KAVAL

KAVAL INDUSTRIES LTD.

Solutions
For Flow Control
Floating Ball Valves

About us

KAVAL is a Canadian valve fabricator, providing clients with floating and trunnion ball valves, as well as gate valves, globe valves, check valves, etc. for oil and gas industry, as well as other industries.

Kaval has production and distribution centers in Calgary, Canada and Nanjing, China, consisting of experienced R&D, QA/QC, Engineering and production teams. We provide customers in the world with soft seated floating and trunnion ball valves, gate valves, globe valves, check valves, etc. for oil and gas industry, as well as other industries. KAVAL is ISO 9000 certified (DNV) and valve designs meet relevant standards such as API 6D, API 600, API 594, ASME B16.34, CSA Z245.15, and tested as per API 598, API 6D, API 607, etc.. Our products meet the most stringent requirement in quality, pricing, delivery and services by our customers.

In the very tough competitive market, KAVAL wins its share by high quality products, quick delivery, excellent service and competitive price. In KAVAL we are proud of our quality control, knowledge of materials, valve design, fabrication, our services, as well as our understanding about requirements in oil and gas industries in North America and the world. Our experienced staff, high standards of excellence, expertise in problem solving and variety of our products will provide our clients with fully satisfaction.

Our international team is composed of experts of valve design, valve manufacture, material production, oil and gas production, EPC, etc. Based on know-how and know-why, we provide our clients with result-oriented flow control solutions for their projects, including selection of materials, specification of valves, etc. rather than only valve products, to meet the client particular applications.

Matching up the market requirement and technology development, we have been dedicating on developing products and services to best meet our client's needs in oil and gas industries. Client's success is our achievement. Our experienced staff, high standards of excellence, expertise in problem solving and variety of our products will provide our clients with fully satisfaction.

KAVAL's premium quality floating ball valves have found wide applications in oilfield, chemical industry, petrochemical and hydrocarbon processing applications.

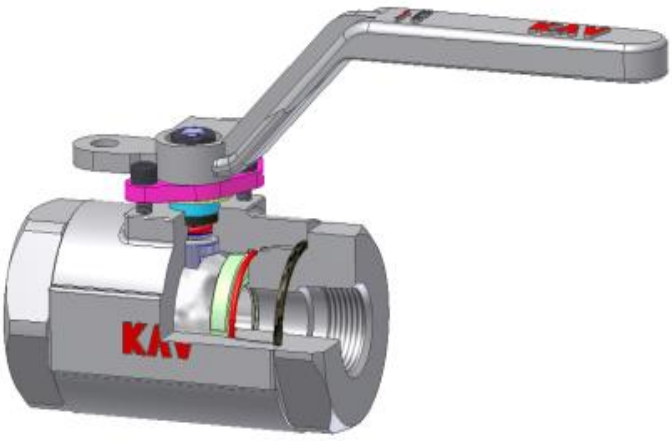
PRODUCTS AND APPLICABLE STANDARDS

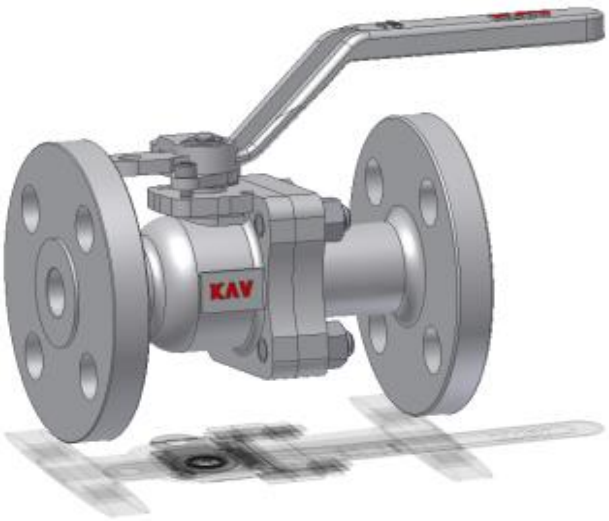
Cast Floating Ball Valve

- Size: NPS 2" ~ 6"
- Class: ANSI 150 ~ 600
- Design standard: API 608/ ASME B16.34
- End: RF flange per ASME B16.5
- Fact to Face: ASME B16.10
- Test: API 6D
- Soft & Metal Seated

Forged Ball Valve (small size)

- Size: NPS 1/4" ~ 2",
- Class: ANSI 800 ~ 2500
- Design standard: API 608, ASME B16.34
- Test: API 598, API 6D
- End: BW, SW, NPT
- Screwed body construction
- Soft & Metal Seated
- Fireproof per API 607





Cast Floating Ball Valves (small size)

- Size: NPS 1/2”- 2”
- Class: ANSI 150 ~1500
- Design standard: API 608
- End: RF flange per ASME 16.5
- Test: API 6D
- Soft & Metal Seated
- Fireproof per API 607

KAVAL floating ball valves are also designed to meet EN/ISO standards:

Design standard: EN ISO17292

Valve shell pressure-temperature: EN ISO17292

Shell wall thickness: EN ISO17292

Face-to-face dimensions: EN 12982

End flange dimensions: EN 1759-1

Fire test: ISO 10497

Pressure/Leak test: EN 12266

CSA standards

Kaval floating valves satisfy CSA Z245.15 (latest edition).

