Trunnion Mounted Ball Valves

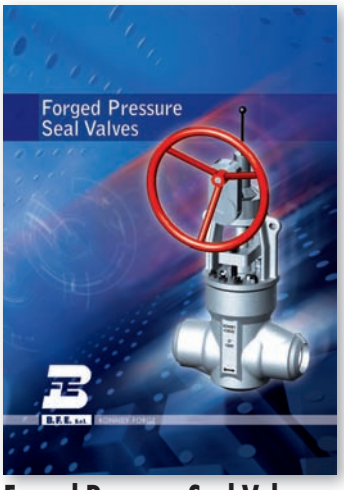
B.F.E. S.r.l.

BONNEY FORGE

BFE AVAILABLE CATALOGUES

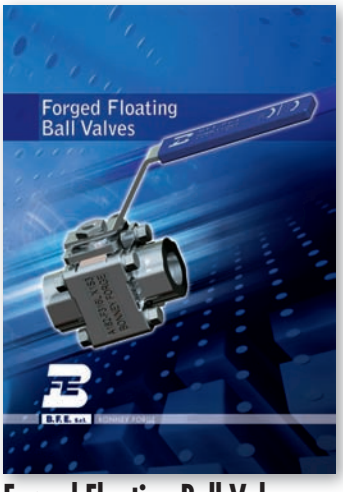
Forged Valves

Cast Steel Valves

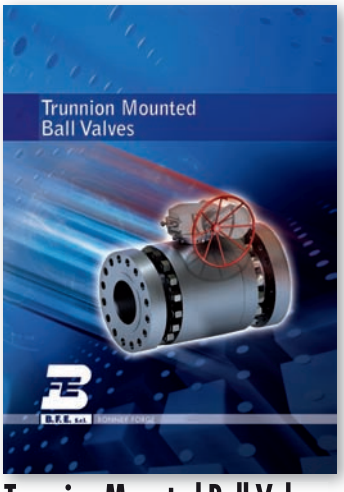


Forged Pressure Seal Valves

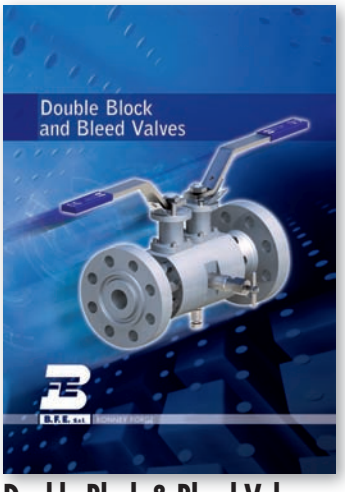
API 6A Valves



Forged Floating Ball Valves



Trunnion Mounted Ball Valves



Double Block & Bleed Valves

Global quality. Total reliability. Two recurrent claims in present-day corporate strategies. But the transition from words to actions demands tangible measures. Specialization and organization underlie what amounts to a "quality culture" at BFE, not in the abstract but as a set of specific rules governing every stage of production. An operating model that is good to have in a partner who bears the responsability of supplying valves that are essential to plant safety and regulation.


DNV - MODULO UNO

RICEVUTA DI CONSERVAZIONE / STORAGE RECEIPT

B.F.E. S.r.l.


DNV - MODULO UNO

CERTIFICATO DI APPROVAZIONE
APPROVAL CERTIFICATE

Certificato N°/Certificate N°: CE PED.12.0064.04/1560.5

B.F.E. S.r.l.


CERTIFICATE


DET NORSKE VERITAS

ENVIRONMENTAL MANAGEMENT SYSTEM CERTIFICATE

B.F.E. S.r.l.


DET NORSKE VERITAS

QUALITY MANAGEMENT SYSTEM CERTIFICATE

B.F.E. S.r.l.


CERTIFICATE


СИСТЕМА СЕРТИФИКАЦИИ ГОСТ Р
ГОССТАНДАРТ РОССИИ

СЕРТИФИКАТ СООТВЕТСТВИЯ


DET NORSKE VERITAS

APPROVAL OF MANUFACTURER
CERTIFICATE

B.F.E. S.r.l.
ALBANO SANT'ALESSANDRO, Italy

Steel Forgings


Certificate of Authority to use the Official API Monogram

American Petroleum Institute


Certificate of Authority to use the Official API Monogram

American Petroleum Institute

B.F.E. S.r.l.

DESIGN, CONSTRUCTION, MARKING FOR TRUNNION BALL VALVES

PRODUCT OVERVIEW

BFE manufactures the most complete line of quality ball valves, and can provide the exact ball valves and actuators to meet the most demanding application requirements.
Our Trunnion Ball Valves are available in an extensive range of designs, materials, sizes and pressure classes and are in full conformance with ANSI, API and NACE specifications.
All ball valves are designed in accordance with ASME B16.34 and where applicable with API 6D or BS EN ISO 17292.

The BFE family of trunnion ball valves provides positive shut-off of fluids and gases under extreme service conditions.

BFE uses only high-quality materials inspected & tested to International Standards and utilizes advanced manufacturing technology with special emphasis on safety, quality, and long service life of our products, to ensure that our clients receive the "best in class" products available from us at a competitive price and delivered on time.

The forging material can ensure the best rigidity and strength under maximum rated operation pressure without inherent flaw of cast. Other properties found in forging include greater impact resistance, resistance to fatigue cracking, particularly when cycling at either high or cryogenic temperature.
Overdesigned wall thickness and adaptation of high strength tie bolts are convenient for valve maintenance and sufficient to bear the stress of pipe.
The internal parts of valve are carefully designed and selected to ensure reliability under all kinds of work condition.

Since a variety of materials are available, BFE valves can be used with various fluids and gases including petroleum based oils and some water glycols.

Trunnion ball valve have a mechanical means of anchoring the ball at the top and the bottom, this design is the standard design applied on larger and higher pressure valves.

Sealing is achieved by spring loaded piston type seats which shut off flow when line pressure acts on the upstream seat. Automatic relief of cavity overpressure is assured due to the trunnion design in case of self relieving seats (BFE standard design).
The ball is operated by a sealed spindle to which the operator is attached.
Ball valves are intended to be used as on/off flow control devices and are not to be used to throttle fluid flow. The valves should always be either fully open or closed.

BFE Trunnion Ball Valve design is developed using the latest software based analysis tools.

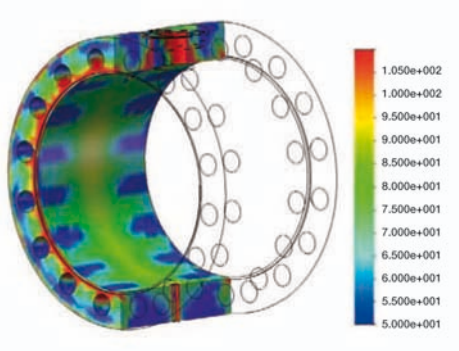
At the design stage, all projects are analysed using 3D solid modeling tools. Benefits include reduction of development time and cost, improved product quality, and ability to solve field problems for customers. Product flexibility and accuracy is assured.

Finite Element Analysis (FEA) is a very important step at the development stage to ensure the best possible performance requirements. Valves operational problems, pressure/temperature-related deformations and flow-related forces within a valve can be evaluated.

BFE uses the FEA for predicting failure due to unknown stresses by showing problem areas in a material and allowing designers to see all of the theoretical stresses within. This method of product design and testing is far superior to the manufacturing costs which would accrue if each sample was actually built and tested.

During any analysis project, it is the responsibility of the BFE analyst to verify that analysis results conform to the physics of the problem under study. Understanding the response of a structure or manufactured product allows effective design decisions to be made in developing structures and products that are functional, meet all engineering requirements, and can be manufactured and assembled.
Computational Fluid Dynamics (CFD) is used to simulate operating flow conditions.

Evaluation of Valve CV coefficient and convective heat transfer coefficient takes place at the design stage.



MAIN FEATURES

Fire-Safe Test Approved

BFE trunnion ball valves are designed in accordance with API 607 & API SPEC 6FA. When non-metal seats are destroyed in a fire, the medium pressure push the upstream seat into the ball to cut off the line fluid and prevent internal leakage due to a secondary metal-to-metal seals. When the first soft seal is damaged, body/bonnet/stem-gasket can reach sealing function and prevent external fluid leakage.

