INVACO
INDUSTRIAL VALVE COMPANY

Floating Ball Valve

Floating Ball Valve

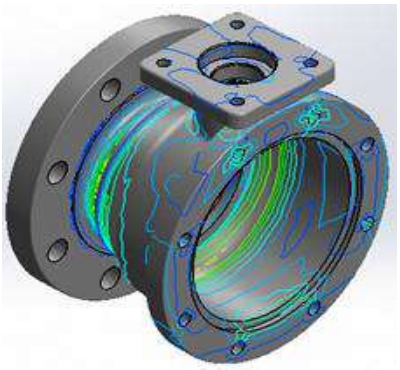
Model 4500:

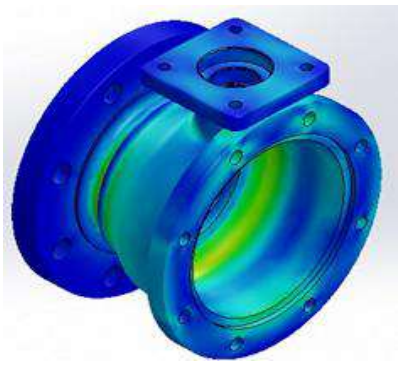
ISO 17292, API 6D, API 607
Size - 1/2" to 8" (15mm to 200mm)
Rating - Class 150 to Class 2500
Full Bore Design
Reduced Bore Design
Two Piece Design
Three Piece Design
Forged Steel Valves
Cast Steel Valves

www.invacovalves.com

Contents:

Floating Ball Valve – Model 4500





Company Overview

"INVACO" (Industrial Valve Company) founded and promoted by the technocrats having experience of 18 years in National and International valve industry. INVACO PRIVATE LIMITED (Industrial Valve Company) is registered experience company in Design, Development, Fabrication & Manufacturing of Industrial Valves. Our mission is to produce high quality and reliable Valves to our national & international clients / customers. Our proactive approach to technical issues enables to understand and implement cost-effective solutions to our valuable customers.

"INVACO" (Industrial Valve Company) committed to excellence by manufacturing top quality valves to exceed customer's needs with low cost, on-time delivery & providing finest service in industry. "INVACO" manufacture Ball valves (Floating & Trunnion Mounted), Butterfly Valves (Damper, Sleeved, Double offset & Triple Offset), Gate Valves, Globe Valves , Check Valves, Strainers, Flap Valves, Dismantling Joints, Flange Adaptor, Flange Couplings & Sluice Gate/ Penstock for Oil & Gas, Petrochemicals, Refineries, Power Plants, Water Treatment Plants, Chemical, Paper & Pulp, Sugar, Steel, Pharma, Pipeline Transmission and other process industries.

"INVACO" (Industrial Valve Company) is specialized in design, manufacturing & testing of FORGED & CAST Steel Floating Ball Valves. All valves are designed as per ISO 17292, API 6D, ASME B16.34 and fire safe as per API 607 / API 6FA follows ISO 9001:2015 Quality Management Systems. INVACO, manufacture ball valve size from 1/2" to 8" (15mm to 200mm) with pressure range from Class 150 to Class 2500 and equivalent EN pressure ratings. Ball valves produced from FORGED & CAST materials like A105N, LF2, F6A, F304L, F316L, F22, F51, F52, F53, F55, WCB, WCC, WC6, LCB, LCC, CA15, CF8, CF8M, CF3, CF3M, 4A,5A, 6A, Aluminum Bronze, Incoloy (825 , 925) , Inconel (625, 718 & 750) , Monel (K400, K500), Alloy 20, Hast Alloy and other special materials.

INVACO aims to produced a zero defect valves for long life and reliable services. Making continual improvements aims towards to minimize the Total Ownership Cost for valued customers. Also aims to established sales and services of valves & actuators worldwide.

This catalog provides basic information of Floating Ball valves. Every effort has been made to maintain technical accuracies however INVACO has reserve rights to make any change in design and materials without prior notice.

Quality Policy

At "INVACO", we established this comprehensive Quality Management System to implement a strategy of continual improvement and compliance with the requirements of the ISO 9001:2015 Quality Assurance standard and other industrial valves standards by:

Customer Focused:

- Make commitments we fully understand and believe we can meet and deliver.
- Meet all commitments to customers on time.
- Satisfy our customer's needs and exceed their expectations.

Performance Driven:

- Verify that our products and services meet customer requirements.
- Monitor benchmark and continuously improve our business, products, and services, organization and employee's performance.

Entire "INVACO" stick to the spirit and intent of this policy to ensure customer satisfaction is achieved at all respects and times.

Certificate of Registration

ISO 9001:2015

This is to Certify That The Quality Management System of

M/S INVACO PRIVATE LIMITED

ADDL. MIDC, PLOT NO. F-27, ANAND NAGAR, AMBERNATH EAST, AMBARNATH, THANE-421501, MAHARASHTRA, INDIA.

has been audited and conformed to be in accordance with the requirements of

ISO 9001:2015

The Quality Management System is Applicable to :

MANUFACTURING & SUPPLY OF INDUSTRIAL & SPECIAL PURPOSE VALVES, STRAINERS & ACCESSORIES.

Certificate No	: QBQ22221		
Initial Registration Date	: 25/02/2021	Issuance Date	: 25/02/2021
Date of Expiry	: 24/02/2024		
1st Surve. Due	: 25/01/2022	2nd Surve. Due	: 25/01/2023

Director

IAS ACCREDITED Management Systems Certification Body MSCB-174

IAF MEMBER OF MULTILATERAL RECOGNITION ARRANGEMENT

Aambitious Assessment Pvt. Ltd.
D-9, Sector 03, Noida, Gautam Buddha Nagar, Uttar Pradesh - 201301, India.
e-mail: info@aapcertification.in, website: www.aapcertification.in
Certificate Verification: Certificate Validity can be re-checked at www.aapcertification.in
This certificate is a property of Aambitious Assessment Pvt. Ltd. and shall be returned immediately when demanded
*Validity of the certificate is subject to successful completion of surveillance audit on or before due date

Quality Standards for Ball Valve

American Petroleum Institute (API)

API 6D
API 6A
API 598
API Spec Q1
API 607
API 6FA

American Society of Mechanical Engineers (ASME)

ASME B16.34
ASME B16.5
ASME B16.47
ASME B16.10
ASME B16.25
ASME B16.11
ASME B1.20.1

British / European Standards

BS 5351
BS 6755
BS 4504
BS EN 558
BS EN 1092
BS EN 12266
EN 10204
BS EN 6364

International Organization for Standardization (ISO)

ISO 9001:2015
ISO 5208
ISO 5211
ISO 14723
ISO 17292
ISO 15848

Manufacturers Standardization Society (MSS – SP)

MSS SP-6
MSS SP-25
MSS SP 44
MSS SP 45
MSS SP 55
MSS SP 61
MSS SP 72
MSS SP 82

National Association of Corrosion Engineers (NACE)

