blow out proof stem designed to back seat during any excess line pressure situation that is not higher than the design pressure of the valve and will help prevent product loss during a fire.

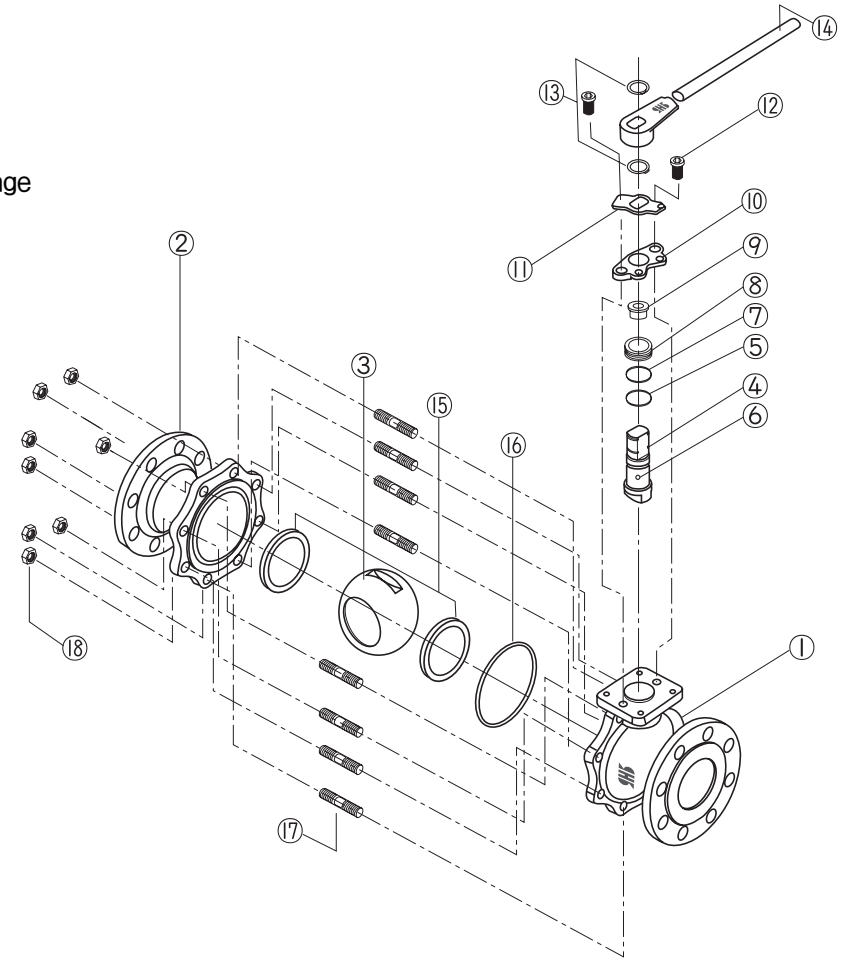


Triple Sealing

All HS Valves are designed with a Grafoil stem seal, a HSN or Viton O-ring and Grafoil gland packing to help ensure no fluid leaks during any abnormal high line pressure that does not exceed the valves design or incase of a fire.

Cast Steel Two-Piece Floating Ball Valves

- Fire Safe Design
- Antistatic Stem
- Locking Device
- Blow-Out Proof Stem
- ISO Mounting Pad Flange

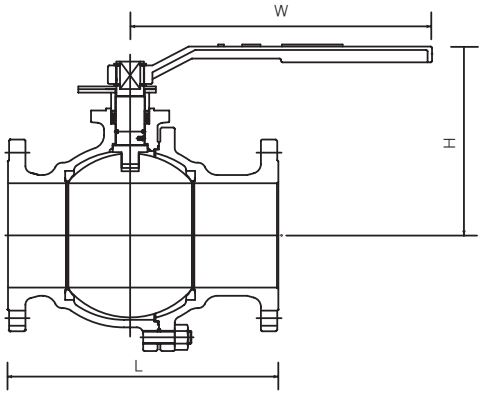


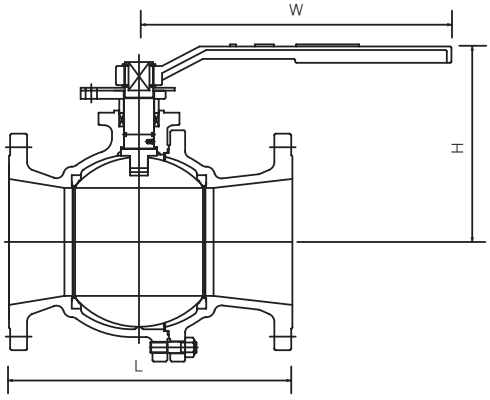
STANDARD MATERIALS

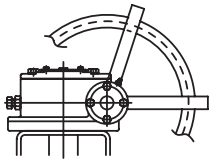
No	Part name	Cast steel	Stainless steel	Remark
1	Body	Refer to page 5 Shell materials		
2	Cap			
3	Ball	A 351 Gr. CF 8M		
4	Stem	A 276 Gr. 316		
5	Back Seat	Grafoil		
6	Antistatic Device	Stainless Steel		
7	O-Ring	Viton or HSN		
8	Gland Packing	Grafoil		
9	Gland Ring	Same as Stem material		
10	Gland Flange(Locking Device)	CF8M & 316SS		
11	Stopper	A 105 + Zn plating		
12	Gland Bolt	A307 Gr. B	A193 B8	
13	Snap Ring	Tool steel + Cr plating		
14	Lever	Ductile iron		
15	Seat Ring	Refer to page 5 Seal materials		
16	Gasket	Refer to page 5 Gasket materials		
17	Stud Bolt	Refer to Page 22 Bolt & Nut Materials		
18	Nut			

* Specification is subject to change without prior notice due to improvements.

Cast Steel 150, 300 Two-Piece Floating Ball Valve







● Gear operated
: 8” and Larger

Class 150

SIZE		BxB	L	H	W	Weight
1 1/2”	mm	38	165	98	240	8
	in	1.5	6.5	3.9	9.4	
2X1 1/2	mm	38	178	125	240	9
	in	1.5	7.0	4.9	9.4	
2	mm	51	178.0	138.0	240	11
	in	2.0	7.0	5.4	9.4	
3X2	mm	51	203.0	138.0	240	15
	in	2.0	8.0	5.4	9.4	
3	mm	76	203.0	174.0	240	22
	in	3.0	8.0	6.9	9.4	
4X3	mm	76	229.0	174.0	240	25
	in	3.0	9.0	6.9	9.4	
4	mm	102	229.0	200.0	350	34
	in	4.0	9.0	7.9	13.8	
6X4	mm	102	394	200	350	64
	in	4.0	15.5	7.9	13.8	
6	mm	152	394	275	440	84
	in	6.0	15.5	10.8	17.3	
8X6	mm	152	457	275	440	100
	in	6.0	18.0	10.8	17.3	
8	mm	203	457	310	380	120
	in	8.0	18.0	12.2	15.0	
10X8	mm	203	533	310	380	150
	in	8.0	21.0	12.2	15.0	