Double Body Gasket

All BFE trunnion ball valves are equipped with two body gasket. The first body gasket is in soft material and the second in graphite (if not otherwise required), this combination assures the best seal characteristic in whatever corrosive service as well give fire safe design.

Anti-Static Device

In order to prevent static electricity which may light the fluid, static-conduction spring is set between the stem/trunnion and the ball.

Anti Blow-Out Proof Stem

The stem is designed with integral T-Type shoulder to provide blow-out proof effectively. The design assures that the stem can not be blown out of the valve in the case of the packing being removed while the valve is under pressure.

Controlled Stem & Stuffing Box Finish
Stem and stuffing box finish machining is a key point of control. The stem is made by cold rolling and stem surface finish is controlled by Ra=0.4, which can reduce friction for stem moving and ensure the seal. The stuffing box surface is controlled within Ra=1.6 for better sealing performance.

Solid Ball
The solid ball used by BFE provides straight-through flow and real full-port performance characteristics. Hollow ball or cored cavity ball are not used for BFE products.

Ball Seat Alignment
Stem/Flange mechanical stops ensure control and precise alignment over ball rotation.

Longevity Of Life
Special consideration was devoted to the attainment of enhanced life and operation of our valve throughout design, development, testing and manufacturing stages. Valve designs combined with the selection of advanced materials are such that long periods of inactivity should not affect the operations of efficiency.

Low Torque Output
Seat designs, stem-bearing system and stem seal arrangements ensure consistent minimal torque values.

Flow Capacity
Valve design allows for high flow capacity in liquid or gas services regardless of whether the media is clean or dirty. Full port valves allow for pigging and ensure maximum flow capacity.

Field Reparaible
Simple user friendly design allows for quick and easy part replacement requiring minimal "Down Time".

Iso Flange Integrated In The Body Design
ISO 5211 mounting always integrated in the valve as standard design.

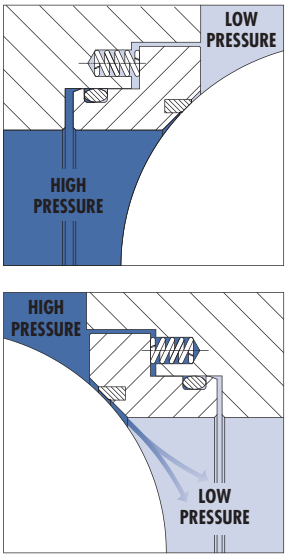
Emergency Sealant Injection
For 6" full port and larger each valve is supplied complete with emergency stem sealant injection feature.

INSPECTION AND TESTING
Every valve is subjected on routine base to different non-destructive testing, like the dye penetrant test on butt weld ends, on all hard faced and cladding areas.
Non-destructive test are also carried out on the critical areas as defined by ANSI B.16.34.
Optional examinations like:
Radiographic
Magnetic particicles
Ultrasonic
Helium leak test
Personal performing NDT are trained and qualified to EN 473/ ASNT-SNT-TC-1A.
Every valve is subject to a pressure test in accordance with the standard API 598 or BS 6755 Part.1.
The rated pressure for the applicable pressure class is in accordance with ANSI B.16.34 / EN 12516-1-2.

MARKING AND IDENTIFICATION
Each valve is identified on proper name plate and on valve body as required by MSS- SP 25, B 16.34 Name plate carries all information on rating, size, valve body and trim material, customer tags. On body, marking includes material designations (per ASTM) and heat code and of course the trade mark.

PISTON EFFECT PRINCIPLE

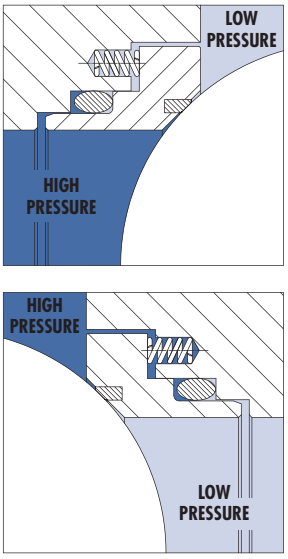
SELF RELIEVING SEAT



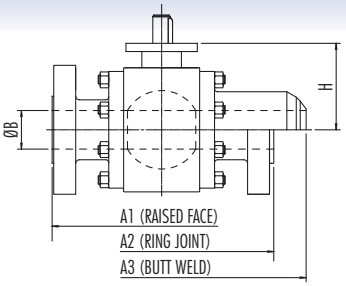
In the standard design of Trunnion Mounted Ball Valves, each seat ring performs the "Single Piston" action. In this case the pressure acting on the external side of the seat ring pushes the same against the ball while the pressure acting on the internal side of the seat rings pushes the same away from the ball. Therefore, while both seat-rings grant the required tightness, when the pressure is applied on their external side, they are defined "Self Relieving", allowing any over pressure acting in the body cavity to be discharged in the line as soon as the force caused by the pressure overcomes the one provided by the springs.

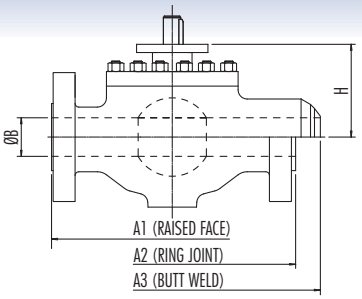
DOUBLE PISTON EFFECT OPTION

On request the seat rings design may be modified to perform the "Double Piston Effect" action. In this case the pressure acting on both the external and internal side of the seat rings, results in a force pushing the same against the ball, therefore each seat ring grants the required tightness even if the pressure is applied in the body cavity.
This features assures dead-tight sealing simultaneously on both sides of the ball and in order to release the possible over pressure developed into the body cavity it is necessary to use an external safety relief valve.



TRUNNION MOUNTED BALL VALVES - ASME CLASS 150



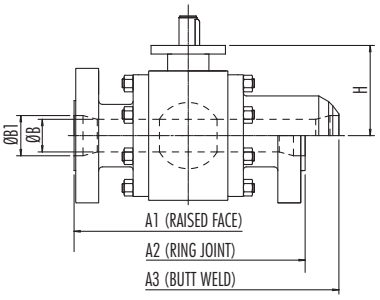


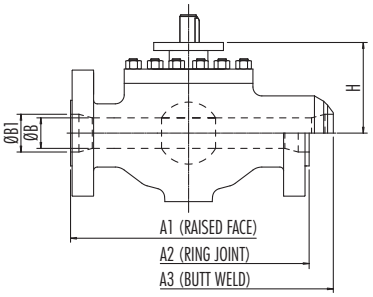
SIDE ENTRY - FULL BORE

SIZE Inch	A1	A2	A3	B	H	Weight Kg	Figure N°
1/2"	108,5	–	165	13	55	6,5	1-B03
3/4"	117,5	–	191	19	57	8	1-B04
1"	127	140	216	25	70	9,5	1-B05
1-1/4"	–	–	–	–	–	–	1-B06
1-1/2"	165	178	191	38	90	19	1-B07
2"	178	191	216	50	98	25	1-B08
3"	203	216	283	75	154	52	1-B10
4"	229	241	305	101	188	88	1-B11
6"	394	406	457	151	250	180	1-B13
8"	457	470	521	202	280	260	1-B14
10"	533	546	559	253	315	400	1-B15
12"	610	622	635	304	340	570	1-B16
14"	686	699	762	335	380	790	1-B17
16"	762	775	838	386	420	1040	1-B18
18"	864	876	914	437	445	1220	1-B19
20"	914	927	991	488	500	1800	1-B20
22"	991	1003	1092	539	530	2350	1-B22
24"	1067	1080	1143	590	590	3200	1-B24