NACE compliance

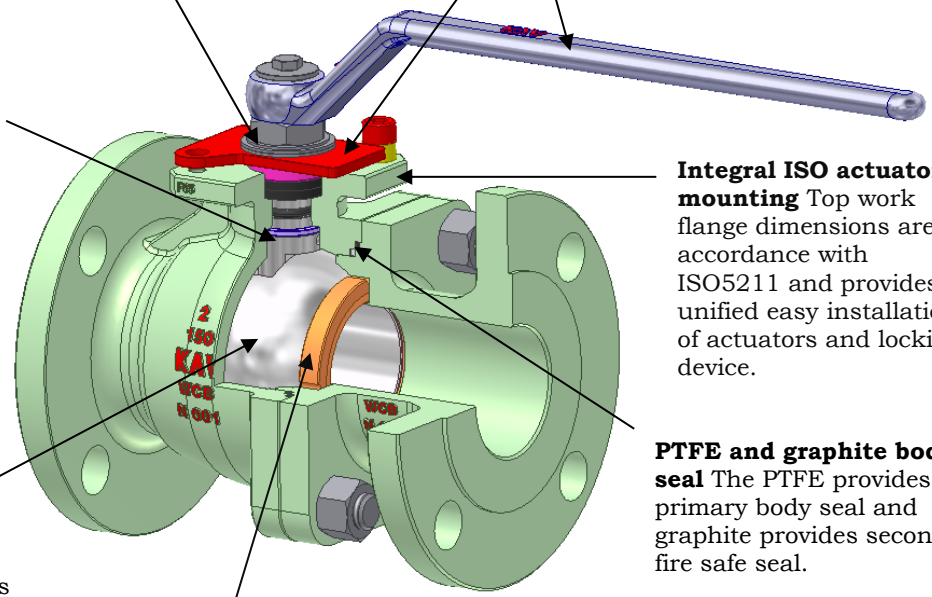
For easy application and to avoid misuse at site, all materials used by KAVAL are in accordance with NACE MR0175/ISO15156 (latest revision) requirements as pre-qualified materials against H_2S attack, while it is customers’ responsibility to determine service conditions of the valves.

DESIGN FEATURES

Belleville spring washers under the handle are used to achieve live loading and minimize the need to retighten the packing.

Position locking plate and indicator handle The locking plate will ensure proper open/close position of the ball and provide CO/CC of the valve. The handle ensures installation on the stem in the correct position and in alignment with the ball port. When the handle is aligned with the pipe, the valve is open. When the handle is perpendicular to the pipe, the valve is closed.

Blow-out proof stem. The stem is blow-out proof design. On the stem, primary O-ring and secondary fire safe flexible graphite stem seal provide low break torque, excellent emission control, and good chemical and thermal resistance. The valve stem has a built in antistatic device which ensures continuous contact of stem-to-ball and stem-to-body.



Integral ISO actuator mounting Top work flange dimensions are in accordance with ISO5211 and provides unified easy installation of actuators and locking device.

PTFE and graphite body seal The PTFE provides the primary body seal and graphite provides secondary fire safe seal.

Other polymer materials may be used as the primary body seal to meet any particular service requirement