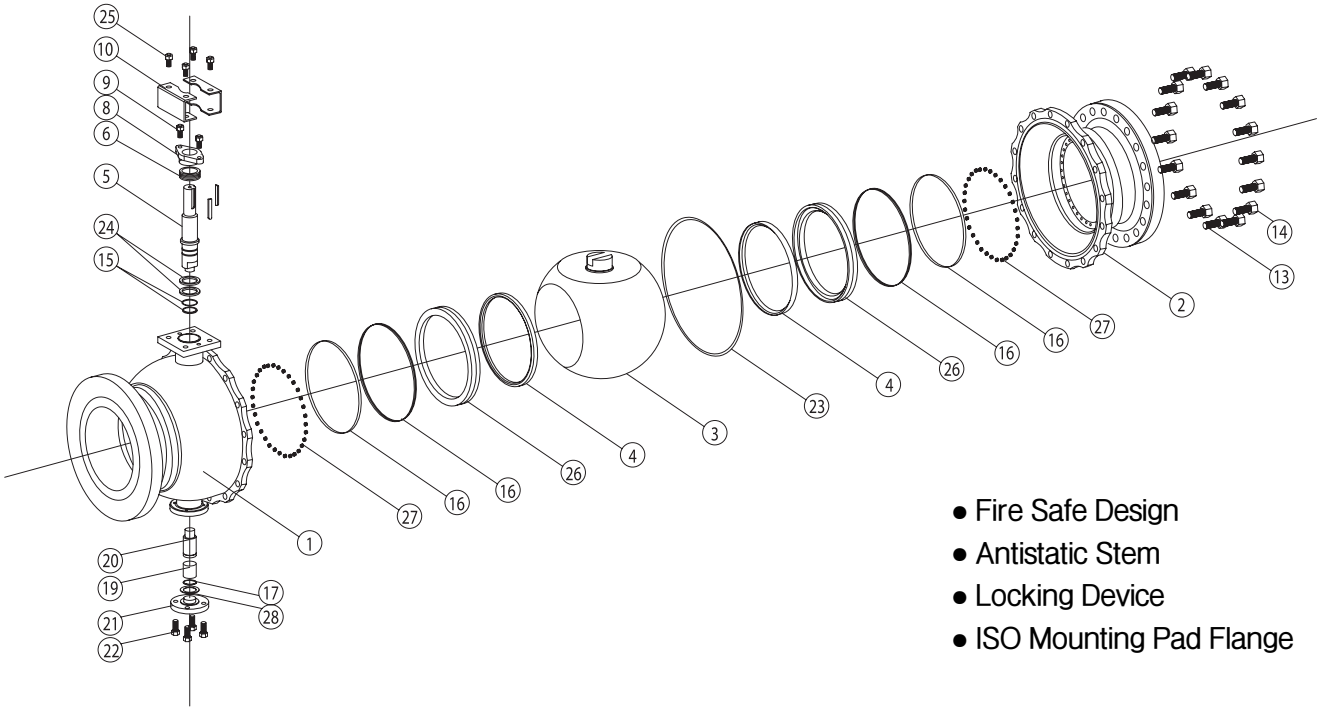
Class 300

SIZE		BxB	L	H	W	Weight
1 1/2”	mm	38	191	98	240	9
	in	1.5	7.5	3.9	9.4	
2X1 1/2	mm	38	216	98	240	12
	in	1.5	8.5	3.9	9.4	
2	mm	51	216	138	240	14
	in	2.0	8.5	5.4	9.4	
3X2	mm	51	283	138	240	22
	in	2.0	11.1	5.4	9.4	
3	mm	76	283	174	240	31
	in	3.0	11.1	6.9	9.4	
4X3	mm	76	305	174	240	39
	in	3.0	12.0	6.9	9.4	
4	mm	102	305	200	350	46
	in	4.0	12.0	7.9	13.8	
6X4	mm	102	403	200	350	84
	in	4.0	15.88	7.9	13.8	
6	mm	152	403	275	440	106
	in	6.0	15.88	10.8	17.3	
8X6	mm	152	502	275	440	130
	in	6.0	19.75	10.8	17.3	
8	mm	203	502	310	380	175
	in	8.0	19.75	12.2	15.0	
10X8	mm	203	568	310	380	190
	in	8.0	22.38	12.2	15.0	

Note
1) BXB=Ball Bore
2) Weight : kg
3)Pressure Relief Plug
NPT 1/4 : 4*3 and Below
NPT 1/2 : 4” and Larger

* Specification is subject to change without prior notice due to improvements.

Cast Steel Two-Piece Trunnion Ball Valves



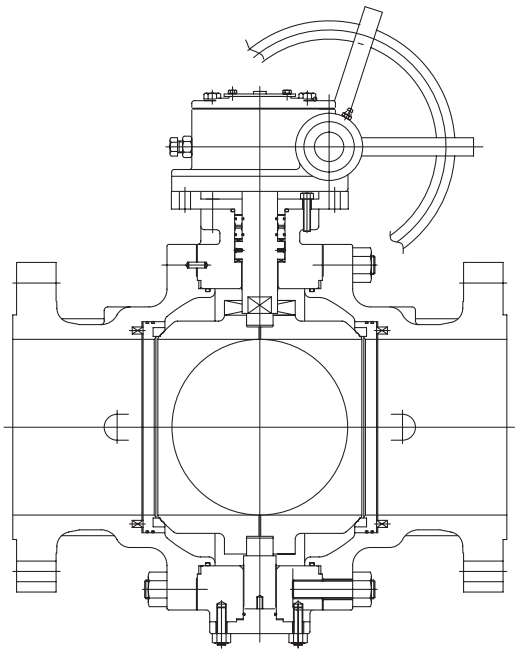
- Fire Safe Design
- Antistatic Stem
- Locking Device
- ISO Mounting Pad Flange