TOP ENTRY - FULL BORE

SIZE Inch	A1	A2	A3	B	H	Weight Kg	Figure N°
1/2"	165	–	165	13	105	12	1-B03
3/4"	191	–	191	19	130	15	1-B04
1"	216	216	216	25	150	18	1-B05
1-1/4"	–	–	–	–	–	–	1-B06
1-1/2"	241	241	241	38	200	25	1-B07
2"	292	295	292	50	215	30	1-B08
3"	356	359	356	75	230	60	1-B10
4"	432	435	432	101	280	110	1-B11
6"	559	562	559	151	310	220	1-B13
8"	660	664	660	202	330	410	1-B14
10"	787	791	787	253	360	580	1-B15
12"	838	841	838	304	480	720	1-B16
14"	889	892	889	335	485	780	1-B17
16"	991	994	991	386	500	1100	1-B18
18"	1092	1095	1092	437	520	1550	1-B19
20"	1194	1200	1194	488	570	1940	1-B20
22"	1295	1305	1295	539	590	2800	1-B22
24"	1397	1407	1397	590	630	3200	1-B24





SIDE ENTRY - REDUCED BORE

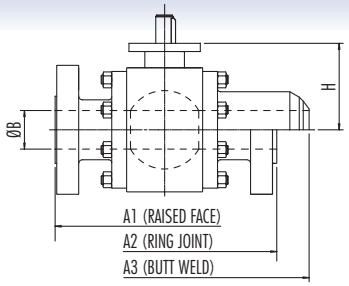
SIZE Inch	A1	A2	A3	B	B1	H	Weight Kg	Figure N°
3/4"x1/2"	117,5	–	191	13	19	55	7	L1-B04
1"x3/4"	127	140	216	19	25	57	8,5	L1-B05
1-1/4"x1"	140	153	229	25	32	70	10,5	L1-B06
1-1/2"x1"	165	178	191	25	38	70	12	L1-B07
2"x1-1/2"	178	191	216	38	50	90	22	L1-B08
3"x2"	203	216	283	50	75	98	32	L1-B10
4"x3"	229	241	305	75	101	154	59	L1-B11
6"x4"	394	406	457	101	151	188	100	L1-B13
8"x6"	457	470	521	151	202	250	190	L1-B14
10"x8"	533	546	559	202	253	280	310	L1-B15
12"x10"	610	622	635	253	304	315	465	L1-B16
14"x10"	686	699	762	253	335	315	520	LL1-B17
14"x12"	686	699	762	304	335	340	620	L1-B17
16"x12"	762	775	838	304	386	340	720	LL1-B18
16"x14"	762	775	838	335	386	380	830	L1-B18
18"x16"	864	876	914	386	437	420	1100	L1-B19
20"x16"	914	927	991	386	488	420	1250	LL1-B20
20"x18"	914	927	991	437	488	445	1350	L1-B20
24"x20"	1067	1080	1143	488	590	500	2000	L1-B24
28"x24"	1245	–	1346	590	685	590	3200	L1-B28
30"x24"	1295	–	1397	590	736	590	3450	L1-B30

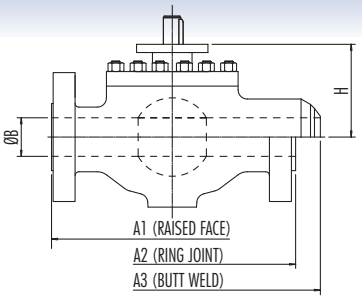
TOP ENTRY - REDUCED BORE

SIZE Inch	A1	A2	A3	B	B1	H	Weight Kg	Figure N°
3/4"x1/2"	191	–	191	13	19	105	13	L1-B04
1"x3/4"	216	216	216	19	25	130	16	L1-B05
1-1/4"x1"	229	229	229	25	32	150	19	L1-B06
1-1/2"x1"	241	241	241	25	38	150	22	L1-B07
2"x1-1/2"	292	295	292	38	50	200	27	L1-B08
3"x2"	356	359	356	50	75	215	34	L1-B10
4"x3"	432	435	432	75	101	230	70	L1-B11
6"x4"	559	562	559	101	151	280	120	L1-B13
8"x6"	660	664	660	151	202	310	230	L1-B14
10"x8"	787	791	787	202	253	330	425	L1-B15
12"x10"	838	841	838	253	304	360	500	L1-B16
14"x10"	889	892	889	253	335	360	680	LL1-B17
14"x12"	889	892	889	304	335	480	800	L1-B17
16"x12"	991	994	991	304	386	480	950	LL1-B18
16"x14"	991	994	991	335	386	485	920	L1-B18
18"x16"	1092	1095	1092	386	437	500	1260	L1-B19
20"x16"	1194	1200	1194	386	488	500	1550	LL1-B20
20"x18"	1194	1200	1194	437	488	520	1750	L1-B20
24"x20"	1397	1407	1397	488	590	570	2400	L1-B24
28"x24"	1549	1562	1549	590	685	630	3800	L1-B28
30"x24"	1651	1664	1651	590	736	630	4100	L1-B30

All weight values are relevant for flanged end valves and can be changed without notice. Face to face dimensions not listed in industry standards are subject to change without notice.

TRUNNION MOUNTED BALL VALVES - ASME CLASS 300



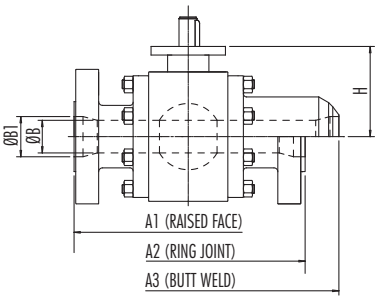


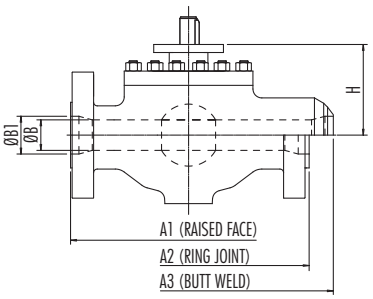
SIDE ENTRY - FULL BORE

SIZE Inch	A1	A2	A3	B	H	Weight Kg	Figure N°
1/2"	140	151	165	13	55	8	3-B03
3/4"	152	165	191	19	57	9	3-B04
1"	165	178	216	25	70	11	3-B05
1-1/4"	–	–	–	–	–	–	3-B06
1-1/2"	191	203	191	38	90	23	3-B07
2"	216	232	216	50	98	29	3-B08
3"	283	298	283	75	157	56	3-B10
4"	305	321	305	101	197	95	3-B11
6"	403	419	403	151	250	190	3-B13
8"	502	518	521	202	280	285	3-B14
10"	568	584	559	253	330	510	3-B15
12"	648	664	635	304	360	750	3-B16
14"	762	778	762	335	400	1050	3-B17
16"	838	854	838	386	430	1450	3-B18
18"	914	930	914	437	460	1600	3-B19
20"	991	1010	991	488	510	2200	3-B20
22"	1092	1114	1092	539	530	2850	3-B22
24"	1143	1165	1143	590	590	3600	3-B24

TOP ENTRY - FULL BORE

SIZE Inch	A1	A2	A3	B	H	Weight Kg	Figure N°
1/2"	165	163	165	13	105	15	3-B03
3/4"	191	191	191	19	130	18	3-B04
1"	216	216	216	25	150	21	3-B05
1-1/4"	–	–	–	–	–	–	3-B06
1-1/2"	241	241	241	38	200	28	3-B07
2"	292	295	292	50	215	38	3-B08
3"	356	359	356	75	230	66	3-B10
4"	432	435	432	101	280	120	3-B11
6"	559	562	559	151	310	230	3-B13
8"	660	664	660	202	330	430	3-B14
10"	787	791	787	253	360	620	3-B15
12"	838	841	838	304	480	730	3-B16
14"	889	892	889	335	485	790	3-B17
16"	991	994	991	386	500	1130	3-B18
18"	1092	1095	1092	437	520	1580	3-B19
20"	1194	1200	1194	488	570	1980	3-B20
22"	1295	1305	1295	539	590	2860	3-B22
24"	1397	1407	1397	590	630	3260	3-B24





