

GROVE[®] BT1 & BT2 Top Entry Ball Valves

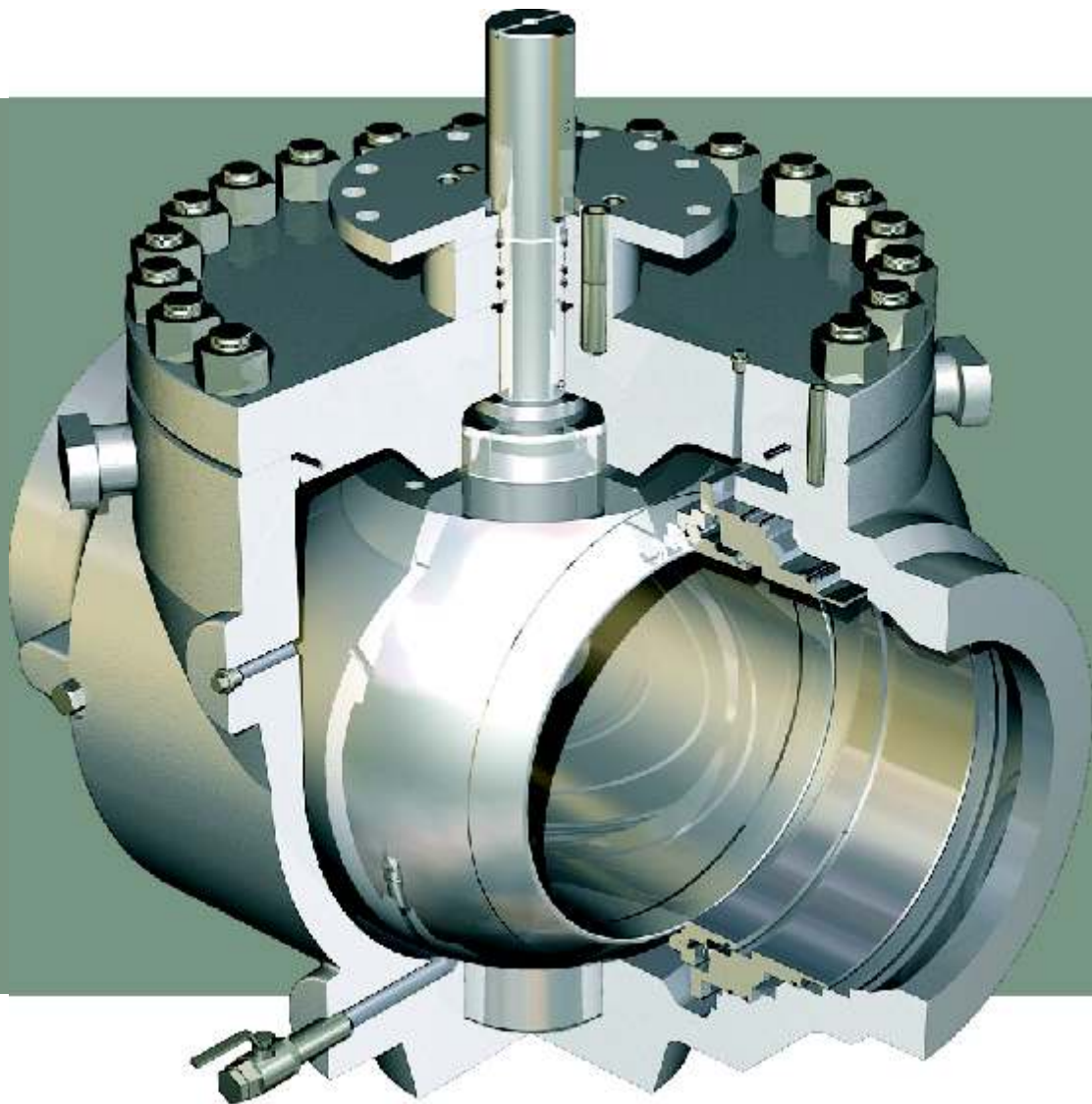


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TOP ENTRY BALL VALVES

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BT1 & BT2 TOP ENTRY BALL VALVES

THE COMPANY

Cameron's Valves & Measurement (V&M) group is a leading provider of valves and measurement systems to the Oil and Gas industry.