NACE MR 01-75
NACE TM 01-77
NACE TM 02-84
NACE MR 01-03

Materials and Equipment Standards and Code (MESC)

MESC SPE 77/100
MESC SPE 77/130
MESC SPE 77/110
MESC SPE 77/211
MESC SPE 77/300
MESC SPE 77/302
MESC SPE 77/312
MESC SPE 77/200

Testing & Inspection for Ball Valve

Test	Applicable Standards	Extent of Test
Visual Inspection	MSS SP - 55	100%
Marking Inspection	MSS SP - 25	100%
Chemical, Physical & Heat Treatment	Relevant ASTM Standards	100%
Alloy Verification / Positive Material Identification(PMI)	INVACO Procedure	Upon Customer Request
Hardness Requirement	NACE MR 01 - 75	Upon Customer Request
Radiographic Testing (RT) (X-Ray & Gamma Ray)	ASME B16.34 (Annex B) , ASTM E94 , E142 , E446 , E186 , E280, BPVC Sec V-Art 7 & 22, ASME Sec VIII - Div-1	Upon Customer Request
Ultrasonic Testing (UT)	ASME B16.34 , ASTM A388 , A609 , A578 , BPVC Sec V – Art 4 & 23, ASME VIII Div-1	Upon Customer Request
Magnetic Particle Inspection(MPI)- (Dry & Wet)	ASME B16.34 Annex C , ASTM E709 , ASTM A275 , E1444, ASME Sec VIII Div-2, BPVC Sec V – Art 7 & 23	Upon Customer Request
Liquid / Dye Penetrant Inspection (LP / DP)	ASME B16.34 Annex D ,ASTM E 165 , E1417 , ASME Sec VIII Div 1,BPVC Sec V – Art 6 & 24.	Upon Customer Request
Impact Test	ASTM A 370	Upon Customer Request
Microstructural & Ferrite Content measurement	ASTM E 562	Upon Customer Request
Microscopic / inclusion Count Test	ASTM E 45	Upon Customer Request

Pitting Corrosion	ASTM G 48	Upon Customer Request
Crevice Corrosion	ASTM G 48	Upon Customer Request
Hydrogen Induced Cracking Test (HIC)	NACE TM 02 - 84	Upon Customer Request
Ferric Chloride Corrosion Test	ASTM A 923	Upon Customer Request
Hardness Test	ASTM E 18 , ASTM E 92, NACE MR 01 - 75	Upon Customer Request
Intergranular Corrosion Cracking (IGC)	ASTM A 262	Upon Customer Request
Chloride Stress Corrosion Cracking Test (CSCC)	NACE TM 01 - 75	Upon Customer Request
Size / Dimension Check	INVACO Approved Drawings	100%
Functional Check	INVACO Approved Drawings	100%
Shell Test (Hydro Test)	API 598, API6D, Approved GA Drawings	100%
Seat Test (Hydro Test)	API 598, API6D, Approved GA Drawings	100%
Backseat Test (Hydro Test)	API 598, API6D, Approved GA Drawings	100%
Seat Test (Air/Pneumatic Test)	API 598, API6D, Approved GA Drawings	100%
Helium Leak / Fugitive Emission Test	ISO 15848, MESC 77 / 312	Upon Customer Request
Torque Test	API 6D , INVACO Procedure	10% or Upon Customer Request
Blasting Report	INVACO Procedure	10% or Upon Customer Request
Surface Finish Report	INVACO Procedure	10% or Upon Customer Request
Painting / Dry Film Thickness Report	INVACO Procedure	10% or Upon Customer Request
Tag No, Serial No, Name Plate	INVACO Procedure	100%

Note: - 1) Backseat test is applicable to Gate & Globe Valve.
2) Above Test available upon customer request with extra cost.
3) For more information kindly contact "INVACO".

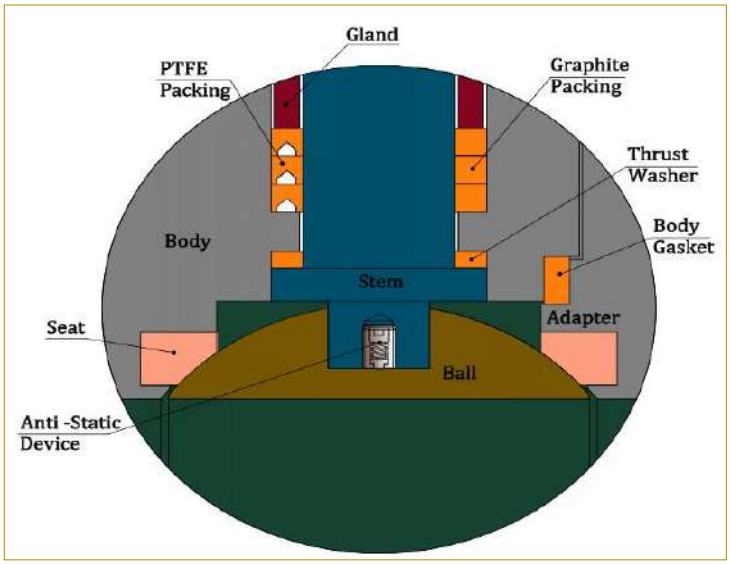
Manufacturing Range for Floating Ball Valve (Model – 4500)

Bore / Design	ASME CLASS / Size – in (mm)				
	150	300	600	900	1500
Full Bore	1/2" – 6" (15 – 150)	1/2" – 4" (15 – 100)	1/2" – 3" (15 – 80)	----	----
Reduced Bore	1/2" – 8" (15 – 200)	1/2" – 6" (15 – 150)	1/2" – 4" (15 – 100)	----	----
2 - Piece	1/2" – 8" (15 – 200)	1/2" – 6" (15 – 150)	1/2" – 3" (15 – 80)	----	----
3 - Piece	1/2" – 8" (15 – 200)	1/2" – 6" (15 – 150)	1/2" – 3" (15 – 150)	1/2" – 2" (15 – 50)	1/2" – 2" (15 – 50)

Design Features for Floating Ball Valve (Model – 4500)

****Blow-out Proof Stem:-**

One piece stem designed with integral "T-type" shoulder to provide blow-out proof effectively. The stem internally inserted as function of backseat to with stand with working pressure.