SIDE ENTRY - REDUCED BORE

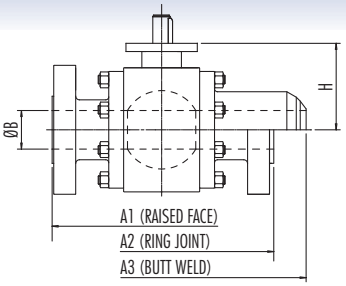
SIZE Inch	A1	A2	A3	B	B1	H	Weight Kg	Figure N°
3/4"x1/2"	152	165	191	13	19	55	8,5	L3-B04
1"x3/4"	165	178	216	19	25	57	9,5	L3-B05
1-1/4"x1"	178	191	229	25	32	70	12	L3-B06
1-1/2"x1"	191	203	191	25	38	70	14	L3-B07
2"x1-1/2"	216	232	216	38	50	90	26	L3-B08
3"x2"	283	298	283	50	75	98	38	L3-B10
4"x3"	305	321	305	75	101	157	64	L3-B11
6"x4"	403	419	403	101	151	197	120	L3-B13
8"x6"	502	518	521	151	202	250	220	L3-B14
10"x8"	568	584	559	202	253	280	310	L3-B15
12"x10"	648	664	635	253	304	330	590	L3-B16
14"x10"	762	778	762	253	335	330	650	LL3-B17
14"x12"	762	778	762	304	335	360	820	L3-B17
16"x12"	838	854	838	304	386	360	970	LL3-B18
16"x14"	838	854	838	335	386	400	1180	L3-B18
18"x16"	914	930	914	386	437	430	1600	L3-B19
20"x16"	991	1010	991	386	488	430	1680	LL3-B20
20"x18"	991	1010	991	437	488	460	1800	L3-B20
24"x20"	1143	1165	1143	488	590	510	2700	L3-B24
28"x24"	1346	1372	1346	590	685	590	4300	L3-B28
30"x24"	1397	1422	1397	590	736	590	4600	L3-B30

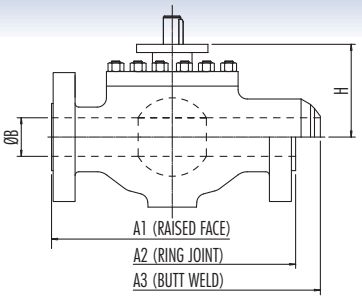
TOP ENTRY - REDUCED BORE

SIZE Inch	A1	A2	A3	B	B1	H	Weight Kg	Figure N°
3/4"x1/2"	191	191	191	13	19	105	15	L3-B04
1"x3/4"	216	216	216	19	25	130	18	L3-B05
1-1/4"x1"	229	229	229	25	32	150	22	L3-B06
1-1/2"x1"	241	241	241	25	38	150	25	L3-B07
2"x1-1/2"	292	295	292	38	50	200	30	L3-B08
3"x2"	356	359	356	50	75	215	40	L3-B10
4"x3"	432	435	432	75	101	230	80	L3-B11
6"x4"	559	562	559	101	151	280	160	L3-B13
8"x6"	660	664	660	151	202	310	280	L3-B14
10"x8"	787	791	787	202	253	330	540	L3-B15
12"x10"	838	841	838	253	304	360	580	L3-B16
14"x10"	889	892	889	253	335	360	790	LL3-B17
14"x12"	889	892	889	304	335	480	920	L3-B17
16"x12"	991	994	991	304	386	480	1100	LL3-B18
16"x14"	991	994	991	335	386	485	1200	L3-B18
18"x16"	1092	1095	1092	386	437	500	1500	L3-B19
20"x16"	1194	1200	1194	386	488	500	1800	LL3-B20
20"x18"	1194	1200	1194	437	488	520	2100	L3-B20
24"x20"	1397	1407	1397	488	590	570	2800	L3-B24
28"x24"	1549	1562	1549	590	685	630	4500	L3-B28
30"x24"	1651	1664	1651	590	736	630	4800	L3-B30

All weight values are relevant for flanged end valves and can be changed without notice. Face to face dimensions not listed in industry standards are subject to change without notice.

TRUNNION MOUNTED BALL VALVES - ASME CLASS 600



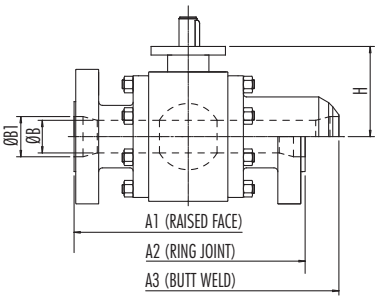


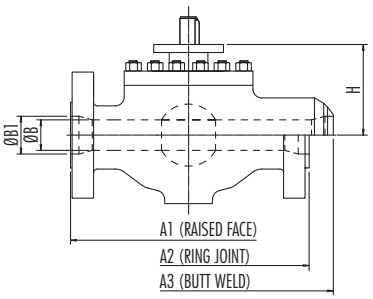
SIDE ENTRY - FULL BORE

SIZE Inch	A1	A2	A3	B	H	Weight Kg	Figure N°
1/2"	165	163	165	13	55	9	6-B03
3/4"	191	191	191	19	57	10	6-B04
1"	216	216	216	25	70	12	6-B05
1-1/4"	–	–	–	–	–	–	6-B06
1-1/2"	241	241	241	38	90	26	6-B07
2"	292	295	292	50	98	34	6-B08
3"	356	359	356	75	157	65	6-B10
4"	432	435	432	101	197	140	6-B11
6"	559	562	559	151	250	250	6-B13
8"	660	664	660	202	290	490	6-B14
10"	787	791	787	253	340	770	6-B15
12"	838	841	838	304	375	1000	6-B16
14"	889	892	889	335	410	1100	6-B17
16"	991	994	991	386	440	1550	6-B18
18"	1092	1095	1092	437	470	2100	6-B19
20"	1194	1200	1194	488	525	2700	6-B20
22"	1295	1305	1295	539	545	3800	6-B22
24"	1397	1407	1397	590	610	5000	6-B24

TOP ENTRY - FULL BORE

SIZE Inch	A1	A2	A3	B	H	Weight Kg	Figure N°
1/2"	165	163	165	13	105	15	6-B03
3/4"	191	191	191	19	130	18	6-B04
1"	216	216	216	25	150	21	6-B05
1-1/4"	–	–	–	–	–	–	6-B06
1-1/2"	241	241	241	38	200	29	6-B07
2"	292	295	292	50	215	40	6-B08
3"	356	359	356	75	230	70	6-B10
4"	432	435	432	101	280	125	6-B11
6"	559	562	559	151	310	240	6-B13
8"	660	664	660	202	330	440	6-B14
10"	787	791	787	253	360	640	6-B15
12"	838	841	838	304	480	740	6-B16
14"	889	892	889	335	485	800	6-B17
16"	991	994	991	386	500	1150	6-B18
18"	1092	1095	1092	437	520	1600	6-B19
20"	1194	1200	1194	488	570	2000	6-B20
22"	1295	1305	1295	539	590	2900	6-B22
24"	1397	1407	1397	590	630	3300	6-B24





SIDE ENTRY - REDUCED BORE

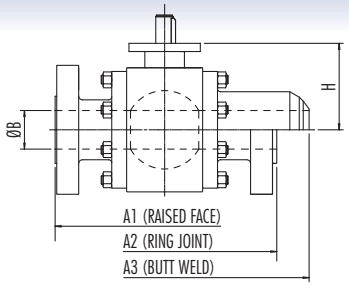
SIZE Inch	A1	A2	A3	B	B1	H	Weight Kg	Figure N°
3/4"x1/2"	191	191	191	13	19	55	10	L6-B04
1"x3/4"	216	216	216	19	25	57	11,5	L6-B05
1-1/4"x1"	229	229	229	25	32	70	14	L6-B06
1-1/2"x1"	241	241	241	25	38	70	16,5	L6-B07
2"x1-1/2"	292	295	292	38	50	90	29	L6-B08
3"x2"	356	359	356	50	75	98	46	L6-B10
4"x3"	432	435	432	75	101	157	88	L6-B11
6"x4"	559	562	559	101	151	197	170	L6-B13
8"x6"	660	664	660	151	202	250	300	L6-B14
10"x8"	787	791	787	202	253	290	560	L6-B15
12"x10"	838	841	838	253	304	340	820	L6-B16
14"x10"	889	892	889	253	335	340	915	LL6-B17
14"x12"	889	892	889	304	335	375	1180	L6-B17
16"x12"	991	994	991	304	386	375	1340	LL6-B18
16"x14"	991	994	991	335	386	410	1450	L6-B18
18"x16"	1092	1095	1092	386	437	440	1700	L6-B19
20"x16"	1194	1200	1194	386	488	440	2100	LL6-B20
20"x18"	1194	1200	1194	437	488	470	2400	L6-B20
24"x20"	1397	1407	1397	488	590	525	3300	L6-B24
28"x24"	1549	1562	1549	590	685	610	5600	L6-B28
30"x24"	1651	1664	1651	590	736	610	6000	L6-B30