The Engineered Valves division provides large-diameter valves for use in natural gas, LNG, crude oil and refined products transmission lines as well as in many other general industrial applications.

Rigorously tested, field-proven and backed by superior aftermarket service, Cameron's GROVE valves are among the best known valves in the world.

APPLICATIONS

The GROVE BT1 and BT2 valves are an advanced design of Top Entry ball valves, manufactured in a wide range of diameters and pressure classes.

In the standard versions the valves are suitable for transmission pipelines, pumping, compression and re-injection units, offshore platforms, onshore terminals, pig traps, measuring stations and surge relief skids. Whenever ball valves are used in critical service applications, in-situ field reparability with quick turnaround is often needed.

The BT1 and BT2 valves are full in-line field repairable, thus eliminating long down times.

BT1 and BT2 valves have complete flexibility in the use of materials for body, trim and seal gasket selections. For this reason, they can be trimmed to meet your most severe applications.

The BT1 and BT2 valves are sized to withstand the external loads from the pipeline or from the manifolds even when the bonnet, the ball and the seats are removed for maintenance. They can also be welded directly onto the pipeline or the manifold assembly.

The bonnet-body construction allows the use of various grades of carbon steel, stainless steel and other alloys thus complying with most severe service conditions.

The GROVE BT1 and BT2 valves can also be adapted for special applications such as abrasive fluids, low temperature service, sequencing service (low and high temperature), subsea installations and LNG plants.

RANGE OF PRODUCTION

SIZE		ASME CLASS						
in.	(mm)	150	300	400	600	900	1500	2500
1 1/2	(40)	●	●	●	●	●	●	●
2	(50)	●	●	●	●	●	●	●
3	(80)	●	●	●	●	●	●	●
4	(100)	●	●	●	●	●	●	●
6	(150)	●	●	●	●	●	●	■
8	(200)	●	●	●	●	●	●	■
10	(250)	●	●	●	●	●	●	■
12	(300)	●	●	●	●	●	●	■
14	(350)	■	■	■	■	■	■	■
16	(400)	■	■	■	■	■	■	■
18	(450)	■	■	■	■	■	■	■
20	(500)	■	■	■	■	■	■	■
22	(550)	■	■	■	■	■	■	■
24	(600)	■	■	■	■	■	■	■
26	(650)	■	■	■	■	■	■	■
28	(700)	■	■	■	■	■	■	■
30	(750)	■	■	■	■	■	■	■
32	(800)	■	■	■	■	■	■	■
34	(850)	■	■	■	■	■	■	■
36	(900)	■	■	■	■	■	■	■
40	(1000)	■	■	■	■	■	■	■
42	(1050)	■	■	■	■	■	■	■
46	(1150)	■	■	■	■	■	■	■
48	(1200)	■	■	■	■	■	■	■
54	(1300)	■	■	■	■	■	■	■
56	(1400)	■	■	■	■	■	■	■
60	(1500)	■	■	■	■	■	■	■

BT1 ● BT2 ■

BT1 DESIGN FEATURES

STANDARD FEATURES

- Triple barrier stem seals
- Anti-Blow Out stem design
- Stem emergency grease fitting
- Low friction metal-backed self lubricating PTFE sleeve bearing and thrust washers
- Trunnion mounted ball
- Plastic polymer insert for seat sealing
- Double Piston Effect seats (DPE)
- Relief valve in the body cavity
- Nickel plating on pressure controlling parts and stem in function of the trim material
- Body thickness in accordance with ASME B16.34
- End Flange dimensions in accordance with API Standard 6D
- Adapter plate with integral position indicator
- In-line maintainable
- API 6FA Fire Safe Design
- Standard Design as per API 6D