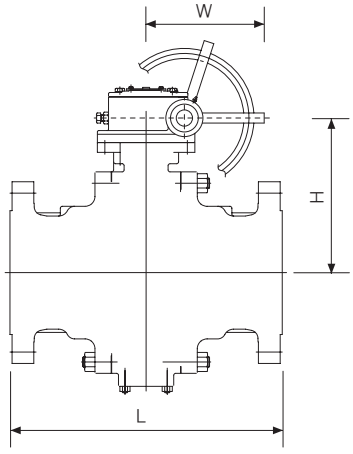
STANDARD MATERIALS

No	Nomenclature	Cast steel	Stainless steel	Remark
1	Body	Refer to catalog page 5 Shell Materials		
2	Cap			
3	Ball	A 351 CF 8M		
4	Seat Ring	Refer to page 5 Seal Materials		
5	Stem	A276 316		
6	Packing	Refer to page 5 Seal Materials		
8	Gland	Same as Stem Material		
9	Gland Bolt	A307 Gr. B	A193 B8	
10	Blacket	Cabon steel		
13	Stud Bolt	Refer to page 22 Bolt & Nut Materials		
14	Nut			
15	O-Ring	Viton or HSN		
16	O-Ring	Viton or HSN		
17	O-Ring	Viton or HSN		
18	Antistatic Device	316 SS		
19	Lower Stem bushing	Grafoil		
20	Lower Stem	A276 Gr 316		
21	Lower Cover	A576-1045	Same as body Materials	
22	Lower Cover bolt/Nut	Refer to page 22 Bolt & Nut Materials		
23	Gasket	Refer to page 5 Gasket Materials		
24	Thrust Washer	Grafoil		
25	Bracket bolt/Nut	Refer to page 22 Bolt & Nut Materials		
26	Retainer	A276 316 or A351 CF8M		
27	Coil Spring	INCONEL X 750		*316 SS
28	Lower Gasket	Refer to page 5 Gasket Materials		
29	Gear box (Worm Gear)	Ductile Iron		
30	Sealant Injection	stainless Steel		Stem & Seat

* Specification is subject to change without prior notice due to improvements.

Cast Steel 150, 300 Two-Piece Trunnion Ball Valve





● Gear operated
: 8” and Larger

Class 150

SIZE		BxB	L	H	W	Weight
8	mm	203	457	310	380	120
	in	8.0	18.0	12.2	15.0	
10 X 8	mm	203	533	310	380	150
	in	8.0	21.0	12.2	15.0	
10	mm	254	533	435	380	240
	in	10.0	21.0	17.1	15.0	
12 X10	mm	254	610	435	380	290
	in	10.0	24.0	17.1	15.0	
12	mm	305	610	460	380	385
	in	12.0	24.0	18.1	15.0	
14 X12	mm	305	686	460	380	470
	in	12.0	27.0	18.1	15.0	
14	mm	337	686	520	600	500
	in	13.3	27.0	20.5	23.6	
16 X14	mm	337.0	762.0	520.0	600.0	590
	in	13.3	30.0	20.5	23.6	
16	mm	387.0	762.0	590.0	600.0	750
	in	15.2	30.0	23.2	23.6	
18 X16	mm	387.0	864.0	590.0	600.0	790
	in	15.2	34.0	23.2	23.6	
18	mm	438.0	864.0	670.0	600.0	980
	in	17.2	34.0	26.4	23.6	
20 X18	mm	438.0	914.0	670.0	600.0	1030
	in	17.2	36.0	26.4	23.6	
20	mm	489.0	914.0	750.0	800.0	1190
	in	19.3	36.0	29.5	31.5	
24 X 20	mm	489.0	1067.0	750.0	800.0	1570
	in	19.3	42.0	29.5	31.5	
24	mm	591.0	1067.0	930.0	800.0	2100
	in	23.3	42.0	36.6	31.5	

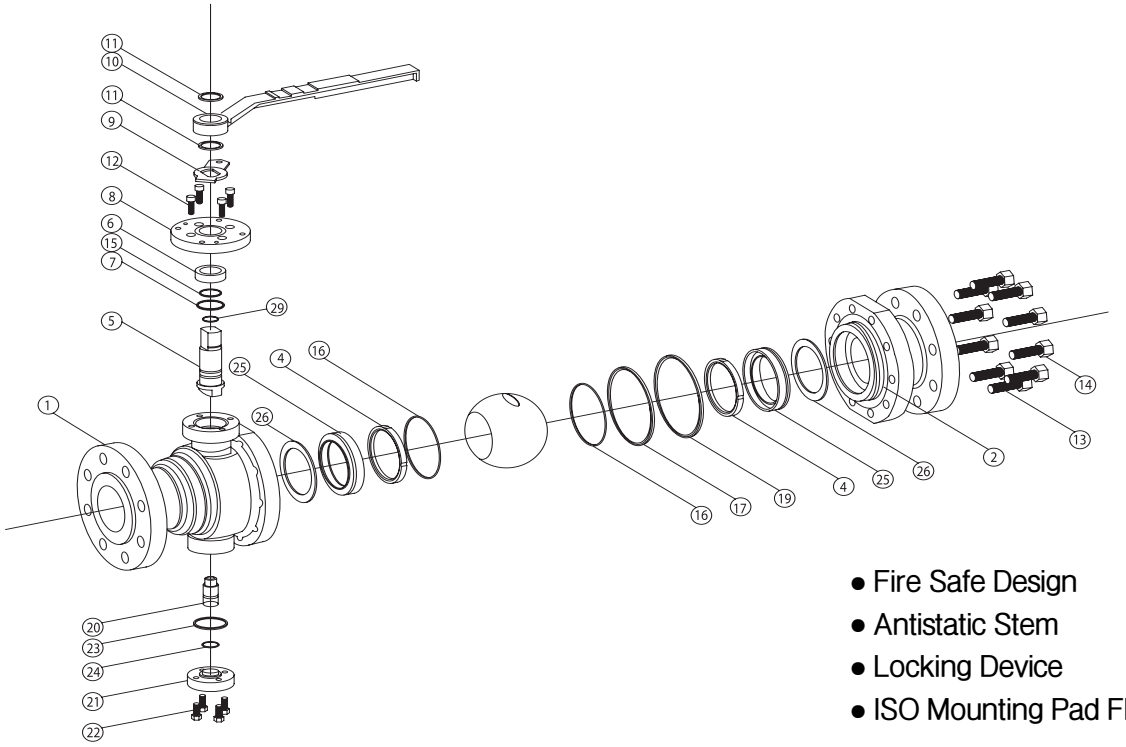
Class 300

SIZE		BxB	L	H	W	Weight
8	mm	203	502	310	380	175
	in	8.0	19.75	12.2	15.0	
10 X 8	mm	203	568	310	380	190
	in	8.0	22.38	12.2	15.0	
10	mm	254	568	435	380	365
	in	10.0	22.38	17.1	15.0	
12 X10	mm	254	648	435	380	380
	in	10.0	25.5	17.1	15.0	
12	mm	305	648	460	380	520
	in	12.0	25.5	18.1	15.0	
14 X12	mm	305	762	460	380	580
	in	12.0	30.0	18.1	15.0	
14	mm	337	762	520	600	720
	in	13.3	30.0	20.5	23.6	
16 X14	mm	337.0	838.0	520.0	600.0	780
	in	13.3	33.0	20.5	23.6	
16	mm	387.0	838.0	590.0	600.0	1020
	in	15.2	33.0	23.2	23.6	
18 X16	mm	387.0	914.0	590.0	600.0	1100
	in	15.2	36.0	23.2	23.6	
18	mm	438.0	914.0	670.0	600.0	1280
	in	17.2	36.0	26.4	23.6	
20 X18	mm	438.0	991.0	670.0	600.0	1360
	in	17.2	39.0	26.4	23.6	
20	mm	489.0	991.0	750.0	800.0	1540
	in	19.3	39.0	29.5	31.5	
24 X 20	mm	489.0	1143.0	750.0	800.0	1950
	in	19.3	45.0	29.5	31.5	
24	mm	591.0	1143.0	930.0	800.0	2600
	in	23.3	45.0	36.6	31.5	

Note
1) BXB=Ball Bore
2) Weight : kg
3)Stem & Seat : Sealant Injection
4)Pressure Relief Plug : NPT1/2

* Specification is subject to change without prior notice due to improvements.