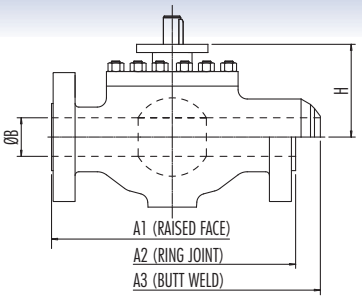
TOP ENTRY - REDUCED BORE

SIZE Inch	A1	A2	A3	B	B1	H	Weight Kg	Figure N°
3/4"x1/2"	191	191	191	13	19	105	15	L6-B04
1"x3/4"	216	216	216	19	25	130	18	L6-B05
1-1/4"x1"	229	229	229	25	32	150	22	L6-B06
1-1/2"x1"	241	241	241	25	38	150	25	L6-B07
2"x1-1/2"	292	295	292	38	50	200	33	L6-B08
3"x2"	356	359	356	50	75	215	46	L6-B10
4"x3"	432	435	432	75	101	230	90	L6-B11
6"x4"	559	562	559	101	151	280	180	L6-B13
8"x6"	660	664	660	151	202	310	320	L6-B14
10"x8"	787	791	787	202	253	330	600	L6-B15
12"x10"	838	841	838	253	304	360	720	L6-B16
14"x10"	889	892	889	253	335	360	990	LL6-B17
14"x12"	889	892	889	304	335	480	1200	L6-B17
16"x12"	991	994	991	304	386	480	1400	LL6-B18
16"x14"	991	994	991	335	386	485	1500	L6-B18
18"x16"	1092	1095	1092	386	437	500	1850	L6-B19
20"x16"	1194	1200	1194	386	488	500	2900	LL6-B20
20"x18"	1194	1200	1194	437	488	520	3100	L6-B20
24"x20"	1397	1407	1397	488	590	570	3500	L6-B24
28"x24"	1549	1562	1549	590	685	630	5700	L6-B28
30"x24"	1651	1664	1651	590	736	630	6000	L6-B30

All weight values are relevant for flanged end valves and can be changed without notice. Face to face dimensions not listed in industry standards are subject to change without notice.

TRUNNION MOUNTED BALL VALVES - ASME CLASS 900



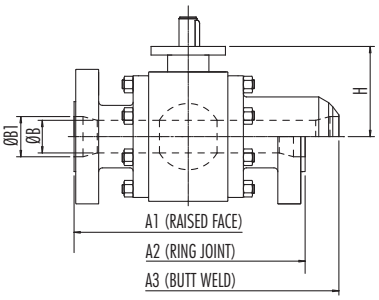


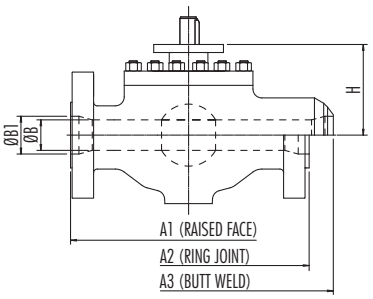
SIDE ENTRY - FULL BORE

SIZE Inch	A1	A2	A3	B	H	Weight Kg	Figure N°
1/2"	216	216	216	13	55	13	90H 803
3/4"	229	229	229	19	57	15	90H 804
1"	254	254	254	25	70	20	90H 805
1-1/4"	–	–	–	–	–	–	90H 806
1-1/2"	305	305	305	38	90	34	90H 807
2"	368	371	368	50	103	49	90H 808
3"	381	384	381	75	163	79	90H 810
4"	457	460	457	101	220	190	90H 811
6"	610	613	610	151	260	350	90H 813
8"	737	740	737	202	300	590	90H 814
10"	838	841	838	253	350	1000	90H 815
12"	965	968	965	304	380	1500	90H 816
14"	1029	1038	1029	323	410	1650	90H 817
16"	1130	1140	1130	374	440	2200	90H 818
18"	1219	1232	1219	424	480	2900	90H 819
20"	1321	1334	1321	472	530	4300	90H 820
24"	1549	1568	1549	571	620	6900	90H 824

TOP ENTRY - FULL BORE

SIZE Inch	A1	A2	A3	B	H	Weight Kg	Figure N°
1/2"	216	216	216	13	105	21	90H B03
3/4"	229	229	229	19	130	25	90H B04
1"	254	254	254	25	150	30	90H B05
1-1/4"	–	–	–	–	–	–	90H B06
1-1/2"	305	305	305	38	200	52	90H B07
2"	368	371	368	50	215	68	90H B08
3"	381	384	381	75	230	120	90H B10
4"	457	460	457	101	280	210	90H B11
6"	610	613	610	151	310	440	90H B13
8"	737	740	737	202	340	680	90H B14
10"	838	841	838	253	380	1000	90H B15
12"	965	968	965	304	500	1400	90H B16
14"	1029	1038	1029	323	520	1800	90H B17
16"	1130	1140	1130	374	540	2600	90H B18
18"	1219	1232	1219	424	590	3500	90H B19
20"	1321	1334	1321	472	620	4500	90H B20
24"	1549	1568	1549	571	690	7300	90H B24





SIDE ENTRY - REDUCED BORE

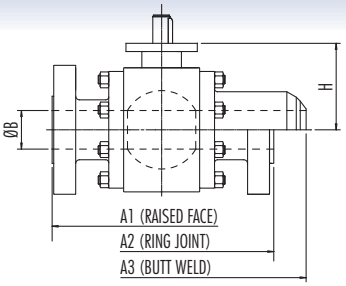
SIZE Inch	A1	A2	A3	B	B1	H	Weight Kg	Figure N°
3/4"x1/2"	229	229	229	13	19	55	15	90HL 804
1"x3/4"	254	254	254	19	25	57	18	90HL 805
1-1/4"x1"	279	279	279	25	32	70	24	90HL 806
1-1/2"x1"	305	305	305	25	38	70	29	90HL 807
2"x1-1/2"	368	371	368	38	50	90	40	90HL 808
3"x2"	381	384	381	50	75	103	54	90HL 810
4"x3"	457	460	457	75	101	163	103	90HL 811
6"x4"	610	613	610	101	151	220	230	90HL 813
8"x6"	737	740	737	151	202	260	450	90HL 814
10"x8"	838	841	838	202	253	300	700	90HL 815
12"x10"	965	968	965	253	304	350	1200	90HL 816
14"x10"	1029	1038	1029	253	323	350	1300	90HLL 817
14"x12"	1029	1038	1029	304	323	380	1600	90HL 817
16"x12"	1130	1140	1130	304	374	380	1700	90HLL 818
16"x14"	1130	1140	1130	323	374	410	1800	90HL 818
18"x16"	1219	1232	1219	374	424	440	2500	90HL 819
20"x16"	1321	1334	1321	374	472	440	2900	90HLL 820
20"x18"	1321	1334	1321	424	472	480	3350	90HL 820
24"x20"	1549	1568	1549	472	571	530	5700	90HL 824
30"x24"	1880	1902	1880	571	713	620	8600	90HL 830