****Anti-static Device:-**

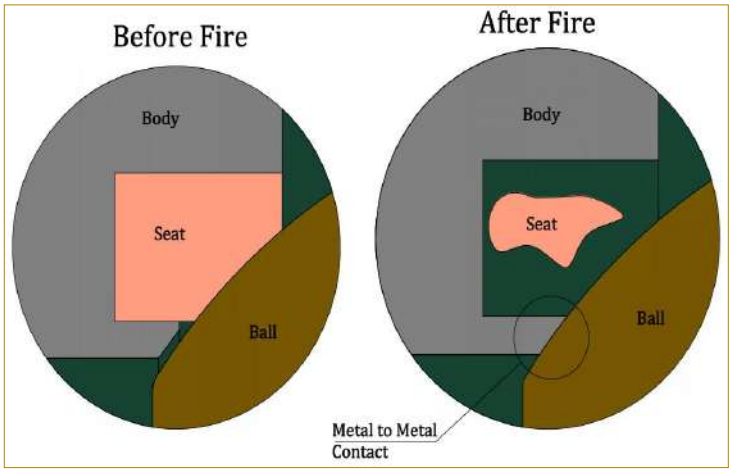
Assembly of spring and ball installed in ball and stem which ensure valve parts are grounding. Antistatic device maintain the electrical continuity between all valve components. In other words, antistatic device used to prevent static electricity which may catch fire or light the working fluid.

****Fire Safe Design:-**

Fire safe design is a combination of soft seat and metal seat. Soft seat get damage or destroyed with increase in temperature, the upstream pressure push the ball into downstream to make contact between ball and the metal seat which cut off the working fluid and minimized the internal leakage. All INVACO, ball valves are designed for Fire Safe in accordance with API 607 & API 6FA.

****Solid Ball:-**

For full bore performance, straight through flow and strength, INVACO always used solid ball. Our suggestion - ball is always preferred in forged materials.



****ISO Flange Mountings:-**

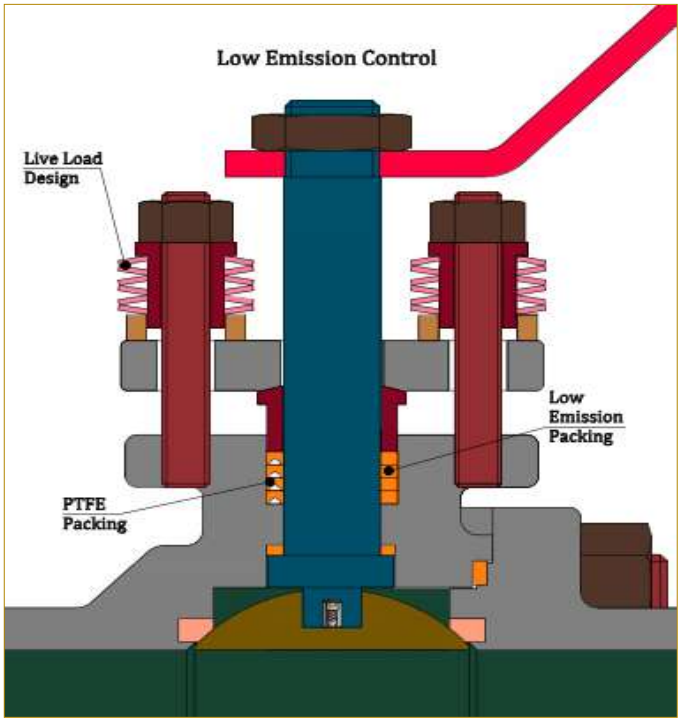
ISO flanged mounting arrangements are always integrated in INVACO valve designed with locking arrangements.

****Controlled Stem & Stuffing Box Finish:-**

Finish machining of stem & stuffing box plays an important role in sealing. The stem is made cold rolling with surface finish of Ra=0.4 reduced friction and ensure sealing. Surface finish of stuffing box within Ra=1.6 results in better sealing effect.

**Low Emission Packing:-

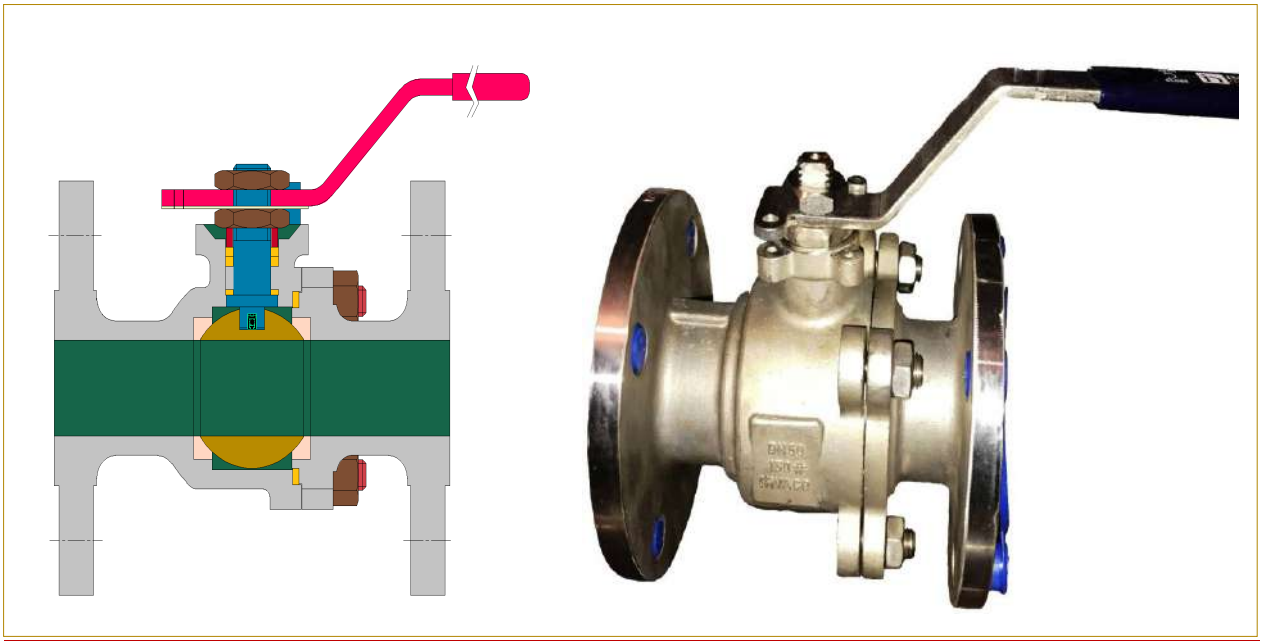
In frequently operated valves, normal graphite can be wear to cause leakage. INVACO designed low emission packing to prevent leakage. Graphite packing with cone designed in die-formed rings has low creep, less stress relaxation and provide better sealing performance & long life cycle. V-Shaped PTFE packing is used for emission control.



**Live Loaded Design:-

In standard valve assembly, gland packing is tightened through gland and gland stud & nuts. During the service & continuous working pressure, gland load reduced to loosen loads at gland packing thus results in gland leakage. INVACO designed for low emission valves used stets of Belleville springs installed in gland stud provide continuous compressive force on gland packing to avoid leakage.