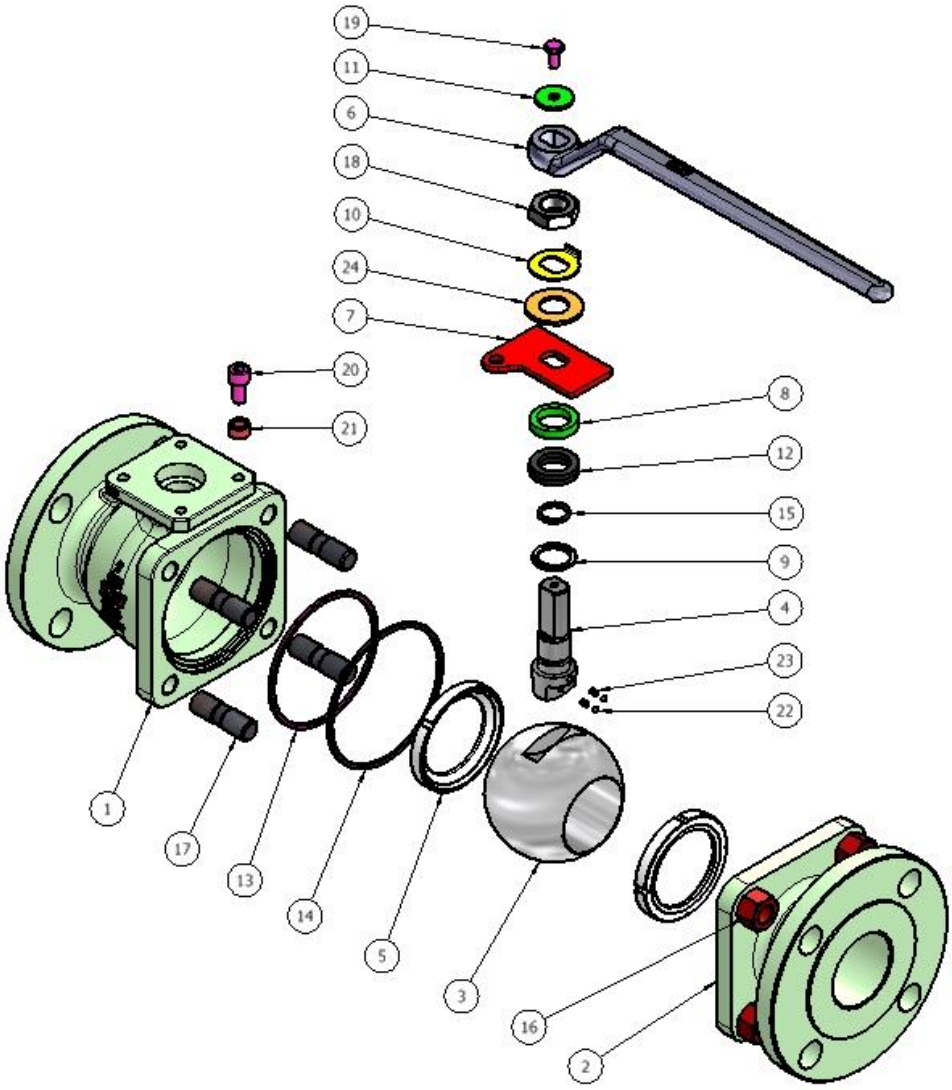
Ground and polished ball is free to float and mates perfectly with the conical seats for a positive leak proof seal, self-cleaning and self-adjusting. The ball is also pressure activated. The higher the line pressure, the tighter the valve will seal.

Deep recessed soft seats
The seat is recessed into a deep machined pocket which serves to surround and protect the seat on all sides. This design eliminates cold flow of the soft seats into the valve conduit where the seats can be damaged by the action of the ball or the flow medium, to provide an extremely long service life of the seats.

KAVAL floating ball valve is bi-directional sealing design, i.e. either end of the valve can be installed upstream without compromising the integrity of the bubble-tight seal.

PARTS AND MATERIAL SELECTION

Below is an explosive illustration of KAVAL full port, split body, floating type ball valve to show the basic design concept. The parts of the valve are numbered and given in bill of material. The regular port is not shown, but design features are the same.



BILL OF MATERIAL

(Typical materials of construction[1])