FEATURES UPON REQUEST

- Self-relieving seats and dual seat design
- Lubricated seats
- Features for vertical installation
- Special Flanges or End Connections in accordance with customer requirements
- Special Face-to-Face and bore sizes
- PTFE spring energized lip seals for stem sealing
- Anti-static device
- Metal-to-Metal seat sealing
- Double-Block-and-Bleed
- AISI 316 and Inconel 625 overlay on all sealing areas
- AISI 316 and Inconel 625 overlay on all wetted areas
- Explosive decompression resistant seals
- Explosive decompression resistant seals
- NACE MR0175 / ISO 15156

BT2 DESIGN FEATURES

STANDARD FEATURES

- Triple barrier stem seals
- Anti-Blow Out stem design
- Stem and seats emergency grease fittings
- Low friction metal-backed self lubricating PTFE sleeve bearing and thrust washers
- Trunnion mounted ball
- Primary Metal-to-Metal seal and protected secondary O-ring seal up to ASME Class 900, for the higher classes Plastic Polymer insert for seat sealing
- Double Piston Effect seats (DPE)
- Pressure relief valve in the body cavity
- Nickel plating on pressure controlling parts and stem in function of the trim material
- Body thickness in accordance with ASME B16.34
- End Flange dimensions in accordance with API Standard 6D
- Adapter plate with integral position indicator
- Factory positioned external stops
- In-line maintainable
- API 6FA Fire Safe Design
- Standard Design as per API 6D

FEATURES UPON REQUEST

- Self-relieving seats and dual seat design
- Lubricated seats
- Special flanges or end connections in accordance with customer requirements
- Special Face-to-Face and bore sizes
- PTFE spring energized lip seals for sealing
- Anti-static device
- Metal-to-Metal seat sealing
- Double-Block-and-Bleed
- Features for vertical pipe installation
- AISI 316 and Inconel 625 overlay on sealing areas
- AISI 316 and Inconel 625 overlay on all overlay on all wetted areas
- Explosive decompression resistant seals
- NACE MR0175 / ISO 15156



BT1 & BT2 DESIGN FEATURES

SEAT SEAL

The Double Piston Effect (DPE) seat design allows each seat to seal with pressure acting from each direction.

DPE seats are standard on the Top Entry Valves, hence, in the event that the upstream seat is damaged, the downstream seat provides a seal (double barrier in both directions). Due to this seat configuration, the double barrier is assured regardless of the flow direction.

Whenever required, the valve can be supplied with Self Relieving Seats (SRS) that provide a single barrier. This independent sealing on the upstream and downstream seats is available upon request.

Under customer request, the valve can be supplied with dual seats design, upstream seat self relieving downstream seat double piston effect to provide a double barrier in one direction and to avoid the presence of the body cavity relief valve. This configuration is available upon request.

The standard design of the seating surface of the BT1 features a plastic insert which ensure low friction and effective performances throughout the life of the valve.

The BT2 sealing is achieved by a primary Metal-to-Metal seal and secondary protected O-Ring seal up to ASME Class 900 for higher classes a plastic O-Ring or plastic insert is used.

The Block-and-Bleed and Double-Block-and-Bleed features are available on all size and classes.

STEM CONSTRUCTION

The stem construction can either be integral with the ball or separate from the ball depending upon the type of service, valve size and trim material selected.

In either case, the stem anti-blow out configuration of the GROVE Top Entry Valves prevents stem ejection by internal pressure.

TRIPLE STEM SEALS

The standard design includes a triple barrier sealing system the configurations are the follows:
Up to 4" N.: 2 O-Rings plus
N.: 1 graphite Ring from 6"
and above N.: 3 O-Rings.