Floating Ball Valve (Model – 4500)



Quality Standards:-

Design Standards	- ISO 17292 / API 6D / ASME B16.34 / MESC SPE 77-100,110,130,300,302,312
Testing Standards	- API 598 / EN 12266 / ISO 5208 / BS 6755
End to End Standards	- ASME B 16.10 / EN 558
Flange Drilling Standards	- ASME B16.5 / BS EN 1092.
Butt-Weld	- ASME B 16.25
Actuator Mounting	- ISO 5211
Fire Testing	- API 607 / API 6FA / ISO 10497
Fugitive Emission Test	- MESC SPE 77 - 312 / ISO 15848
Cryogenic Services	- BS 6364, MSS SP 134
Valve Marking	- MSS SP 25 / ASME B 16.34
Visual Inspection	- MSS SP 55
Material Testing	- NDE / NACE MR 01- 75 / NACE MR 01- 03 Compliance available.

Key Features:-

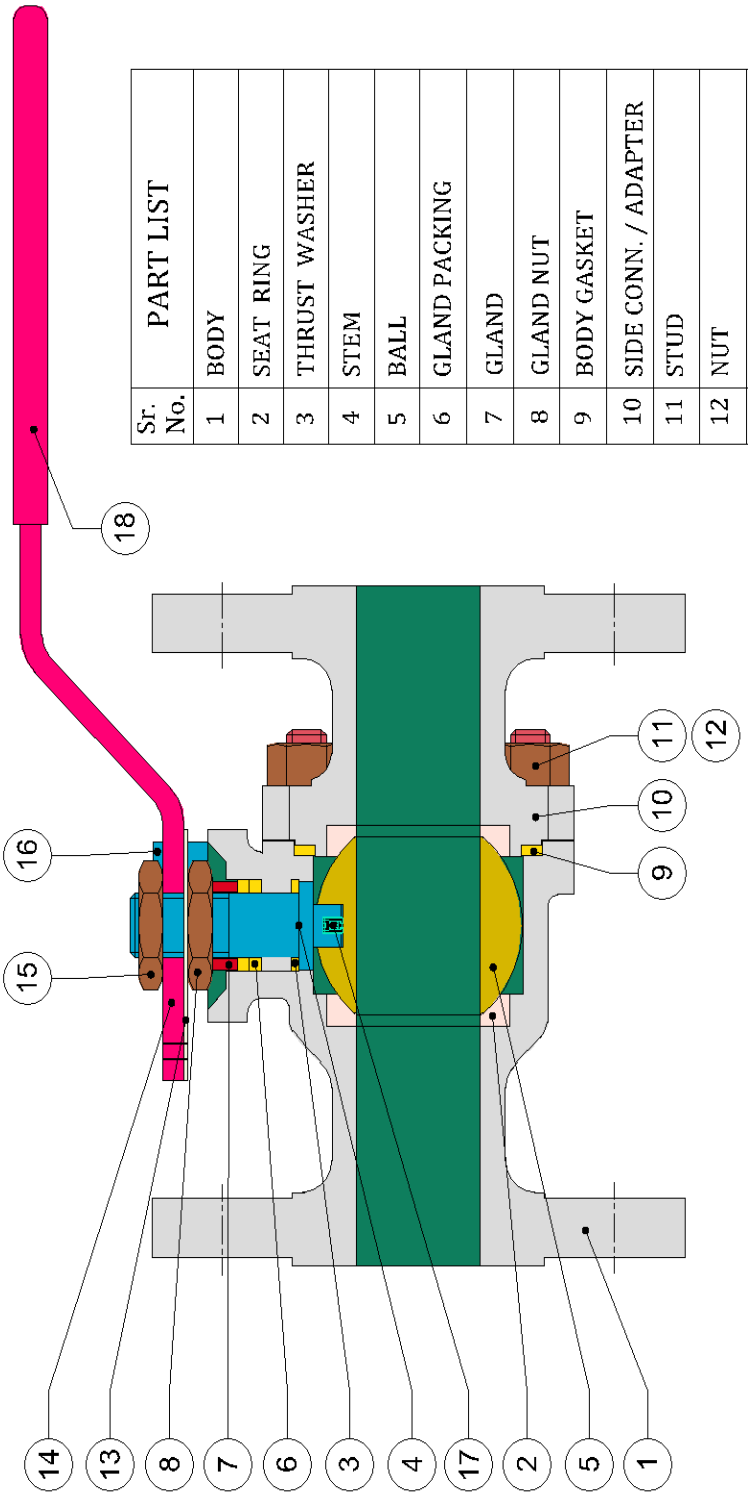
- Size :- 2” to 60” (50mm to 1500mm)
- Rating:- 150# to 2500# & Equiv. DIN Rating
- 2Pc / 3Pc Design , Full Bore / Reduced Bore
- Casting / Forging Body with Solid Ball.
- Soft , Metal & Fire Safe Design
- Blow Out Proof Stem
- Anti – Static Design
- Extended Bonnet & Extended Stem
- Manual, Electrical/Pneumatic/Hydraulic Act
- Pup Piece Available

Materials - Carbon Steel, Low Temperature Carbon Steel, Stainless Steel, Duplex, Super Duplex, Incoloy, Inconel, Monel, Aluminum Bronze, Hastalloy, Titanium and other materials.

Applications - Offshore / Onshore Oil & Gas, Chemical, Petrochemical & Allied Process, Power Plant, Water Treatment Plant, Liquefied Natural Gas, Sugar, Paper & Pulp, Steel, Piping & Process Industries

GA Drawing for Floating Ball Valve (Model – 4500)

FLOATING BALL VALVE (MODEL - 4500)



Sr. No.	PART LIST
1	BODY
2	SEAT RING
3	THRUST WASHER
4	STEM
5	BALL
6	GLAND PACKING
7	GLAND
8	GLAND NUT
9	BODY GASKET
10	SIDE CONN. / ADAPTER
11	STUD
12	NUT
13	LOCK PLATE
14	LEVER
15	LEVER NUT
16	LOCK PIN
17	ANTI-STATIC DEVICE
18	LEVER SLEEVE

SPARE PART LIST			
FOR STARTUP		FOR MAINTENANCE	
----		2	SEAT RING
6	GLAND PACKING		
9	BODY GASKET		

NOTE:- 2 PIECE FLOATING BALL VALVES AVAILABLE IN CASTING & FORGING MATERIALS.