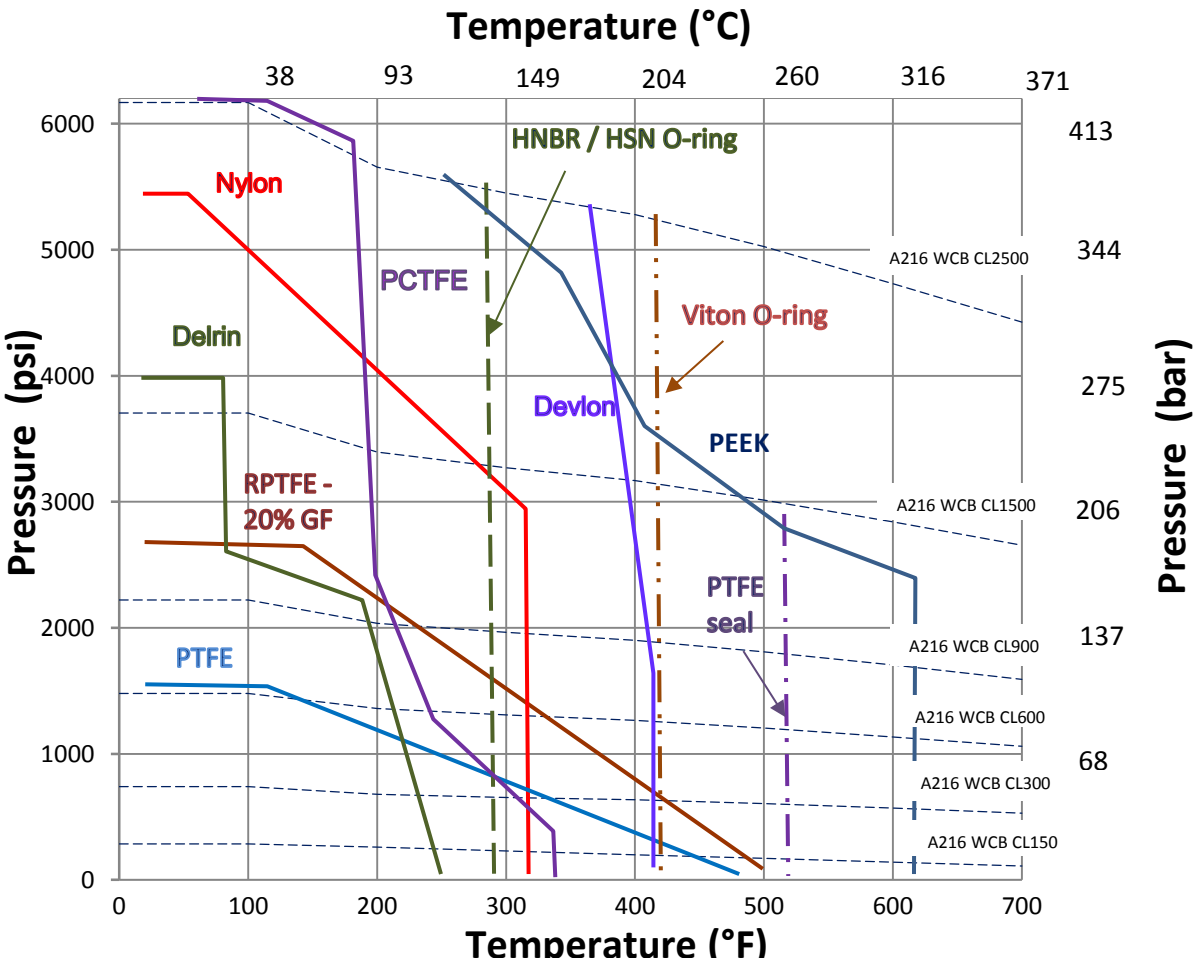
ITEM	PART NAME	MATERIAL		
		Normal temperature service	Low temperature service[2]	Stainless steel for server corrosive service
1	Body	ASTM A216 WCB	ASTM A352 LCC	ASTM A351 CF8M
2	Adapter	ASTM A216 WCB	ASTM A352 LCC	ASTM A351 CF8M
3	Ball	ASTM A182 F316/ ASTM A105N+ENP[3]	ASTM A182 F316/ ASTM A350 LF2+ENP[3]	ASTM A182 F316
4	Stem	ASTM A182 F316/ ASTM A105N+ENP[3]	ASTM A182 F316 / ASTM A350 LF2+ENP[3]	ASTM A182 F316
5	Seat [4]	PTFE / RPTFE / NYLON / DEVLON / PEEK		
6	Handle	ASTM A216 WCB	ASTM A216 WCB	ASTM A216 WCB
7	Stopper	Carbon steel	Carbon steel	Carbon steel
8	Gland	ASTM A182 F316	ASTM A182 F316	ASTM A182 F316
9	Thrust Washer	PTFE	PTFE	PTFE
10	Lock Washer	Carbon steel	Carbon steel	Carbon steel
11	Washer	Carbon steel	Carbon steel	Carbon steel
12	Packing	Graphite	Graphite	Graphite
13	Body Seal[5]	PTFE	PTFE	PTFE
14	Body Gasket	Graphite	Graphite	Graphite
15	O Ring	VITON B	VITON GLT	VITON B
16	Body Stud	ASTM A193 B7M	ASTM A320 L7M	ASTM A193 B8M
17	Body Nut	ASTM A194 2HM	ASTM A194 7M	ASTM A194 8M
18	Stem Nut	ASTM A193 B7M	ASTM A320 L7M	ASTM A193 B8M
19	Stem Bolt	CARBON STEEL	CARBON STEEL	CARBON STEEL
20	Stop Screw	ASTM A193 B7M	ASTM A320 L7M	ASTM A193 B8M
21	Stop Sleeve	ASTM A276 410	ASTM A276 410	ASTM A276 410
22	Antistatic Ball	SS316	SS316	SS316
23	Antistatic Spring	SS316	SS316	SS316
24	Belleville Spring	AS 9262	AS 9262	AS 9262

Note:

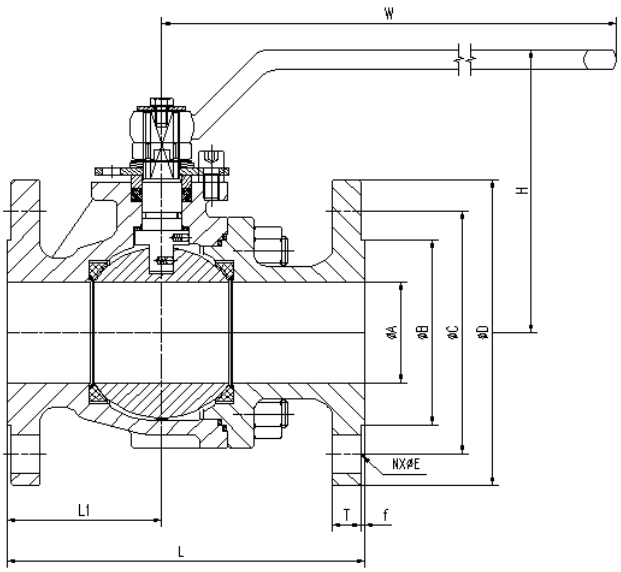
1. The BOM table lists standard materials which are most commonly used in oil and gas industries. Other materials are available depending on service conditions of the valve and client requirement.
2. A350 LF2 material, unless otherwise specified, will be Class 1.
3. The thickness of ENP, unless otherwise specified, will be 3 mil (0.075 mm).
4. Flexible seat design provides tight shutoff at high and low pressures, reduce wear and valve torque. A wide range of seat materials are available and can be selected upon client request (see the pressure/temperature rating chart of sealing materials).
5. PEEK or other polymer seal is available upon client requirements for particular applications.