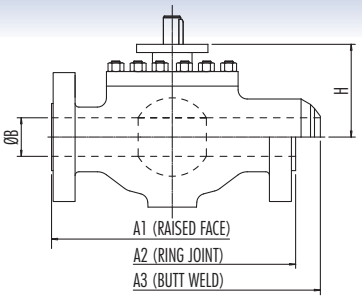
TOP ENTRY - REDUCED BORE

SIZE Inch	A1	A2	A3	B	B1	H	Weight Kg	Figure N°
3/4"x1/2"	229	229	229	13	19	105	24	90HL B04
1"x3/4"	254	254	254	19	25	130	30	90HL B05
1-1/4"x1"	279	279	279	25	32	150	35	90HL B06
1-1/2"x1"	305	305	305	25	38	150	40	90HL B07
2"x1-1/2"	368	371	368	38	50	200	55	90HL B08
3"x2"	381	384	381	50	75	215	70	90HL B10
4"x3"	457	460	457	75	101	230	140	90HL B11
6"x4"	610	613	610	101	151	280	280	90HL B13
8"x6"	737	740	737	151	202	310	550	90HL B14
10"x8"	838	841	838	202	253	340	900	90HL B15
12"x10"	965	968	965	253	304	380	1100	90HL B16
14"x10"	1029	1038	1029	253	323	380	1300	90HLL B17
14"x12"	1029	1038	1029	304	323	500	1800	90HL B17
16"x12"	1130	1140	1130	304	374	500	2100	90HLL B18
16"x14"	1130	1140	1130	323	374	520	2200	90HL B18
18"x16"	1219	1232	1219	374	424	540	2900	90HL B19
20"x16"	1321	1334	1321	374	472	540	3500	90HLL B20
20"x18"	1321	1334	1321	424	472	590	3800	90HL B20
24"x20"	1549	1568	1549	472	571	620	5400	90HL B24
30"x24"	1880	1902	1880	571	713	690	9000	90HL B30

All weight values are relevant for flanged end valves and can be changed without notice. Face to face dimensions not listed in industry standards are subject to change without notice.

TRUNNION MOUNTED BALL VALVES - ASME CLASS 1500



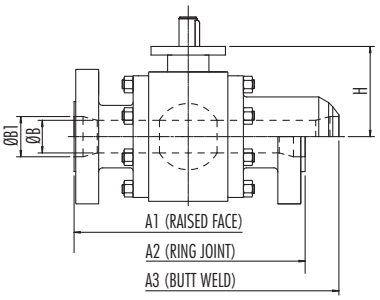


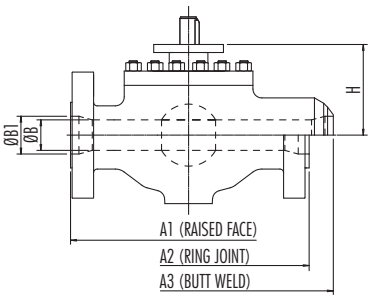
SIDE ENTRY - FULL BORE

SIZE Inch	A1	A2	A3	B	H	Weight Kg	Figure N°
1/2"	216	216	216	13	55	13	15H 803
3/4"	229	229	229	19	57	15	15H 804
1"	254	254	254	25	70	20	15H 805
1-1/4"	–	–	–	–	–	–	15H 806
1-1/2"	305	305	305	38	90	34	15H 807
2"	368	371	368	50	103	49	15H 808
3"	470	473	470	75	163	100	15H 810
4"	546	549	546	101	220	200	15H 811
6"	705	711	705	145	270	490	15H 813
8"	832	841	832	193	310	830	15H 814
10"	991	1000	991	240	360	1500	15H 815
12"	1130	1146	1130	288	420	2300	15H 816
14"	1257	1276	1257	316	440	2800	15H 817
16"	1384	1407	1384	361	480	4100	15H 818
18"	1477	1499	1537	406	560	6400	15H 819
20"	1664	1686	1664	456	620	9100	15H 820
24"	1782	1810	2043	531	700	15000	15H 824

TOP ENTRY - FULL BORE

SIZE Inch	A1	A2	A3	B	H	Weight Kg	Figure N°
1/2"	216	216	216	13	105	21	15H B03
3/4"	229	229	229	19	130	25	15H B04
1"	254	254	254	25	150	30	15H B05
1-1/4"	–	–	–	–	–	–	15H B06
1-1/2"	305	305	305	38	200	52	15H B07
2"	368	371	368	50	215	68	15H B08
3"	470	473	470	75	240	150	15H B10
4"	546	549	546	101	290	280	15H B11
6"	705	711	705	145	320	600	15H B13
8"	832	841	832	193	360	1100	15H B14
10"	991	1000	991	240	400	1450	15H B15
12"	1130	1146	1130	288	520	2000	15H B16
14"	1257	1276	1257	316	550	2600	15H B17
16"	1384	1407	1384	361	570	3900	15H B18
18"	1477	1499	1537	406	610	5100	15H B19
20"	1664	1686	1664	456	650	6700	15H B20
24"	1782	1810	2043	531	710	11800	15H B24





SIDE ENTRY - REDUCED BORE

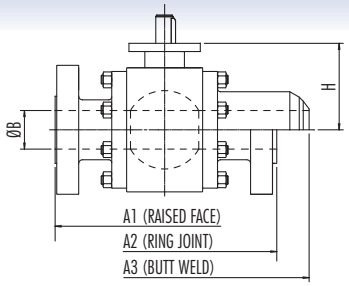
SIZE Inch	A1	A2	A3	B	B1	H	Weight Kg	Figure N°
3/4"x1/2"	229	229	229	13	19	55	15	15HL 804
1"x3/4"	254	254	254	19	25	57	18	15HL 805
1-1/4"x1"	279	279	279	25	32	70	24	15HL 806
1-1/2"x1"	305	305	305	25	38	70	29	15HL 807
2"x1-1/2"	368	371	368	38	50	90	40	15HL 808
3"x2"	470	473	470	50	75	103	67	15HL 810
4"x3"	546	549	546	75	101	163	124	15HL 811
6"x4"	705	711	705	101	145	220	290	15HL 813
8"x6"	832	841	832	145	193	270	570	15HL 814
10"x8"	991	1000	991	193	240	310	1050	15HL 815
12"x10"	1130	1146	1130	240	288	360	1800	15HL 816
14"x10"	1257	1276	1257	240	316	360	2150	15HLL 817
14"x12"	1257	1276	1257	288	316	420	2500	15HL 817
16"x12"	1384	1407	1384	288	361	420	2900	15HLL 818
16"x14"	1384	1407	1384	316	361	440	3300	15HL 818
18"x16"	1477	1499	1537	361	406	480	5000	15HL 819
20"x16"	1664	1686	1664	361	456	480	5200	15HLL 820
20"x18"	1664	1686	1664	406	456	560	7600	15HL 820
24"x20"	1782	1810	2043	456	531	620	11000	15HL 824

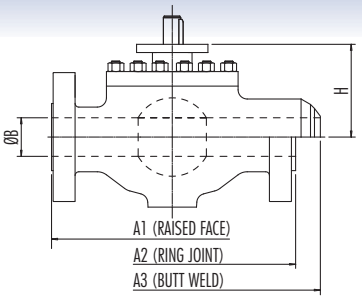
TOP ENTRY - REDUCED BORE

SIZE Inch	A1	A2	A3	B	B1	H	Weight Kg	Figure N°
3/4"x1/2"	229	229	229	13	19	105	24	15HL B04
1"x3/4"	254	254	254	19	25	130	30	15HL B05
1-1/4"x1"	279	279	279	25	32	150	35	15HL B06
1-1/2"x1"	305	305	305	25	38	150	40	15HL B07
2"x1-1/2"	368	371	368	38	50	200	55	15HL B08
3"x2"	470	473	470	50	75	215	90	15HL B10
4"x3"	546	549	546	75	101	240	200	15HL B11
6"x4"	705	711	705	101	145	290	370	15HL B13
8"x6"	832	841	832	145	193	320	700	15HL B14
10"x8"	991	1000	991	193	240	360	1300	15HL B15
12"x10"	1130	1146	1130	240	288	400	1580	15HL B16
14"x10"	1257	1276	1257	240	316	400	2200	15HLL B17
14"x12"	1257	1276	1257	288	316	520	2700	15HL B17
16"x12"	1384	1407	1384	288	361	520	3100	15HLL B18
16"x14"	1384	1407	1384	316	361	550	3300	15HL B18
18"x16"	1477	1499	1537	361	406	570	4300	15HL B19
20"x16"	1664	1686	1664	361	456	570	4600	15HLL B20
20"x18"	1664	1686	1664	406	456	610	6000	15HL B20
24"x20"	1782	1810	2043	456	531	650	9400	15HL B24

All weight values are relevant for flanged end valves and can be changed without notice. Face to face dimensions not listed in industry standards are subject to change without notice.