Material of Construction for Floating Ball Valve (Model – 4500)

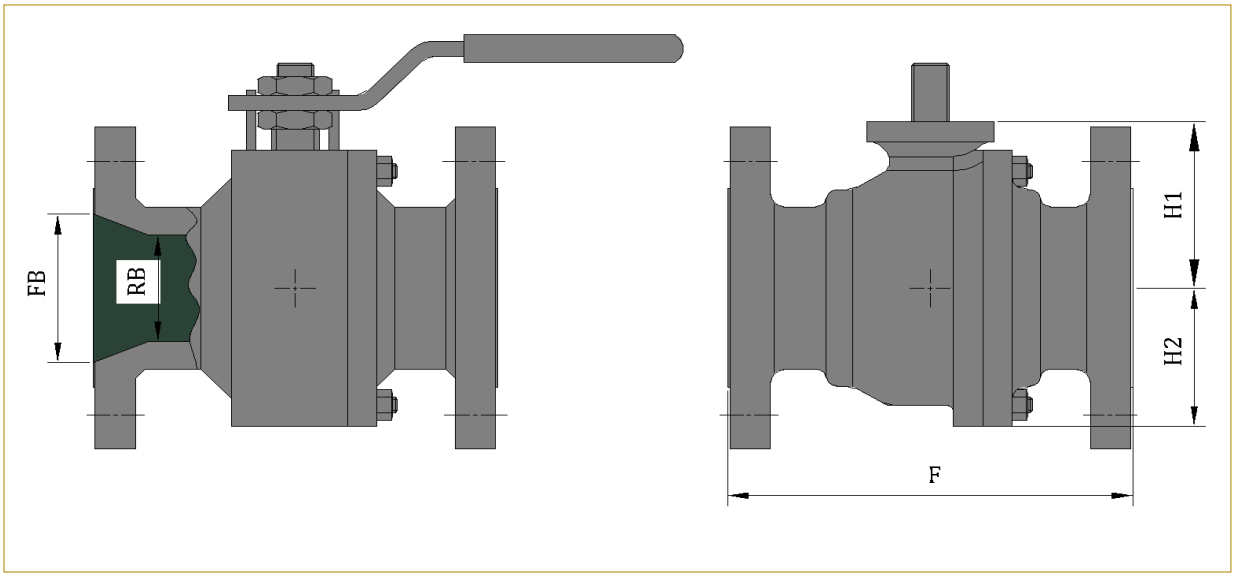
Bill of Material for CASTING Floating Ball Valve							
Sr. No.	Part	Carbon Steel	Low Temp. Carbon Steel	Stainless Steel	Duplex	Aluminium Bronze	Nickel Alloys
1	Body	A216 Gr WCB	A325 Gr. LCB , LCC	A351 Gr. CF8M, CF8	A890 Gr. 4A,5A,6A	C95800, C95500, C63200	CW6MC , CW12M, M53-1
2	Seat Ring	PTFE / RPTFE / Devlon / Peek / Nylon					
3	Thrust Washer	PTFE / Brass					
4	Stem	F304/F316/17-4PH			F51, F53, F55	Monel	Inconel 625, 750, 825/Monel
5	Ball	CF8,CF8M,F304,F316			4A,5A,6A, F51, F53, F55,	C95800, C95500, C63200, Monel	CW6MC , CW12M, M53-1
6	Gland packing	PTFE / Graphite					
7	Gland	CF8,CF8M,F304,F316			4A,5A,6A, F51, F53, F55,	C95800, C95500, C63200, Monel	CW6MC , CW12M, M53-1, Inconel,Monel
8	Gland Nut	A193 Gr. B7 / B7M	A320 Gr. L7 / L7M	A193 Gr B8 / B8M			
9	Body Gasket	SPWG + SS (304/316)			SPWG + Duplex	SPWG + Monel	SPWG + (Monel,Inconel)
10	Adaptor	A216 Gr WCB	A325 Gr. LCB , LCC	A351 GrCF8M, CF8	A890 Gr. 4A,5A,6A	C95800, C95500, C63200	CW6MC , CW12M, M53-1
11	Stud	A193 Gr. B7 / B7M	A320 Gr. L7 / L7M	A193 Gr B8 / B8M			
12	Nut	A194 Gr. 2H / 2HM	A194 Gr. 4 / 7 /7M	A194 Gr. 8 / 8MA			
13	Lock Plate	Carbon Steel		Stainless Steel			
14	Lever						
15	Lever Nut	A194 Gr. 2H / 2HM	A194 Gr. 4 / 7 /7M	A194 Gr. 8 / 8MA			
16	Lock Pin	A 105 / A105N	F304 , F316		F51, F53, F55	Brass / Monel	Inconel/Monel
17	Anti-Static	Standard (Stainless Steel)					
18	Sleeve	PVC					
Note:- "INVACO' reserve right to change Material & Design anytime without prior notice.							

Bill of Material for FORGING Floating Ball Valve

Sr. No.	Part	Carbon Steel	Low Temp. Carbon Steel	Stainless Steel	Duplex	Nickel Alloys
1	Body	A105N	A350 Gr. LF2	A182 Gr. F316, F304	A182 Gr. F51,F53,F55	Inconel 625, 750, 825/Monel
2	Seat Ring	PTFE / RPTFE / Devlon / Peek / Nylon				
3	Thrust Washer	PTFE / Brass				
4	Stem	F304/F316/17-4PH			F51, F53, F55	Inconel 625, 750, 825/Monel
5	Ball	F304,F316			F51, F53, F55,	Inconel 625, 750, 825/Monel
6	Gland packing	PTFE / Graphite				
7	Gland	F304,F316			F51, F53, F55,	Inconel 625, 750, 825/Monel
8	Gland Nut	A193 Gr. B7 / B7M	A320 Gr. L7 / L7M	A193 Gr B8 / B8M		
9	Body Gasket	SPWG + SS (304/316)			SPWG + Duplex	SPWG + (Monel,Inconel)
10	Adaptor	A105N	A350 Gr. LF2	A182 Gr. F316, F304	F51, F53, F55,	Inconel 625, 750, 825/Monel
11	Stud	A193 Gr. B7 / B7M	A320 Gr. L7 / L7M	A193 Gr B8 / B8M		
12	Nut	A194 Gr. 2H / 2HM	A194 Gr. 4 / 7 /7M	A194 Gr. 8 / 8MA		
13	Lock Plate	Carbon Steel		Stainless Steel		
14	Lever					
15	Lever Nut	A194 Gr. 2H / 2HM	A194 Gr. 4 / 7 /7M	A194 Gr. 8 / 8MA		
16	Lock Pin	A 105 / A105N	F304 , F316		F51, F53, F55	Inconel/Monel
17	Anti-Static	Standard (Stainless Steel)				
18	Sleeve	PVC				

Note:- "INVACO' reserve right to change Material & Design anytime without prior notice.