PRESSURE/TEMPERATURE RATINGS OF SEAT MATERIALS

The pressure-temperature ratings for KAVAL floating ball valves are determined by the body material and the seat material. The chart is indicative of the standard seat and sealing materials. For ratings of other materials, contact the technical department of KAVAL.



DIMENSION DATA



ASME Class150 full port

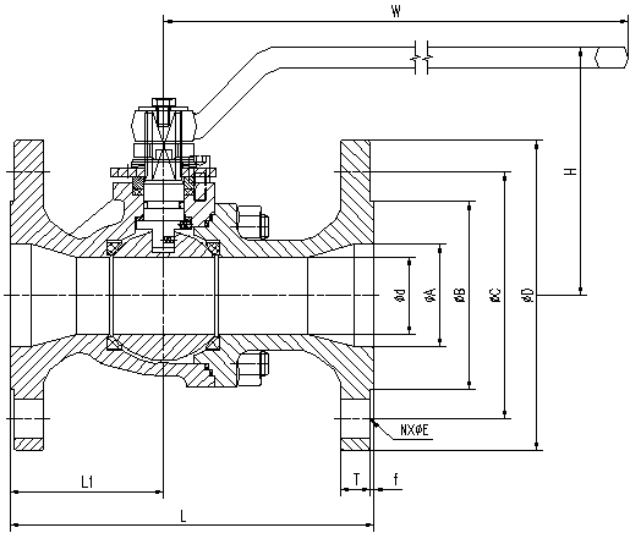
Valve size	Valve Dimensions (mm)										Weight (kg)
	A	B	C	D	N-E	T	f	L	L1	W	H	
1/2”	12	34.9	60.3	90	4-16	8.0	2	108	42	180	73	1.8
3/4”	18	42.9	69.9	100	4-16	8.9	2	117	45	180	90	2.3
1”	24	50.8	79.4	110	4-16	9.6	2	127	50	180	90	3.3
1 1/2”	37	73	98.4	125	4-16	12.7	2	165	65	288	121	6.5
2”	50	92.1	120.7	152	4-19	14.3	2	178	77	288	141	10.7
3”	76	127	152.4	190	4-19	17.5	2	203	85	394	196	25
4”	100	157.2	190.5	230	8-19	22.3	2	229	95	488	237	37
6”	151	215.9	241.3	280	8-22.5	23.9	2	394	175	800	295	81

ASME Class 300 full port

Valve size	Valve Dimensions (mm)										Weight (kg)
	A	B	C	D	N-E	T	f	L	L1	W	H	
1/2”	12	34.9	66.7	95	4-16	12.7	2	140	42	180	73	2.8
3/4”	18	42.9	82.6	115	4-19	14.3	2	152	45	180	90	4.1
1”	24	50.8	88.9	125	4-19	15.9	2	165	50	180	90	5.6
1 1/2”	37	73	114.3	155	4-22.5	19.1	2	190	75	288	121	9.1
2”	50	92.1	127	165	8-19	20.7	2	216	85	288	141	13.9
3”	76	127	168.3	210	8-22.5	27	2	282	95	394	196	32
4”	100	157.2	200	255	8-22.5	30.2	2	305	115	488	237	48.5
6”	151	215.9	269.9	320	12-22.5	35	2	403	175	800	295	104

ASME Class 600 full port

Valve size	Valve Dimensions (mm)											Weight (kg)
	A	B	C	D	N-E	T	f	L	L1	W	H	
1/2”	12	34.9	66.7	95	4-16	14.3	7	165	70	180	100	2.7
3/4”	18	42.9	82.6	115	4-19	15.9	7	190	75	180	103	6.3
1”	24	50.8	88.9	125	4-19	17.5	7	216	78	180	115	6.0
1 1/2”	37	73	114.3	155	4-22.5	22.3	7	241	100	394	153	12.5
2”	50	92.1	127	165	8-19	25.4	7	292	113	394	163	21.3
3”	76	127	168.3	210	8-22.5	31.8	7	356	153	488	209	45
4”	100	157.2	215.9	275	8-25.5	38.1	7	432	178	700	257	88