Cast Steel Two - Piece Spring Seated Ball Valves



- Fire Safe Design
- Antistatic Stem
- Locking Device
- ISO Mounting Pad Flange

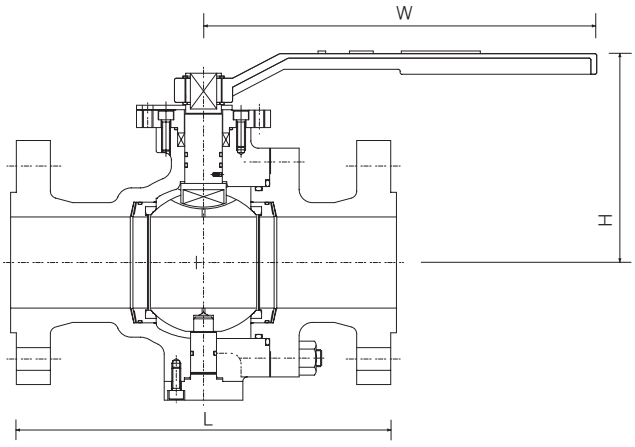
STANDARD MATERIALS

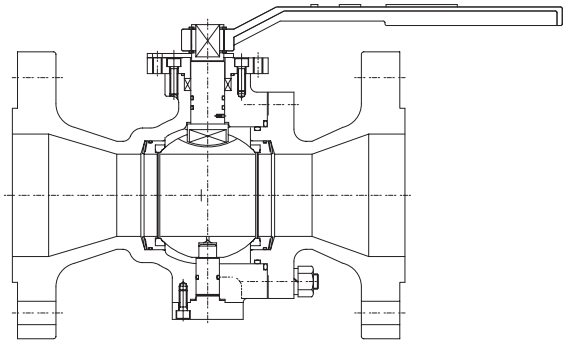
No	Nomenclature	Cast steel	Stainless steel	Remark
1	Body	Refer to page 5 Shell Materials		
2	Cap			
3	Ball	A 351 Gr. CF8M		
4	Seat Ring	Refer to page 5 Seal Materials		
5	Stem	A276 Gr. 316		
6	Packing	Refer to page 5 Seal Materials		
7	Thrust Washer	Grafoil		
8	Gland	Same as stem Material		
9	Stopper	A105 + Zn plating		
10	Lever	Ductile		
11	Snap Ring	Tool steel + Cr plating		
12	Wrench Bolt	A307 Gr. B	A193 B8	
13	Stud Bolt	Refer to page 22 Bolt & Nut Materials		
14	Nut			
15	O-Ring	Viton or HSN		
16	O-Ring	Viton or HSN		
17	O-Ring	Viton or HSN		
18	Antistatic Device	316 SS		
19	Lower Stem Bushing	Grafoil		
20	Lower Stem	A276 Gr. 316		
21	Lower Cover	A576-1045	Same as body Materials	
22	Lower Cover bolt/Nut	Refer to page 22 Bolt & Nut Materials		
23	Gasket	Refer to page 5 Gasket Materials		
24	O-Ring	Viton or HSN		
25	Retainer	A276 316 or A351 CF8M		
26	Coil Spring	Inconel X 750		8" and Larger
	Flat Spring	SKD5+ENP 3 Mil		6" and Below
27	Stopper Bolt	Refer to page 22 Bolt & Nut Materials		
28	Sealant Fitting	Stainless Steel		6" and Larger
29	O-Ring	Viton or HSN		

* Specification is subject to change without prior notice due to improvements.

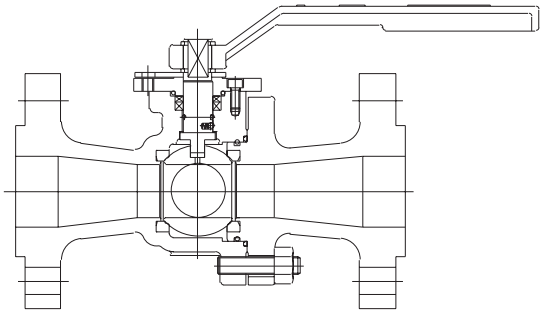
Cast Steel 600 Two - Piece Ball Valve

● Trunnion Type : 4 ”and Larger





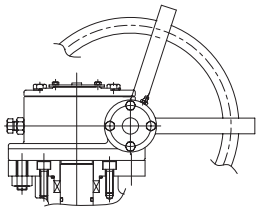
● Floating type : 3” and Below



Class 600

SIZE		BxB	L	H	W	Weight
2X1 1/2”	mm	38	292	120	240	17
	in	1.5	11.5	4.7	9.4	
2	mm	51	292	145	240	22
	in	2.0	11.5	5.7	9.4	
3 X 2	mm	51	356	145	240	31
	in	2.0	14.0	5.7	9.4	
3	mm	76	356	170	350	46
	in	3.0	14.0	6.7	13.8	
4 X 3	mm	76	432	170	350	68
	in	3.0	17.0	6.7	13.8	
4	mm	102	432	200	440	89
	in	4.0	17.0	7.9	17.3	
6 X 4	mm	102	559	200	440	127
	in	4.0	22.0	7.9	17.3	
6	mm	152	559	310	380	228
	in	6.0	22.0	12.2	15.0	
8 X 6	mm	152	660	310	380	273
	in	6.0	26.0	12.2	15.0	
8	mm	200	660	330	600	365
	in	7.9	26.0	13.0	23.6	
10 X 8	mm	200	787	330	600	580
	in	7.9	31.0	13.0	23.6	
10	mm	248	787	460	600	600
	in	9.8	31.0	18.1	23.6	