Dimensions for Floating Ball Valve (Model – 4500)



ASME CLASS 150 – FULL BORE

Size		FB	F (mm)			H1	H2
in	mm	mm	RF	RTJ	WE	mm	mm
½	15	13	108	---	108	31	24
¾	20	19	118	---	118	38	31
1	25	25	127	---	127	46	40
1.1/2	40	38	165	---	191	59	53
2	50	49	178	191	216	74	63
2.1/2	65	62	191	203	214	101	83
3	80	74	203	216	283	115	92
4	100	100	229	241	305	140	111
6	150	150	394	406	457	183	158

ASME CLASS 150 – REDUCE BORE

Size		RB	F (mm)			H1	H2
in	mm	mm	RF	RTJ	WE	mm	mm
¾ x ½	20 x 15	13	118	---	118	31	24
1x ¾	25 x 20	19	127	---	127	38	31
1½ x 1	40 x 25	25	165	---	191	46	40
2 x 1½	50 x 40	38	178	191	216	59	53
3 x 2½	80 x 65	62	203	216	283	101	83
4 x 3	100x80	74	229	241	305	115	92
6 x 4	150x100	100	394	406	457	140	111
8 x 6	200x150	150	457	470	521	186	158

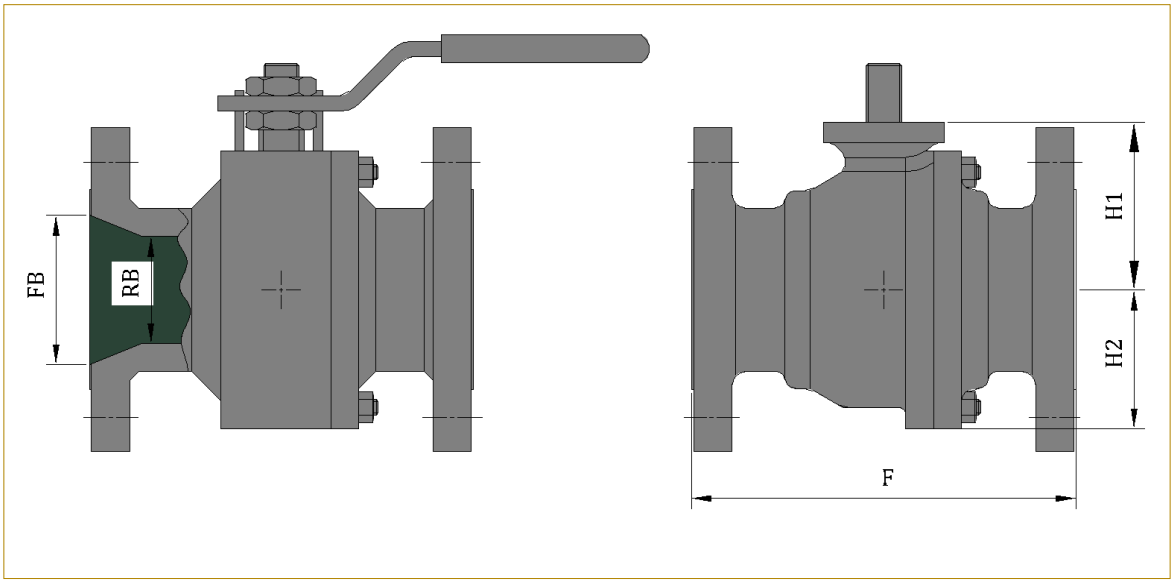
ASME CLASS 300 – FULL BORE

Size		FB	F (mm)			H1	H2
in	in	mm	RF	RTJ	WE	mm	mm
½	15	13	140	---	140	29	22
¾	20	19	152	---	152	38	28
1	25	25	165	---	165	47	35
1.1/2	40	38	191	---	191	68	56
2	50	49	216	232	216	74	60
2.1/2	65	62	241	257	241	106	86
3	80	74	283	298	283	122	96
4	100	100	305	321	305	139	114

ASME CLASS 300 – REDUCE BORE

Size		RB	F (mm)			H1	H2
in	in	mm	RF	RTJ	WE	mm	mm
¾ x ½	20 x 15	13	152	---	152	29	22
1x ¾	25 x 20	19	165	---	165	38	28
1½ x 1	40 x 25	25	191	---	191	47	35
2 x 1½	50 x 40	38	216	232	216	68	56
3 x 2½	80 x 65	62	283	298	283	106	86
4 x 3	100x80	74	305	321	305	122	96
6 x 4	150x100	100	403	419	403	139	114

Abbr.: - RF – Raised Faced, RTJ – Ring Type Joint, WE – Weld End, FB – Full Bore, RB – Reduced Bore.



ASME CLASS 600 – FULL BORE							
Size		FB	F (mm)			H1	H2
in	mm	mm	RF	RTJ	WE	mm	mm
½	15	13	165	---	165	31	30
¾	20	19	191	---	191	41	33
1	25	25	216	---	216	51	39
1.1/2	40	38	241	---	241	68	56
2	50	49	292	295	292	75	61
2.1/2	65	62	330	333	330	109	90
3	80	74	356	359	356	139	119

ASME CLASS 600 – REDUCE BORE							
Size		RB	F (mm)			H1	H2
in	mm	mm	RF	RTJ	WE	mm	mm
¾ x ½	20 x 15	13	191	---	191	31	30
1x ¾	25 x 20	19	216	---	216	41	33
1½ x 1	40 x 25	25	241	---	241	51	39
2 x 1½	50 x 40	38	292	295	292	68	56
3 x 2½	80 x 65	62	356	359	356	109	90
4 x 3	100x80	74	432	435	432	139	119

ASME CLASS 900 – FULL BORE							
Size		FB	F (mm)			H1	H2
in	in	mm	RF	RTJ	WE	mm	mm
½	15	13	216	---	216	41	39
¾	20	19	229	---	229	45	43
1	25	25	254	---	216	61	53
1.1/2	40	38	305	---	241	72	59
2	50	49	368	371	368	86	67
ASME CLASS 1500 – FULL BORE							
½	15	13	216	---	216	46	42
¾	20	19	229	---	229	49	45
1	25	25	254	---	254	67	59
1.1/2	40	38	305	---	305	81	68
2	50	49	368	371	368	98	72

ASME CLASS 900 – REDUCE BORE							
Size		RB	F (mm)			H1	H2
in	in	mm	RF	RTJ	WE	mm	mm
¾ x ½	20 x 15	13	229	---	229	41	39
1x ¾	25 x 20	19	254	---	216	45	43
1½ x 1	40 x 25	25	305	---	241	61	53
2 x 1½	50 x 40	38	368	371	368	72	59
3 x 2	80 x 50	49	381	384	381	86	67
ASME CLASS 1500 – REDUCE BORE							
¾ x ½	20 x 15	13	229	---	229	46	42
1x ¾	25 x 20	19	254	---	254	49	45
1½ x 1	40 x 25	25	305	---	305	67	59
2 x 1½	50 x 40	38	368	371	368	81	68
3 x 2	80 x 50	49	470	473	470	98	72

Abbr.: - RF – Raised Faced, RTJ – Ring Type Joint, WE – Weld End, FB – Full Bore, RB – Reduced Bore.

Note: - 1) All dimensions are in "mm" unless & otherwise specified.
2) "INVACO" reserve the right to change the information anytime without prior notice.

Torque for Floating Ball Valve (Model – 4500)

Torque for Floating Ball Valve in N-m						
Size		ASME CLASS				
in	mm	150	300	600	900	1500
1 / 2	15	11	18	23	29	42
3 / 4	20	13	21	29	46	58
1	25	22	36	56	84	128
1.1/2	40	44	71	108	165	214
2	50	62	92	146	225	386
2.1/2	65	94	125	194	356	---
3	80	133	198	259	529	---
4	100	190	368	504	---	---
6	150	602	1024	---	---	---
8	200	1065	2185	---	---	---

Note: - 1 For Peek or Devlon add 1.2 & for metal seat add 1.6.