ASME Class 150 regular port

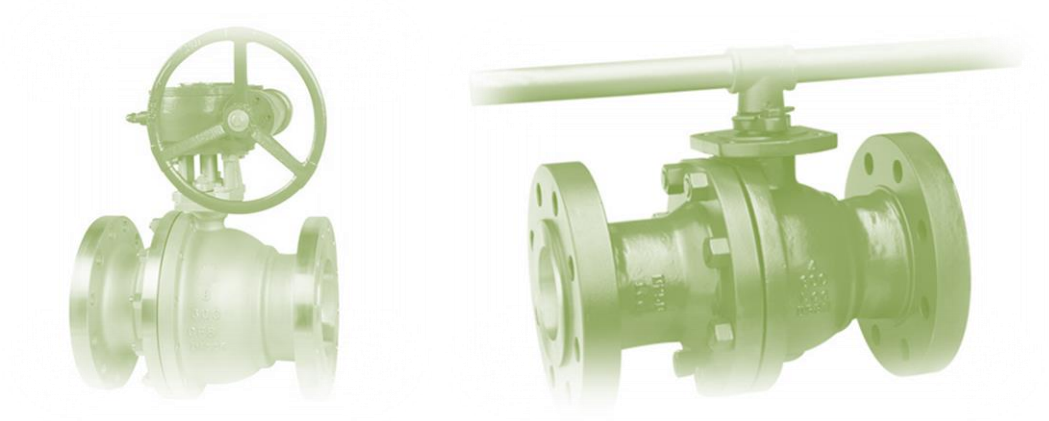
Valve size	Valve Dimensions (mm)												Weight (kg)
	d	A	B	C	D	N-E	T	f	L	L1	W	H	
3/4”X1/2”	12	18	42.9	69.9	100	4-16	8.9	2	117	45	180	73	2.6
1”X3/4”	18	24	50.8	79.4	110	4-16	9.6	2	127	50	180	90	2.8
1 1/2”X1”	24	37	73	98.4	125	4-16	12.7	2	165	65	180	90	4.0
2”X1 1/2”	37	50	92.1	120.7	152	4-19	14.3	2	178	75	288	121	7.9
3”X2”	50	76	127	152.4	190	4-19	17.5	2	203	87	288	141	17
4”X3”	76	100	157.2	190.5	230	8-19	22.3	2	229	100	394	196	28.5
6”X4”	100	151	215.9	241.3	280	8-22.5	23.9	2	394	150	488	237	51

ASME Class 300 regular port

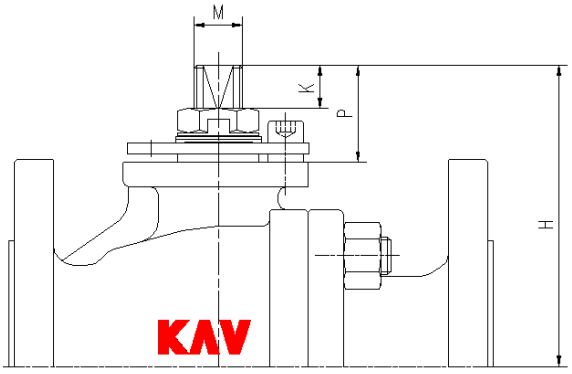
Valve size	Valve Dimensions (mm)												Weight (kg)
	d	A	B	C	D	N-E	T	f	L	L1	W	H	
3/4"X1/2"	12	18	42.9	82.6	115	4-19	14.3	2	152	45	180	73	3.4
1"X3/4"	18	24	50.8	88.9	125	4-19	15.9	2	165	50	180	90	4.2
1 1/2"X1"	24	37	73	114.3	155	4-22.5	19.1	2	190	75	180	90	7.3
2"X1 1/2"	37	50	92.1	127	165	8-19	20.7	2	216	85	288	121	10.6
3"X2"	50	76	127	168.3	210	8-22.5	27	2	282	95	288	141	23.5
4"X3"	76	100	157.2	200	255	8-22.5	30.2	2	305	115	394	196	42
6"X4"	100	151	215.9	269.9	320	12-22.5	35	2	403	175	488	237	72

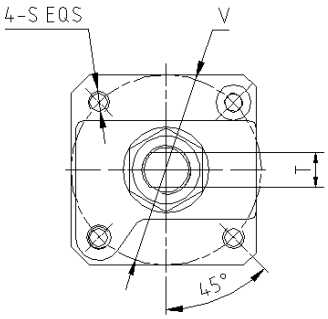
ASME Class 600 regular port

Valve size	Valve Dimensions (mm)												Weight (kg)
	d	A	B	C	D	N-E	T	f	L	L1	W	H	
3/4"X1/2"	12	18	42.9	82.6	115	4-19	15.9	7	190	75	180	100	5.0
1"X3/4"	18	24	50.8	88.9	125	4-19	17.5	7	216	78	180	103	7.0
1 1/2"X1"	24	37	73	114.3	155	4-22.5	22.3	7	241	100	180	115	10.0
2"X1 1/2"	37	50	92.1	127	165	8-19	25.4	7	292	113	394	153	17
3"X2"	50	76	127	168.3	210	8-22.5	31.8	7	356	153	394	163	29
4"X3"	76	100	157.2	215.9	275	8-25.5	38.1	7	432	178	488	209	63.5
6"X4"	100	151	215.9	292.1	355	12-28.5	47.7	7	559	210	700	257	121.5