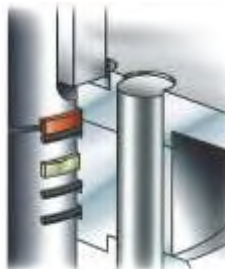
Provision for the injection of sealant can be provided to achieve temporary sealing until required maintenance is carried out.

The outer seal can be replaced with the line under pressure provided that the body cavity is fully vented (please adhere to the procedure in the Maintenance Manual).

BALL POSITION

For lever-operated valves, the open and closed positions are assured by corresponding stops on the bearing housing. When the valve is with gearbox or actuated these stops are considered secondary stops, as primary stops will be set the stops onto the gear/actuator.

"OPEN" and "CLOSED" indicators are also provided.



BODY/BONNET CONSTRUCTION

The typical shape of the body as well as the cast construction allow for an optimization of material distribution which is particularly suitable for high pressure classes.

The body to bonnet joint design is in compliance with ASME VIII Div. 1, and the ASME B16.34 body thickness make the structure of the pressure containing parts extremely robust, allowing for a convenient selection of gasket types to be utilized whenever required (i.e. low temperature, sour gas). It also allows for the inclusion of additional graphite seals to further guarantee the tightness under fire conditions.

The body drain is located in the lowest part of the body cavity and features an NPT drain valve with a safety plug.

Unless otherwise specified the valve ends comply with:

- Flanged Ends in accordance with API 6D/ISO 14313
- Welded Ends in accordance with ASME 16.25.

The bolts threads are per ISO metric.

TORQUE

The low operating torque and the long trouble-free service life of the GROVE Top Entry Valves are the result of:

- The design of the stem which is not loaded by side thrust;
- Two (upper and lower) rigid, large diameter, short coupled trunnions which support the ball side load due to differential pressure;
- Self lubricating sleeve bearing and thrust washers.



The GROVE Top Entry Valves are suited for almost any kind of powered operators and are able to meet most severe operating and test conditions such as those required of Emergency Shut Down Valves or HIPPS Valves.

BT1 & BT2 DESIGN FEATURES

FULL IN-LINE MAINTENANCE

The GROVE Top Entry ball valve is designed to be maintained in line.

The bolted construction allows disassembly on-site for inspection and possible repair.

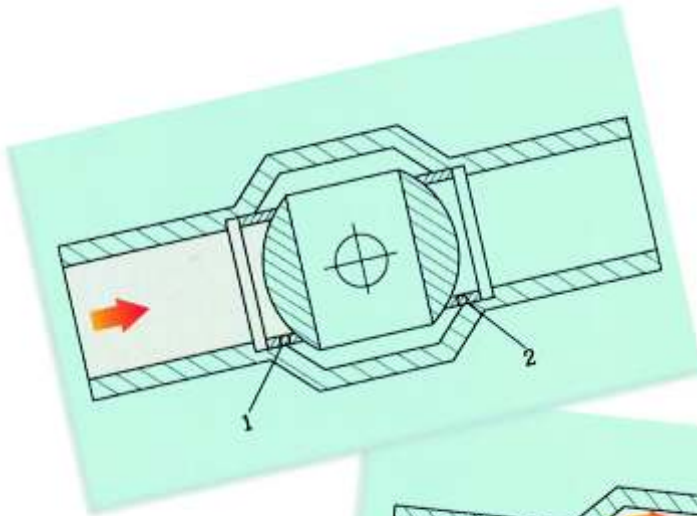
Removal of the bolted bonnet from the valve body allows access to the ball and seats which can be removed with special maintenance tools, designed by GROVE.

The standard valve utilizes a DPE seat design and therefore the tightness of the seating surfaces can be assessed by pressurizing the body cavity only, before any re-pressurization of the pipeline.