TRUNNION MOUNTED BALL VALVES - ASME CLASS 2500



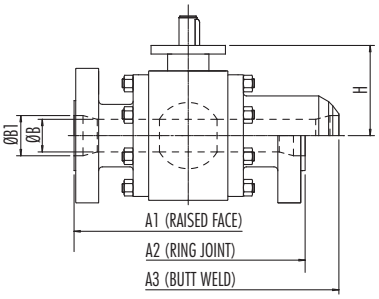


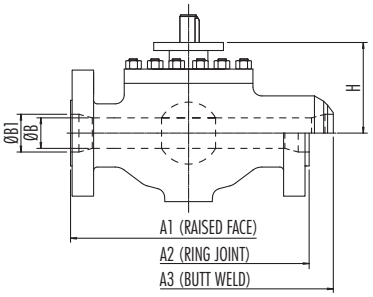
SIDE ENTRY - FULL BORE

SIZE Inch	A1	A2	A3	B	H	Weight Kg	Figure N°
1/2"	264	264	264	13	55	21	25H 803
3/4"	273	273	273	15,5	57	25	25H 804
1"	308	308	308	21	70	30	25H 805
1-1/4"	–	–	–	–	–	–	25H 806
1-1/2"	384	387	384	32	98	53	25H 807
2"	451	454	451	43	125	89	25H 808
3"	578	584	578	63	190	200	25H 810
4"	673	683	673	88	240	390	25H 811
6"	914	927	914	131	280	780	25H 813
8"	1022	1038	1022	179	380	1360	25H 814
10"	1270	1292	1270	223	450	2100	25H 815
12"	1422	1445	1422	265	520	3280	25H 816

TOP ENTRY - FULL BORE

SIZE Inch	A1	A2	A3	B	H	Weight Kg	Figure N°
1/2"	264	264	264	13	120	30	25H B03
3/4"	273	273	273	15,5	150	38	25H B04
1"	308	308	308	21	180	49	25H B05
1-1/4"	–	–	–	–	–	–	25H B06
1-1/2"	384	387	384	32	220	78	25H B07
2"	451	454	451	43	230	120	25H B08
3"	578	584	578	63	260	250	25H B10
4"	673	683	673	88	310	470	25H B11
6"	914	927	914	131	360	940	25H B13
8"	1022	1038	1022	179	440	1400	25H B14
10"	1270	1292	1270	223	490	2600	25H B15
12"	1422	1445	1422	265	580	4300	25H B16





SIDE ENTRY - REDUCED BORE

SIZE Inch	A1	A2	A3	B	B1	H	Weight Kg	Figure N°
3/4"x1/2"	273	273	273	13	15,5	55	24	25HL 804
1"x3/4"	308	308	308	15,5	21	57	28	25HL 805
1-1/4"x1"	349	352	349	21	32	70	35	25HL 806
1-1/2"x1"	384	387	384	21	38	70	42	25HL 807
2"x1-1/2"	451	454	451	32	43	98	66	25HL 808
3"x2"	578	584	578	43	63	125	152	25HL 810
4"x3"	673	683	673	63	88	190	290	25HL 811
6"x4"	914	927	914	88	131	240	530	25HL 813
8"x6"	1022	1038	1022	131	179	280	1100	25HL 814
10"x8"	1270	1292	1270	179	223	380	1750	25HL 815
12"x10"	1422	1445	1422	223	265	450	2600	25HL 816

TOP ENTRY - REDUCED BORE

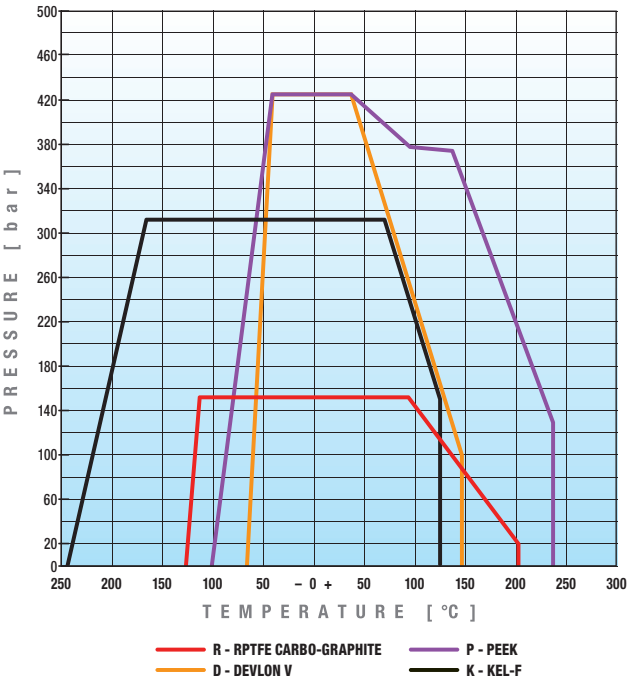
SIZE Inch	A1	A2	A3	B	B1	H	Weight Kg	Figure N°
3/4"x1/2"	273	273	273	13	15,5	120	35	25HL B04
1"x3/4"	308	308	308	15,5	21	150	43	25HL B05
1-1/4"x1"	349	352	349	21	32	180	59	25HL B06
1-1/2"x1"	384	387	384	21	38	180	69	25HL B07
2"x1-1/2"	451	454	451	32	43	220	100	25HL B08
3"x2"	578	584	578	43	63	230	160	25HL B10
4"x3"	673	683	673	63	88	260	300	25HL B11
6"x4"	914	927	914	88	131	310	680	25HL B13
8"x6"	1022	1038	1022	131	179	360	1200	25HL B14
10"x8"	1270	1292	1270	179	223	440	2200	25HL B15
12"x10"	1422	1445	1422	223	265	490	3400	25HL B16

All weight values are relevant for flanged end valves and can be changed without notice. Face to face dimensions not listed in industry standards are subject to change without notice.

VALVE SEAT & GASKET MATERIAL SELECTION GUIDE

PLEASE NOTE THAT THE FOLLOWING RATINGS ARE REFERRED TO THE VALVE SEATS. DO NOT USE THIS RATINGS FOR THE VALVE CLASS SELECTION.

SEAT PRESSURE/TEMPERATURE RATING



Choosing the right seat material is the most important decision in ball valve selection. Use the Pressure/Temperature rating chart for the most common seat materials and ask us in case of special material or applications.
The BFE SEAL CODE (3 digits) is designed to cover essential features of BFE seats and gasket material, the code is marked on the valve nameplate in order to easily allow customers to identify the internal soft material.

DIGIT-1 – INSERT SEAT MATERIAL
DIGIT-2 – EMERGENCY BODY SEAL
DIGIT-3 – FIRST BODY SEAL

Example: SEAL CODE "RGR":

INSERT SEAT MATERIAL = RPTFE CARBO-GRAPHITE
EMERGENCY BODY SEAL = GRAPHITE
FIRST BODY SEAL = RPTFE CARBO-GRAPHITE.