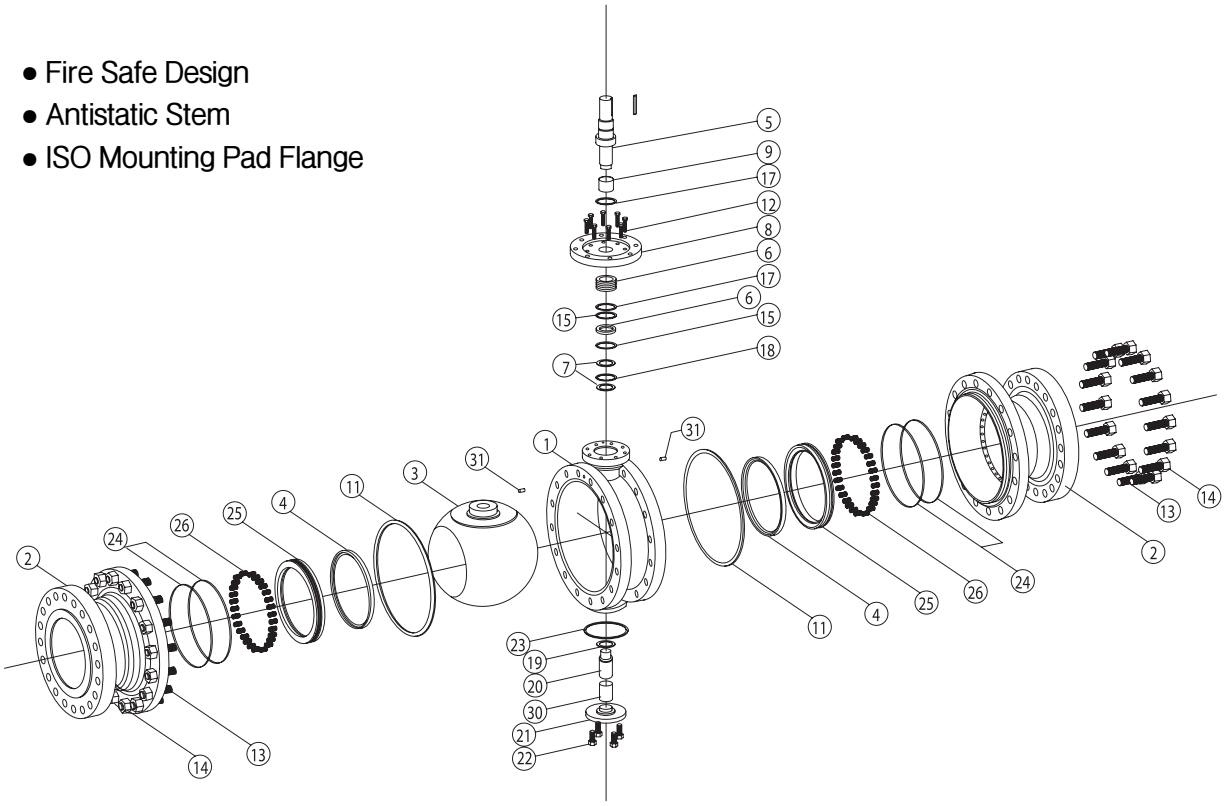
Note
1) BXB=Ball Bore
2) Weight : kg
3)Pressure Relief Pulg
NPT 1/4” : 2*1 1/2” – 3”
1/2” : 4” and Larger
4)Stem and Seat Sealant Injection
6” and Larger



● Gear operated
: 6” and Larger

Cast Steel Three Piece Trunnion Ball Valves

- Fire Safe Design
- Antistatic Stem
- ISO Mounting Pad Flange

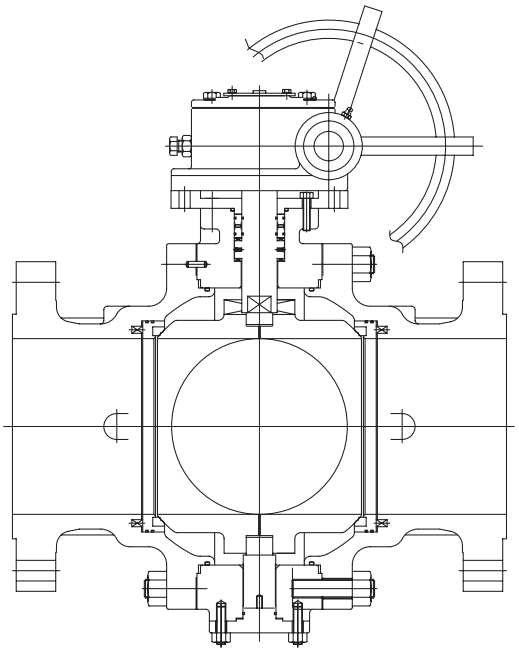


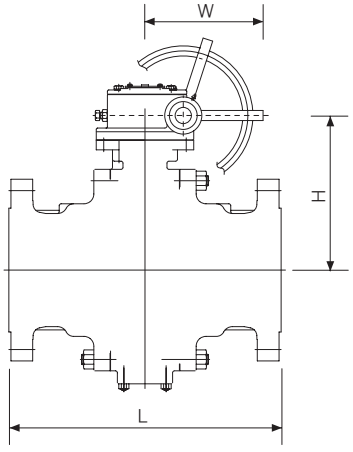
STANDARD MATERIALS

No	Nomenclature	Cast steel	Stainless steel	Remarks
1	Body	Refer to page 5 Shell Materials		
2	Cap			
3	Ball	A 351 Gr. CF8M		
4	Seat Ring	Refer to page 5 Seal Materials		
5	Stem	A276 Gr. 316		
6	Lantern Ring	A276 Gr. 316		
7	Thrust	Grafoil		
8	Gland	A576-1045	Same of body ma' l	
9	Stem Bushing	Grafoil		
10	Packing	Refer to page 5 Seal Materials		
11	Gasket (Sprial Wound)	Refer to page 5 Gasket Materials		
12	Wrench Bolt	A307 Gr. B	A193 B8	
13	Stud Bolt	Refer to page 22 Bolt & Nut Materials		
14	Nut			
15	O-Ring (Lantern Ring)	Viton or HSN		
16	O-Ring (Lantern Ring)	Viton or HSN		
17	O-Ring (Mounting)	Viton or HSN		
18	Antistatic Device	316 SS		
19	O-Ring (Low Stem)	Viton or HSN		
20	Lower Stem	A276 Gr. 304	Same as body ma' l	
21	Lower Cover	A576-1045	Same as body ma' l	
22	Lower Cover bolt/Nut	Refer to page 22 Bolt & Nut Materials		
23	Gasket	Grafoi		
24	O-Ring (Retainer)	Viton or HSN		
25	Retainer	A276 316 or A351 Gr. CF8M		
26	Coil Spring	Inconel X 750		*316SS
30	Lower Stem Bush	Grafoil		
31	Sealant Injection	Stainless Steel		Stem and Seat Sealant
32	Gear box (Worm Gear)	Ductile Iron		

* Specification is subject to change without prior notice due to improvements.