ACTUATOR MOUNTING DATA





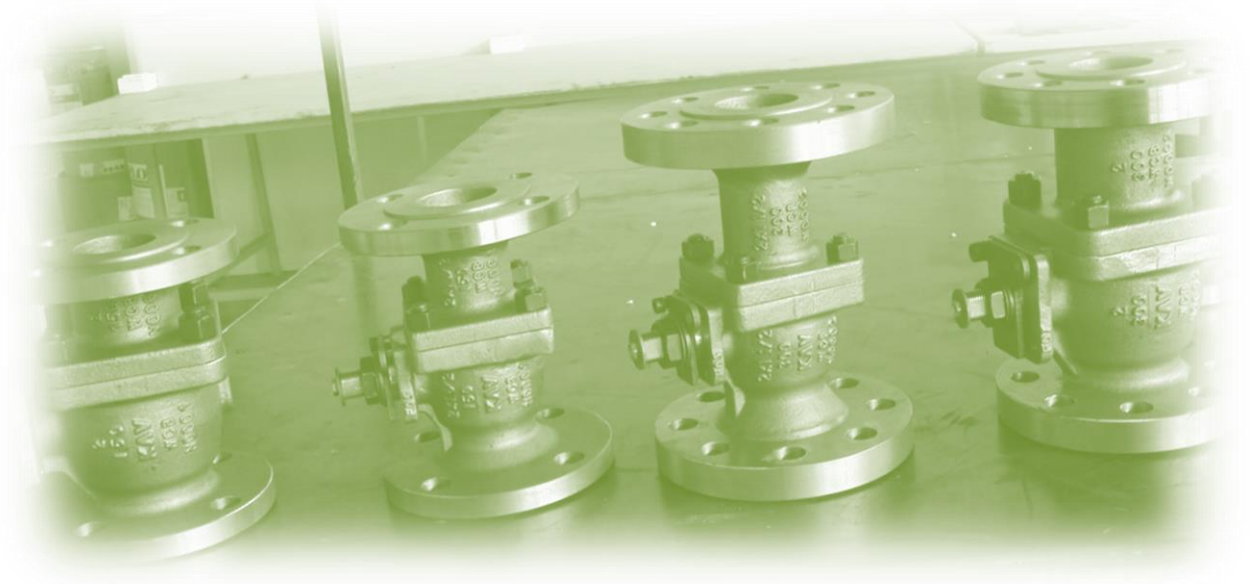
ASME Class 150 full port

Valve size	Valve Dimensions (mm)								Torque (N.m)
	H	P	M	K	S	T	V	ISO 5211	
1/2”	70	30	M14X1.5	11	M5	10	Ø36	F03	7
3/4”	72	30	M14X1.5	11	M5	10	Ø36	F03	10
1”	80	30	M14X1.5	11	M6	10	Ø50	F05	15
1 1/2”	90.5	35.5	M18X1.5	15	M6	13	Ø50	F05	30
2”	110.5	35.5	M18X1.5	16	M8	13	Ø70	F07	45
3”	151.5	41.5	M22X1.5	18	M10	15	Ø102	F10	90
4”	193	58	M30X2	27	M10	20	Ø102	F10	130
6”	274	79.5	M40X2	39.5	M12	28	Ø125	F12	320

ASME Class 300 full port

Valve size	Valve Dimensions (mm)								Torque (N.m)
	H	P	M	K	S	T	V	ISO 5211	
1/2”	70	30	M14X1.5	11	M5	10	Ø36	F03	10
3/4”	72	30	M14X1.5	11	M5	10	Ø36	F03	14
1”	80	30	M14X1.5	11	M6	10	Ø50	F05	20
1 1/2”	90.5	35.5	M18X1.5	15	M6	13	Ø50	F05	40
2”	110.5	35.5	M18X1.5	16	M8	13	Ø70	F07	70
3”	151.5	41.5	M22X1.5	18	M10	15	Ø102	F10	110
4”	193	58	M30X2	27	M10	20	Ø102	F10	245
6”	274	79.5	M40X2	39.5	M12	28	Ø125	F12	530

ASME Class 600 full port									
Valve size	**Valve Dimensions (mm)**								**Torque (N.m)**
	H	P	M	K	S	T	V	ISO 5211	
1/2”	70	30	M14X1.5	11	M5	10	Ø36	F03	16
3/4”	72	30	M14X1.5	11	M5	10	Ø36	F03	20
1”	80	30	M14X1.5	11	M6	10	Ø50	F05	40
1 1/2”	108.5	41.5	M22X1.5	18	M8	15	Ø70	F07	90
2”	118.5	41.5	M22X1.5	18	M8	15	Ø70	F07	110
3”	165	59	M30X2	26.5	M10	20	Ø102	F10	230
4”	224.5	79.5	M40X2	39.5	M10	28	Ø102	F10	500