2 For actuator selection or sizing, factor of safety 1.3 – 1.5 is recommended.

3 INVACO reserve the right to change Design, Material or specification or any other information without prior notice.

Coefficient of Flow for Floating Ball Valve (Model – 4500):

Size		Cv
in	mm	
1 / 2	15	27
3 / 4	20	61
1	25	110
1.1/2	40	213
2	50	466
2.1/2	65	746
3	80	1092
4	100	2052
6	150	4916
8	200	9136

Note: - 1 All size are Full Bore as per API 6D.

2 The Coefficient of Flow (Cv) is defined in U.S. gallon per minute (gpm) of water required to pass through a valve with a pressure drop of 1 psi.

3 INVACO reserve the right to change Design, Material or specification or any other information without prior notice.

Body & Trim Material for Floating Ball Valve (Model – 4500)

Body & Trim Material		
Material Group / Type	**Casting**	**Forging**
Carbon Steel	A216 Gr WCB , WCA	A105 / A 106
	A216 Gr WCC	A105N
Low Temperature Carbon Steel	A352 Gr LCB	A350 Gr LF2 CL.1
	A352 Gr LCC	
	A352 Gr LC1 / LC2	
	A352 Gr LC3	A350 Gr LF3 CL.1
Alloy Steel	A217 Gr WC1	A182 Gr F1
	A217 Gr WC5	
	A217 Gr WC6	A182 Gr F11 CL.2
	A217 Gr WC9	A182 Gr F22 CL.3
	A217 Gr C5	A182 Gr F5a
	A217 Gr C12	A182 Gr F9
	A217 Gr C12A	A182 Gr F91
Stainless Steel	A217 Gr CA15	A182 Gr F6A / ANSI 410
	A351 Gr CF10M	A182 Gr F304H
	A351 Gr CF8A	A182 Gr F347H
	A351 Gr CF8	A182 Gr F304
	A351 Gr CF3	A182 Gr F304L
	A351 Gr CF8M	A182 Gr F316
	A351 Gr CF3M	A182 Gr F316L
	A351 Gr CF8C	A182 Gr F347
Duplex / Super Duplex	A890 Gr CD4MCuN (1B)	
	A890 Gr CD3MCuN (1C)	
	A890 Gr CE8MN (2A)	
	A890 Gr CD3MN (4A)	A182 Gr F51
	A890 Gr CE3MN (5A)	A182 Gr F53
	A890 Gr CD3MWCuN (6A)	A182 Gr F55
Nickel / Super Nickel Alloys	A494 Gr CY40	Inconel 600
	A494 Gr CZ100	
	A494 Gr CW6MC	Inconel 625
	A494 Gr M 35 -1	Monel 400
		Monel K-500
	A494 Gr CW6M / CW12MW	Hastalloy C / C-276
Aluminum Bronze	B148 Gr C95200	
	B148 Gr C95400	
	B148 Gr C95500	
	B148 Gr C95800	
Titanium	B367 Gr C2	B381 Gr F2
	B367 Gr C3	B381 Gr F3
Special Materials	A351 Gr CN7M	Alloy 20
	A351 Gr CN2MCuN	904L
	A351 Gr CK3MCuN	SMO 254 / A182 Gr F44
	CB7CU -1	17 – 4 PH

Note: - Wrought names are given as a reference for commonly accepted equivalent material. "INVACO" cannot hold any liability for any damages incurred due to this table. For more information kindly contact "INVACO".

Material Specification for Fastener's:-

Bolting Material	Nut Materials	Temperature Range	Body Material
ASTM A193 Gr. B7	ASTM A194 Gr. 2H	-40°C to +538°C	Carbon Steel
ASTM A193 Gr B7M	ASTM A194 Gr. 2HM	-50°C to +538°C	Low Alloy Steel
ASTM A320 Gr. L7	ASTM A194 Gr. 7/4	-100°C to +371°C	Low Temp. Carbon Steel
ASTM A320 Gr. L7M	ASTM A194 Gr. 7M	-75°C to +538°C	Low Temp. Carbon Steel
ASTM A193 Gr. B8	ASTM A194 Gr. 8	-200°C to +538°C	Stainless Steel
ASTM A193 Gr. B8M	ASTM A194 Gr. 8M / 8MA	-200°C to +538°C	Stainless Steel/Nickel Alloys / AL-Br / Duplex
A453 Gr 660 CL A	A453 Gr 660 CL A	-30°C to +538°C	Duplex

NOTE:-

- Above temperature range is for BOLTIING, not body materials.
- Welding repair on Bolting is strictly not allowed.
- Temperature range & use may vary with requirement like NACE, Impact Test.
- For more information refer ASME B31.3, B16.34, A193, A194, A320 & A453.
- Other Bolt & Nut material available on request.
- INVACO cannot hold any liability for any damages incurred to this table.

Coating for Fastener's

- ENP
- Hot Deep Galvanized
- Hot Zinc
- Red Xylem
- PTFE Coating
- Cadmium
- Cadmium with PTFE

Seat Insert & Seal Material:-

Materials	Temperature Range °C		Pressure Class		Size	
	Min.	Max.	Seat Rings	Seal	Seat Rings	Seal
PTFE (Glass Filled)	- 100	+200	600#	----	24"(600mm)	----
PTFE (Carbon Filled)	- 100	+180	600#	----	24"(600mm)	----
Nylon6 (Devlon)	- 60	+140	2500#	----	60"(1500mm)	----
Nylon	- 60	+120	2500#	----	60"(1500mm)	----
Peek	- 100	+240	2500#	----	24"(600mm)	----
Derlin	- 45	+90	1500#	----	24"(600mm)	----
Viton B	- 29	+180	600#	2500#	60"(1500mm)	60"(1500mm)
Viton AED	- 40	+200	600#	2500#	60"(1500mm)	60"(1500mm)
Buna N / NBR	- 30	+120	600#	2500#	60"(1500mm)	60"(1500mm)
HNBR	- 40	+150	600#	2500#	60"(1500mm)	60"(1500mm)
Graphite	- 240	+560	----	2500#	24"(600mm)	60"(1500mm)

NOTE: - **Above table is for reference, information may differ, INVACO cannot hold any liability for any damages incurred due to this table.
** Temperature & Pressure range may vary with different brands manufacturer.

Static and Dynamic Seals (Gaskets & Packing):-

- Graphite Packing / Gasket.
- PTFE, R-PTFE Packing / Rings.
- Spiral Wound Gasket (Soft + Metal filled)
- Metal Gasket (RTJ, BX, T type seal ring).
- Lip Seal (U/O type, radial or face seal).