Cast Steel 150, 300 & 600 Three Piece Trunnion Ball Valve





Class 150

SIZE		BxB	L	H	W	Weight
16	mm	387.0	762.0	590.0	600.0	750
	in	15.2	30.0	23.2	23.6	
18 X16	mm	387.0	864.0	590.0	600.0	790
	in	15.2	34.0	23.2	23.6	
18	mm	438.0	864.0	670.0	600.0	980
	in	17.2	34.0	26.4	23.6	
20 X18	mm	438.0	914.0	670.0	600.0	1030
	in	17.2	36.0	26.4	23.6	
20	mm	489.0	914.0	750.0	800.0	1190
	in	19.3	36.0	29.5	31.5	
24 X 20	mm	489.0	1067.0	750.0	800.0	1570
	in	19.3	42.0	29.5	31.5	
24	mm	591.0	1067.0	930.0	800.0	2100
	in	23.3	42.0	36.6	31.5	

Class 300

SIZE		BxB	L	H	W	Weight
16	mm	387.0	838.0	590.0	600.0	1020
	in	15.2	33.0	23.2	23.6	
18 X16	mm	387.0	914.0	590.0	600.0	1100
	in	15.2	36.0	23.2	23.6	
18	mm	438.0	914.0	670.0	600.0	1280
	in	17.2	36.0	26.4	23.6	
20 X18	mm	438.0	991.0	670.0	600.0	1360
	in	17.2	39.0	26.4	23.6	
20	mm	489.0	991.0	750.0	800.0	1540
	in	19.3	39.0	29.5	31.5	
24 X 20	mm	489.0	1143.0	750.0	800.0	1950
	in	19.3	45.0	29.5	31.5	
24	mm	591.0	1143.0	930.0	800.0	2600
	in	23.3	45.0	36.6	31.5	

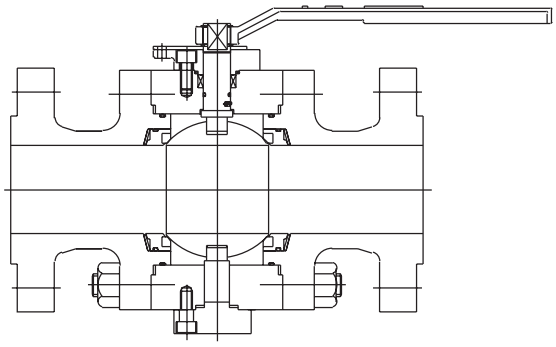
Class 600

SIZE		BxB	L	H	W	Weight
10	mm	248	787	460	600	600
	in	9.8	31.0	18.1	23.6	
12 X 10	mm	248	838	485	600	660
	in	9.8	33.0	19.1	23.6	
12	mm	298	838	570	800	820
	in	11.7	33.0	22.4	31.5	
14 X 12	mm	298	889	570	800	1060
	in	11.7	35.0	22.4	31.5	
14	mm	327	889	610	800	1130
	in	12.9	35.0	24.0	31.5	
16 X 14	mm	327.0	991.0	610.0	800.0	1440
	in	12.9	39.0	24.0	31.5	
16	mm	375.0	991.0	680.0	800.0	1550
	in	14.8	39.0	26.8	31.5	
18 X 16	mm	375.0	1092.0	680.0	800.0	1860
	in	14.8	43.0	26.8	31.5	
18	mm	419.0	1092.0	720.0	800.0	2100
	in	16.5	43.0	28.3	31.5	
20 X 18	mm	419.0	1194.0	720.0	800.0	2400
	in	16.5	47.0	28.3	31.5	
20	mm	464.0	1194.0	798.0	950.0	2800
	in	18.3	47.0	31.4	37.4	
24 X 20	mm	464.0	1397.0	798.0	950.0	3900
	in	18.3	55.0	31.4	37.4	
24	mm	559.0	1397.0	830.0	950.0	5300
	in	22.0	55.0	32.7	37.4	

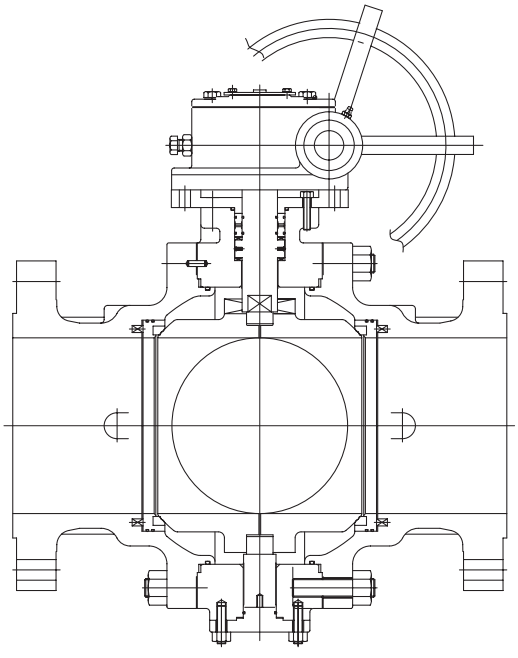
Note
1) BXB=Ball Bore
2) Weight : kg
3)Pressure Relief Pulg : NPT 1/2”
4)Stem and Seat Sealant Injection

* Specification is subject to change without prior notice due to improvements.

Cast Steel 900 Three Piece Trunnion Ball Valve



● 3” and Below

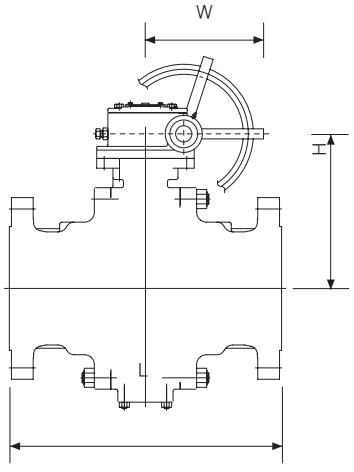


● 4” and Larger
Refer to Page 16

Class 900

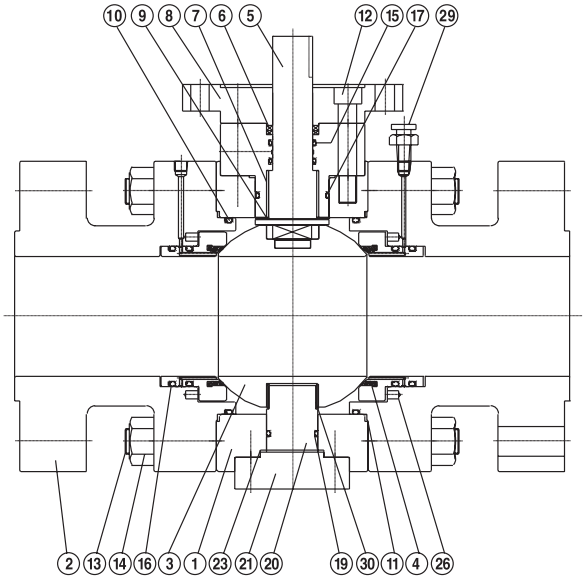
SIZE		BxB	L	H	W	Weight
2X1 1/2”	mm	35	368	180	240	45
	in	1.4	14.5	7.1	9.4	
2	mm	47	368	205	240	51
	in	1.9	14.5	8.1	9.4	
3 X 2	mm	47	381	205	240	57
	in	1.9	15.0	8.1	9.4	
3	mm	73	381	220	350	88
	in	2.9	15.0	8.7	13.8	
4 X 3	mm	73	457	220	350	93
	in	2.9	18.0	8.7	13.8	
4	mm	98	457	267	440	170
	in	3.9	18.0	10.5	17.3	
6 X 4	mm	98	610	267	440	230
	in	3.9	24.0	10.5	17.3	
6	mm	146	610	350	600.0	390
	in	5.7	24.0	13.8	23.6	
8 X 6	mm	146	737	350	600	480
	in	5.7	29.0	13.8	23.6	
8	mm	190	737	460	600	620
	in	7.5	29.0	18.1	23.6	
10 X 8	mm	190	838	460	600	670
	in	7.5	33.0	18.1	23.6	
10	mm	238	838	572	800	820
	in	9.4	33.0	22.5	31.5	
12 X 10	mm	238	965	572	800	950
	in	9.4	38.0	22.5	31.5	
12	mm	282	965	610	800	1230
	in	11.1	38.0	24.0	31.5	