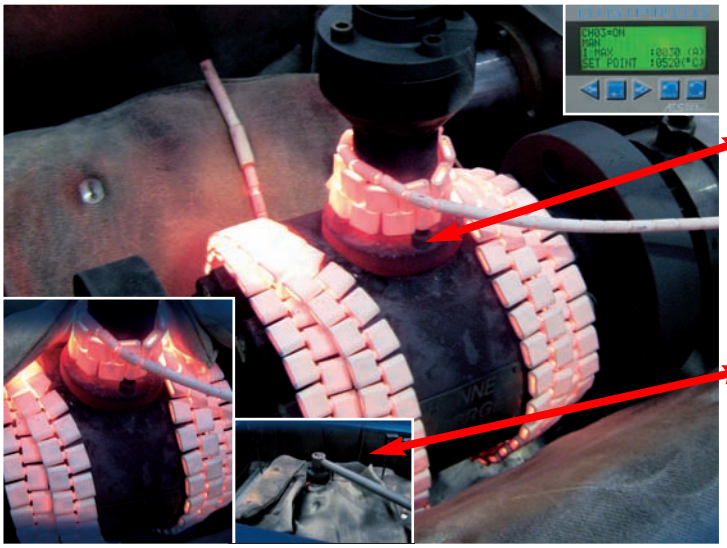
The following table shows the most used materials, their characteristics, application (seat or gasket) and the BFE ID.

SEAL MATERIAL	MATERIALS CHARACTERISTICS	BFE SYMBOL	AVAILABLE MATERIAL FOR SEAT	AVAILABLE MATERIAL FOR GASKET
			BFE SEAL CODE DIGIT 1	BFE SEAL CODE DIGIT 2/3
VIRGIN PTFE	Polytetrafluoroethylene is a Fluorocarbon-based polymer. This seating material has excellent chemical resistance and low coefficient of friction. PTFE is non-contaminating and accepted by FDA for use in food services. Not recommended for liquid alkalis and fluorine.	M	YES	YES
RPTFE 25% CARBO-GRAPHITE	PTFE's mechanical properties are enhanced by adding percentage of filler material to provide improved strength, stability and wear resistance.	R	YES	YES
RPTFE 60% BRONZE	This material exhibits a unique combination of heat resistance and low friction together with outstanding chemical and good electrical properties. No moisture absorption, high arc resistance, and is self lubricating with a low coefficient of friction.	B	YES	NO
DEVLON-V	Devlon-V (special Nylon produced by Devol Engineering Ltd) offers very good performances regarding the maximum allowable pressure and excellent elasticity.	D	YES	NO
KEL-F	PCTFE (Polychlorotrifluoroethylene) is a fluorocarbon based polymer. It offers a unique combination of physical and mechanical properties non-flammability, chemical resistance, and near zero moisture absorption. It is suitable for cryogenic applications.	K	YES	NO
PEEK	Polyetheretherketone high temperature semi rigid elastomer. Best suited for high pressure and temperature service. Also offers very good corrosion resistance.	P	YES	NO
UHMWP	Ultra-High Molecular Weight Polyethylene. Ideal for use in lowlevel radiation service. This seat also meets the requirements of the tobacco industry where TFE is prohibited and it offers an excellent resistance to abrasive media.	U	YES	YES
VITON A	Standard material for O-RING	V	YES	YES
VITON GLT	Viton GLT is a fluoroelastomer designed to retain the high heat and the chemical resistance of general use grades of Viton fluoroelastomer, while improving the low temperature flexibility of the material. Glass transition temperatures of materials are indicative of low temperature performance in typical elastomer applications	L	YES	YES
HNBR	Hydrogenated nitrile rubber (HNBR) has excellent mechanical, thermo-oxidative and chemical resistant properties and an excellent operating temperature range.	H	YES	NO
GRAPHITE	Hard carbon with excellent heat resistance. Not suitable as seat material when presence of oxidized service is expected.	G	YES	YES
TUNGSTEN CARBIDE COAT	For liquid or gas services with high presence of solids or in any case where extreme hardness and wear resistance is required. Tungsten carbide itself is practically inert and extremely strong. Any attack is usually on the binder. Not suitable when small presence of caustic soda is expected.	W	YES	N.A.
CHROME CARBIDE COAT	For liquid or gas services with small presence of solids. Not suitable when small presence of caustic soda is expected.	C	YES	N.A.
OTHER	For other materials please ask to BFE.	–	–	–

CRYOGENIC CONFIGURATION

BFE trunnion ball valves designated for use in cryogenic temperatures to minus 196°C (320°F) offer superior service life in tough and demanding applications.
The design incorporates a vent hole drilled on the upstream side of the ball, eliminating the possibility of trapping liquid or gas in the cavity and thereby preventing dangerous overpressure due to thermal expansion.
The bonnet extension keeps heat transfer down, the packing frost free and the operational torque low.
Selection of materials of construction is optimized for the intended service. Extended bonnets are peovided to ensure zero leakage.

METAL SEATED CONFIGURATION



BFE metal seated trunnion ball valves are designed for high temperature applications and for abrasive services:

- **HIGH TEMPERATURE:** BFE trunnion ball valves designated for high temperature operation offer superior service life for any kind of fluid compatible with graphite. BFE Metal to Metal sealed ball valves employ a special spring loaded seat design, which would absorb the heat expansion of valve components, so that the valve would not get stuck due the high temperature.

- **ABRASIVE SERVICE:** The valve is highly resistant to erosion, very effective in the handling of fluids containing abrasives and any dirty media and maintenance free. The valve is provided with Tungsten Carbide coated metal seats to avoid the erosion of soft seats. Soft seat must not be used for abrasive service.

OTHER SPECIAL SERVICES

SERVICE	DESCRIPTION & VALVE FEATURES
OXYGEN GAS	BFE trunnion ball valves designated for Oxygen Service are prepared and cleaned to standards required for the safe operation of Oxygen Service equipment and product purity. Acetal Resign (Delrin) seats and Nylatron seals must not be used in oxygen service.
VACUUM	BFE trunnion ball valves can be used with standard design in "Medium Vacuum" range (up to 0.001 Torr). Specially prepared and tested valves can be used through the "High Vacuum" range. Valves with reinforced TFE, carbon-graphite or metal seats are not recommended for vaacum service.
CHLORINE	BFE trunnion ball valves designated for Chlorine Service are in stainless steel material (Grade 304 or 316) or other alloys such as Monel or Hastelloy C. Reinforced PTFE can be used for the chlorine service. Due the high coefficient of expansion the ball vent hole is required. They are prepared and cleaned to standards required.
ALIMENTARY	The BFE special "cavity filled" design (standard design for alimentary service valves) offer the best way to mantain the body cavity clean and empty from impurities. BFE trunnion ball valves designated for alimentary files Service are also prepared and cleaned to standards required.
SLURRY & MUD	The BFE special "cavity filled" design (standard design for slurry service valves) offer the best way to mantain the body cavity empty from slurry and safe from phase transition to the solid state (immobilizing the valve).
RUBBER POLYMERS	The BFE special "cavity filled" design (standard design for polymers service valves) offer the best way to mantain the body cavity empty from fluid and safe from possible polymerization in place (immobilizing the valve).
HYDROGEN PEROXIDE	Ball Valves are recommended for hydrogen peroxide service. The valve is nitrogen leak tested and prepared and cleaned to standards required. The ball vent hole is required.

GENERAL SALE CONDITIONS

QUOTATION VALIDITY

Unless otherwise agreed, quotations are valid for four weeks from date of issue.
The delivery terms are always "ex-works" unless otherwise stated.
Prices and sale conditions can be changed without any previous notice.

ORDERS ACCEPTANCE

Orders are considered accepted at our general sale conditions clearly mentioned on order acknowledgment.

GOODS DELIVERY

The Company does not accept any responsability for delays is delivery which are always intended as indicative and not binding. Transport risks are at receiver's charge also in case of CIF delivery.

GUARANTEE

The Company warrantees all its products, from material and/or manufacturing defects, to be used as recommended by standards, and in accordance with approved piping practice and technique, for a period of one year from shipping date, unless otherwise agreed.
The Company liability covers eventual "free of charge" replacements for defective parts or products, providing it has not failed in the observance of above mentioned conditions and in use in compliance with standards, and, anyway, after return of defective goods. Any other liability, neither objective nor subjective will be accepted.

CLAIMS AND ORDER CANCELLATIONS

Claims will be considered only if made within 10 days from goods receipt.
Partial or complete cancellations of order can be accepted only upon previous agreement or by written consent and, however, not later than 15 days from order date.
Any controversy will be handled by the Court of Milan.

Dimensions on the catalogue are indicative.
BFE S.r.l. reserves the right to make all necessary changes without notice.

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