HOW TO ORDER

Type of valve	Size	Port	Class	Model	End connection	Operator	Body	Trim	Seat	Body seal / Stem seal
☐☐☐	☐☐	☐	☐☐	☐☐	☐	☐	☐☐	☐☐	☐	☐

Type of valve:
FBS = Floating ball, Standard
FBC = Floating ball, Cryogenic
FBP = Floating ball, Special

Size:
07 = 1/4" 09 = 3/8" 11 = 1/2" 13 = 3/4" 01 = 1" 15 = 1 1/2"
02 = 2" 25 = 2 1/2" 03 = 3" 04 = 4" 06 = 6"

Port:
R = Regular port F = Full port

Class:
01 = 150 03 = 300 06 = 600 08 = 800 09 = 900 15 = 1500 25 = 2500
20 = 2000 CWP 30 = 3000 CWP 40 = 4000 CWP 50 = 5000 CWP 60 = 6000 CWP

Model (of configuration):
A1 = 1 pc, Soft seal, casting, bolted closure
A2 = 2 pc, Soft seal, casting, bolted closure
A3 = 3 pc, Soft seal, casting, bolted closure
E2 = 2 pc, Soft seal, forging, threaded closure
B1 = 1 pc, Soft seal, forging, bolted closure
B2 = 2 pc, Soft seal, forging, bolted closure
B3 = 3 pc, Soft seal, forging, bolted closure
E3 = 3 pc, Soft seal, forging, threaded closure

End connection:
R = Raised face flange J = RTJ W = Butt weld S = Socket weld
N = NPT Female M = NPT Male P = SW X NPT

Operator:
G = Manual Gear L = Lever B = Bare stem S = Spring Lever A = Actuator

Body:
01 = A216 WCB 02 = A352 LCC 03 = A351 CF8M 04 = A351 CF8
06 = A351CF3M 07 = A351 CF3
11 = A105N 12 = A350 LF2 13 = A182 F316 (L) 14 = 182 F304 (L)
20 = other material

Trim:
E1 = Body material (equivalent forging) + 1.5 mil ENP
E2 = Body material (equivalent forging) + 3mil ENP & 316 stem
E3 = Body material (equivalent forging) + 3mil ENP
E4 = Body material Trim & 4140 Stem + 3mil ENP
S2 = CF8 /304SS
S3 = CF8M / 316SS
S4 = 410SS
S5 = 22Cr Duplex stainless steel
S7 = 316S Trim & F51 Stem
S8 = F51 Ball and Stem + 316 Trim

Seat:
T = MPTFE N = Nylon K = PEEK P = PCTFE D = DEVLON M = METAL O = other material

Body seal / Stem seal:
A = PTFE /PTFE B = PTFE/ Graphite C = PTFE/VITON D = PTFE/HNBR
K = PEEK E = SS + Graphite/Graphite

FLOW COEFFICIENT

When flow goes through a valve it loses some energy. The pressure drop (ΔP) of the flow across a valve is determined by the flow rate, specific gravity of the flow and the **flow coefficient, *K*,** of the valve. For liquid,

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Where
Q: Flow rate
Δ*P*: Pressure drop
Sg: Specific gravity (1 for water)
K: Flow coefficient Kv (SI unit) or Cv (Imperial Unit)

Cv is is defined as the flow rate in US Gallons per minute [gpm] of water at a temperature of 60°F with a pressure drop of 1 psi across a fully open valve.

Kv is the flow coefficient in metric units. It is defined as the flow rate in cubic meters per hour [m3/h] of water at a temperature of 16°C with a pressure drop of 1 bar across a fully open valve.

For gas (compressible flow):

——— · (————)

where
Cv: Valve flow coefficient, dimensionless
q: Volumetric flow rate, scfh
Gg: Gas specific gravity (ratio of flowing gas to density of air with both at standard conditions, which is equal to the ratio of the molecular weight of gas to the molecular weight of air)
ΔP: Pressure differential, psi
*T*1: Absolute upstream temperatures (in °K)
*P*1: Upstream absolute static pressure, psia
y: Expansion factor, ratio of flow coefficient for a gas to that for a liquid at the same Reynolds Number, dimensionless
(*y* = 0.667 when P2 (down stream pressure) <= 0.5 times P1 for choked or critical flow, *y* = 1.000 when *P*2 (down stream pressure) > 0.5 times P1 for very low pressure differential)

The typical flow coefficient Cv of ball valves (full port at full open position):

Size (In)	Class 150	Class 300	Class 600	Class 900	Class 1500	Class 2500
1/2	24	24	24	24	24	24
3/4	53	53	53	53	53	53
1	92	92	92	92	92	92
1 ½	211	211	211	211	211	
2	381	381	381	381		
3	845	845	845			
4	1523	1523	1523			
6	3381	3381	3381			
8	6031	6031				
10	9442	9442				
12	13614					

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