Note
1) BXB=Ball Bore
2) Weight : kg
3)Stem Sealant Injection Fitting : All Size
4)Seat Sealant Injection Fitting : 6” and Larger



 * Specification is subject to change without prior notice due to improvements.

Forged Steel 1500, Three Piece Trunnion Ball Valve



Class 1500

SIZE		BxB	L	H	W	Weight
2X1 1/2"	mm	35	368	180	240	45
	in	1.4	14.5	7.1	9.4	
2	mm	47	368	215	350	59
	in	1.9	14.5	8.5	13.8	
3 X 2	mm	47	470	215	350	82
	in	1.9	18.5	8.5	13.8	
3	mm	70	470	220	440	116
	in	2.8	18.5	8.7	17.3	
4 X 3	mm	70	546	220	440	147
	in	2.8	21.5	8.7	17.3	
4	mm	92	546	277	380	204
	in	3.6	21.5	10.9	15.0	
6 X 4	mm	92	705	278	380	300
	in	3.6	27.75	10.9	15.0	
6	mm	136	705	365	600	575
	in	5.4	27.75	14.4	23.6	
8 X 6	mm	136	832	365	600	690
	in	5.4	32.75	14.4	23.6	
8	mm	178	832	480	600	750
	in	7.0	32.75	18.9	23.6	

Note
1) BXB=Ball Bore
2) Weight : kg
3)Stem and Seat Sealant Injection
4)Gear Operation : 4" and Larger

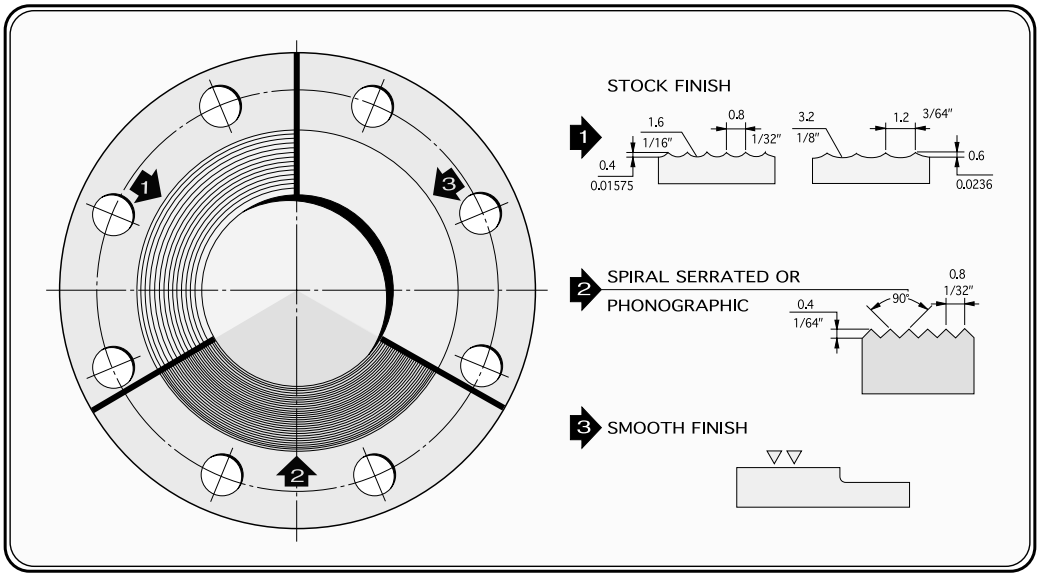
STANDARD MATERIALS

No	Nomenclature	Cast steel	Stainless steel	Remarks
1	Body	Forged Steel (Refer to Page 5 Shell Materials)		
2	Cap	Forged Steel (Refer to Page 5 Shell Materials)		
3	Ball	A 351 Gr CF8M		
4	Seat Ring	Refer to page 5 Seal Materials		
5	Stem	A276 Gr. 316		
6	Packing	Refer to page 5 Seal Materials		
7	Thrust Bushing	Grafoil		
8	Gland	Same as Body Materials		
9	Stem Bushing	Grafoil		
10	O-Ring (Cap)	Viton or HSN		
11	Gasket	Refer to page 5 Gasket Materials		
12	Wrench Bolt	A193 B7		
13	Stud Bolt	Refer to page 22 Bolt & Nut Materials		
14	Nut			
15	O-Ring (Packing)	Viton or HSN		
16	O-Ring (Retainer)	Viton or HSN		
17	O-Ring (Gland)	Viton or HSN		
18	Antistatic Device	316 SS		
19	O-Ring (Lower Stem)	Refer to page 5 Seal Materials		
20	Lower Stem	A 276 316		
21	Lower Cover	Same as Body Materials		
22	Lower Cover bolt/Nut	Refer to page 22 Bolt & Nut Materials		
23	Lower Gasket	Grafoil		
26	Coil Spring	Inconel X 750		*316SS
29	Sealant Injection	Stainless Steel		Stem and Seat Sealant
30	Lower Stem Bushing	Grafoil		