Testing Pressure:-

ASME CLASS	Working Pressure			Body Test (Hydro)			Seat Test (Hydro)			Seat Test (Air)		
	psi	bar	Kg/cm²	psi	bar	Kg/cm²	psi	bar	Kg/cm²	psi	bar	Kg/cm²
150	285	19.6	20	464	32	33	333	23	23.5	100	6	7
300	741	51.1	52	1145	79	81	842	58	59	100	6	7
400	988	68.1	69	1523	105	107	1189	82	84	100	6	7
600	1480	102.1	104	2262	156	159	1653	114	116	100	6	7
800	2001	138	141	3046	210	214	2248	155	158	100	6	7
900	2222	153.2	156	3423	236	240	2494	172	175	100	6	7
1500	3703	255.3	260	5685	392	400	4177	288	293	100	6	7
2500	6171	425.5	434	945	652	665	6932	478	487	100	6	7

Note: - Rating Pressure may be change for different materials.

Spares part list:-

For Floating Ball Valve			
Part No	**Part**	**Quantity for Start up**	**Quantity for 2 years Operation**
2	Seat Ring (Seat Insert)	---	3 nos
6	O-Ring (Retainer Ring)	2	3 nos
9	O- Ring (Stem)	2	3 nos

How to Order Floating Ball Valve (Model – 4500)

Valve Type	Size	Pressure Rating	End. Conn.	Body Material	Ball Material	Stem	Seat Ring	Seal Ring	Operation	Special
A	B	C	D	E	F	G	H	I	J	K

A- Valve Type

Code	Valve Type	Series	Code	Valve Type	Series
01	2 PCs Trunnion Mounted Full Bore	TF – 4000	08	3 PCs Floating Reduced Bore Socket Weld	SWR - 4900
02	2 PCs Trunnion Mounted Reduced Bore	TR – 4000	09	3 PCs Floating Full Bore Screwed (F – NPT)	SCF - 4900
03	3 PCs Trunnion Mounted Full Bore	THF – 4000	10	3 PCs Floating Reduced Bore Screwed (F-NPT)	SCR - 4900
04	3 PCs Trunnion Mounted Reduced Bore	THR - 4000	11	3 PCs Floating Full Bore But Weld	BWF – 4900
05	2 PCs Floating Full Bore	F – 4500	12	3 PCs Floating Reduced Bore But Weld	BWR – 4900
06	2 PCs Floating Reduced Bore	R – 4500	13	1 PCs Floating Full Bore	F – 4800
07	3 PCs Floating Full Bore Socket Weld	SWF - 4900	14	1 PCs Floating Reduced Bore	R - 4800

B - Size

NPS	½”	¾”	1”	1.1/2”	2”	2.1/2”	3”	4”	5”	6”	8”	10”	12”
DN	15	20	25	40	50	65	80	100	125	150	200	250	300
Code	**1A**	**2A**	**01**	**3A**	**02**	**4A**	**03**	**04**	**05**	**06**	**08**	**10**	**12**
NPS	14”	16”	18”	20”	22”	24”	26”	28”	30”	32”	34”	36”	40”
DN	350	400	450	500	550	600	650	700	750	800	850	900	1000
Code	**14**	**16**	**18**	**20**	**22**	**24**	**26**	**28**	**30**	**32**	**34**	**36**	**40**
Note:- For higher size code use respective NPS (inch)as Code													

C – Rating

Class	125	150	300	400	600	800	900	1500	2500	PN 2.5	PN6	PN10	PN16
Code	**01**	**02**	**03**	**04**	**05**	**06**	**07**	**08**	**09**	**10**	**11**	**12**	**13**
Class	PN 25	PN 40	PN 63	PN 100	PN 160	PN 320	1000PSI	2000psi	3000psi	5000psi	10000 psi	15000psi	20000psi
Code	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**

D – End Connection

Class	Type	Class	Type	Class	Type	Class	Type
A	Raised Face (RF)	D	But Weld	G	Hub	J	But Weld x RTJ
B	Flat Face(FF)	E	Socket Weld	H	Socket X Screw	K	Wafer
C	Ring Type Joint(RTJ)	F	Screwed	I	But Weld x RF	L	Other

E – Body / Adaptor Material

Code	Material	Code	Material	Code	Material	Code	Material	Code	Material
01	WCB	10	CF3M	19	C95500	28	F304L	37	Incoloy825
02	WCC	11	CK3MCuN	20	C95800	29	F316L	38	Incoloy925
03	LCB	12	CN7M	21	C62300	30	17 – 4PH	39	Monel K400
04	LCC	13	4A	22	A105	31	F11	40	Monel K500
05	WC6	14	5A	23	A105N	32	F51	41	Inconel 600
06	CA15	15	6A	24	LF2	33	F53	42	Inconel 625
07	CF8	16	M35-1	25	F6a	34	F55	43	Hastalloy C276
08	CF8M	17	CW6MC	26	F304	35	F44	44	904L
09	CF3	18	CW12MW	27	F316	36	Incoloy800	45	Other

F – Ball Material

Code	Material	Code	Material	Code	Material	Code	Material
01	CF8	10	M35-1	19	304L	28	Incoloy825
02	CF8M	11	CW6MC	20	316L	29	Incoloy925
03	CF3	12	CW12MW	21	17-4PH	30	Monel K400
04	CF3M	13	C95500	22	F11	31	Monel K500
05	CK3MCuN	14	C95800	23	F51	32	Inconel 600
06	CN7M	15	C62300	24	F53	33	Inconel 625
07	4A	16	A105(ENP)	25	F55	34	Hastalloy C276
08	5A	17	304	26	F44	35	904L
09	6A	18	316	27	Incoloy800	36	Other

G – Stem Material

Code	Material	Code	Material
A	A105N	I	F53
B	410	J	F55
C	F6A	K	F44
D	F304/F304L	L	Incoloy 825
E	F316/F316L	M	Inconel 625
F	17-4PH	N	Monel
G	F11	O	904L
H	F51	P	Other

H – Seat Ring

Code	Material
A	PTFE
B	RPTFE
C	DEVLON
D	PEEK
E	NYLON
F	DERLIN
G	EPDM
H	Other

I – Seal Ring

Code	Material
A	EPDM
B	VITON – B
C	VITON-AED
D	NBR / BUNA N
E	HNBR
F	Other

J – Operations

K - Special

Code	Operations	Code	Special Req.
A	Bare Stem	A	Extended Bonnet
B	Lever	B	Extended Stem
C	Gear	C	Cryogenic
D	Electrical Act'r	D	Other
E	Pneumatic Act'r	E	

Example: - 4" x 150#, 2Pc Floating Full Bore,
Flanged RF, Body/Adaptor – CF8M,
Ball & Stem – F316, Seat Ring – RPTFE,
Lever, Cryogenic Design.

CODE: - 05 04 02 A 08 20 E B B C

INVACO PVT LTD
INDUSTRIAL VALVE COMPANY

Floating Ball Valve

Model - 4500

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