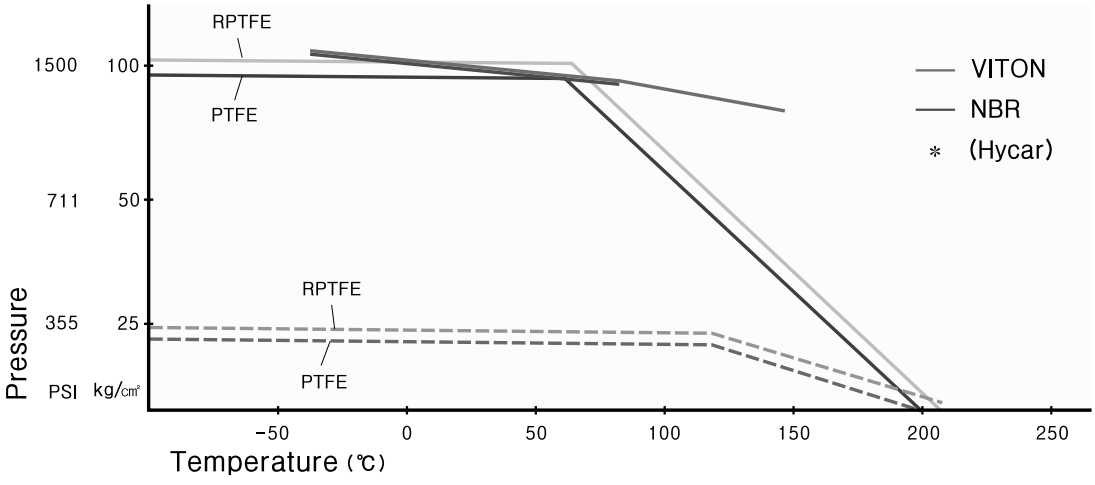
Maximum Operating Pressure & Test Pressure

API 6D STANDARD				
Class	Max Operating Pressure	Test Pressure (Psi)		
		Shell	Seat (Water)	Seat(Air)
150	275	425	300	80
300	720	1100	800	
600	1440	2175	1600	
900	2160	3250	2400	
1500	3600	5400	4000	

Standard Flange Finish (MSS SP-6)



Seat and O-Ring Temperature • Pressure Rating



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Ball Valve Stem Torque Data Sheet

Stem Torque

Unit : Lb-in

SIZE	150LB (275PSI)	300LB (720PSI)	600LB (1440PSI)	900LB (2160PSI)	1500LB (3600PSI)
1/2"	15	39	·	·	·
3/4"	24	63	·	·	·
1"	41	108	·	·	·
1-1/2"	120	315	727	2,251	3,652
2"	222	582	1,645	2,818	4,696
3"	569	1,489	2,826	2,419	4,572
4"	1,174	3,073	5,606	9,306	16,723
6"	4,235	11,089	13,988	21,675	37,138
8"	9,165	23,995	22,740	33,434	·
10"	7,108	18,611	24,148	57,535	·
12"	8,763	22,943	35,694	83,273	·
14"	11,269	29,505	37,912	·	·
16"	15,325	40,123	54,404	·	·
18"	22,851	72,304	105,127	·	·
20"	26,638	83,078	136,777	·	·
24"	46,903	91,304	190,890	·	·

Conversion Table

	Kg-m	N-m	Lb-ft	Lb-in
Kg-m	1	Kg-m * 9.8	Kg-m / 0.1382	Kg-m / 0.0115
N-m	N-m / 9.8	1	N-m / 1.355	N-m / 0.1129
Lb-ft	Lb-ft * 0.1382	Lb-ft * 1.355	1	Lb-ft *12
Lb-in	Lb-in * 0.0115	Lb-in * 0.1129	Lb-in / 12	1

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Comparison List for Casting and Forgings

General Classification	Casting			Forgings		
	ASTM	JIS	BS	ASTM	JIS	BS
Cast Iron	A126 - Class A	G5501-FC20	1452-14	-	-	-
	- Class B	-FC25	-17	-	-	-
	- Class C	-FC30	-20	-	-	-
Malleable Iron	A197	G5703-FCMB28	310-B18/6	-	-	-
	A47 - 32510	-FCMB35	-B22/14	-	-	-
	- 35018	-FCMB37	-	-	-	-
Ductile Iron	A395	G5502-FCD40	-	-	-	-
	-	-FCD45	-	-	-	-
	A536	-FCD55	-	-	-	-
Carbon Steel	A216 - WCA	G5151-SCPH1	-	A105	G3201-SF45	1503-161B
	-	G5101-SC46	1504-161	-	-	-
	- WCB	G5151-SCPH2	-B	A105	G3201-SF50	1503-161C
Carbon -1/2Mo	A217 - WC1	G5111-SCA41	1504-240	A18 -F1	-	1503-240B
1 1/4Cr-1/2Mo	- WC6	G5111-SCA51	1504-621	-F11	-	-
2 1/4Cr-1Mo	- WC9	-	-622	-F22	-	1503-622
5Cr-1/2Mo(C 0.25)	A217 - C5	G5111-SCA52	1504-625	-F5a	-	1503-625
9Cr-1Mo	A217 - C12	-	1504-629	-F9	-	-
Carbon Steel for Low Temp.	A352 - LCB	-	4242-GRA	A350-LF1	-	-
Carbon-1Mo for Low Temp.	- LC1	-	-	-	-	-
2 1/2Ni	- LC2	-	-	-	-	-
3 1/2Ni	- LC3	-	-	A350-LF3	-	-
13Cr	A217 - CA15	G5121-SCS1	-	A182-F6	G4303-SUS51B	1503-713
18Cr-8Ni(C 0.03)	A351 - CF3	-	-	A182-F304L	-SUS28B	-
18Cr-8Ni(C 0.08)	- CF8	G5121-SCS13	-	-F304	-SUS27B	1503-801
18Cr-8Ni-2Mo(C 0.03)	A351 - CF3M	G5121-SCS16	-	-F316L	G4303-SUS33B	-
18Cr-8Ni-2Mo(C 0.08)	- CF8M	-SCS14	1632-GRC	-F316	-SUS32B	1503-845B
18Cr-8Ni-Cb(C 0.08)	A351 - CF8C	-	-	-F347	G4303-SUS43B	-821Nb
22Cr-12Ni(C 0.10)	- CH10	-	-	-	-	-
22Cr-12Ni(C 0.20)	- CH20	-	-	-	-	-
23Cr-19Ni(C 0.20)	- CK20	-	-	-	-	-
19Cr-27Ni-2Mo-3Cu(C 0.07)	- CN7M	-	-	-	-	-
HASTELLOY.B	A494-N-12MV	-	-	-	-	-

Bolt & Nut Material

Body Material	Ⓑ General		Ⓒ NACE	
	Bolt	Nut	Bolt	Nut
High-Temperature cast steel	ASTM A193 B7 (HB MAX 302)	ASTM A194 2H (HB 248 to 352)	ASTM A193 B7M (HRC MAX 22)	ASTM A194 2HM (HRC MAX 22)
Low-Temperature cast steel	ASTM A320 L7	ASTM A194 Gr4	ASTM A320 L7M (HRC MAX 22)	ASTM A194 7M (HRC MAX 22)
Corrosion-Resist cast steel	ASTM A193 B8 (HB MAX 223)	ASTM A194 8 (HB MAX 126 to 300)	Ⓓ	

Ⓑ HS VALVE STANDARD
Ⓒ Option
Ⓓ Same as General requirement

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MEMO

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