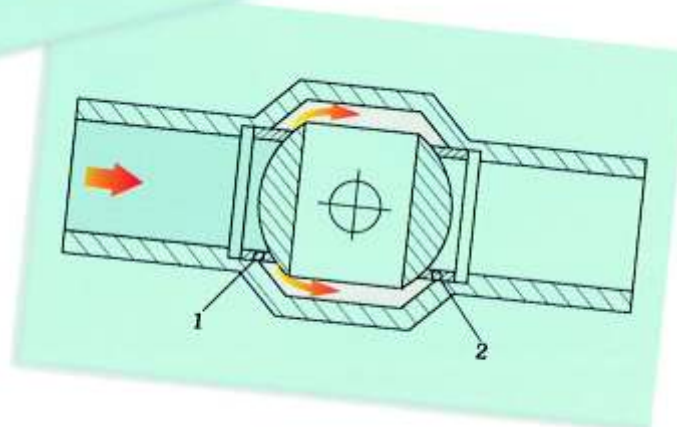
DOUBLE PISTON EFFECT (DPE)

Spring loaded seats are able to float along the flow axis.

Line pressure behind the seat ring supplements the seat spring load and pushes the seats tightly against the ball. (Piston Effect).



If the upstream seat (1) is damaged and leaks, the pressure entering the body cavity acts on the downstream seat or ball.



Seat (2) sealing the downstream seat tightly against the ball.

BT1 & BT2 OPTIONAL FEATURES

STEM EXTENSIONS

GROVE ball valves can be provided with optional stem extensions suitable for buried installations.

When used on a buried valve, the stem extension can be furnished "water-tight" and both the grease injection system and drain system will be extended.

The length of the extension is measured from the center-line of the valve to the center-line of the handwheel. This distance must be specified at the order stage.

Upon request; wrenches, manual operators and powered actuators can be supplied with locking devices to suit the customer's specification.

METAL-TO-METAL SEATS

The seating surfaces between the seat and the ball can be completely metallic.



This trim is recommended whenever the standard soft sealing is not suitable because of the unfavorable combination of pressure, temperature, chemical composition of the fluid, or when solid or abrasive particles are present.

Metal-to-Metal seats utilize a coating on the ball and seats that is applied by means of "High Velocity Oxy-Fuel" (HVOF) using Tungsten Carbide.

GROVE operates its own in-house HVOF process for the supply of high quality Metal-to-Metal seated valves.

TRANSITION PIECES

Transition pieces can be welded on to the valves during the manufacturing process.

Transition pipes can be made available free-issue to GROVE by the customer or can be procured by GROVE to suit the customer's specifications.

GROVE offers a wide variety of weld procedures in accordance with most international standards.



BT1 & BT2 OPTIONAL FEATURES

INSTALLATION ON VERTICAL PIPE

Top Entry ball valves to be installed on vertical pipelines are supplied together with special equipment which permits the ball and the seats to be supported during lateral disassembly.

The clearance required to carry out this operation will be provided upon request.



BT2 in vertical position, with special tools, during the ball assembly/disassembly operations.

INTERNAL SLEEVE

When severe commissioning conditions are foreseen, in the presence of pipeline construction residuals and when the integrity of the internals is to be guaranteed the option for Top Entry ball valves to have a customized temporary sleeve is available.

ACTUATORS

All BT Series valves are designed with an adapter plate to enable the fitting of powered actuators (electric, hydraulic, pneumatic). The assembly of the actuator on a new valve is usually carried out at the factory thus guaranteeing the full functionality of the completed assembly.

Should a valve require modification to enable an actuator to be fitted on-site, qualified personnel are available to supervise the modification.

BT1 & BT2 SPECIAL APPLICATION

“S” DESIGN FOR SUBSEA SERVICE

The BT Series S-type valve is the subsea version of the GROVE Top Entry ball valve, specifically designed to suit subsea service conditions.

The BT Series S-type valve is a very reliable product and is designed to provide optimum service without maintenance.

The S-type design meets the restrictive criteria usually adopted for pressure retaining and drive train components, making the S-type valve suitable also for Emergency Shutdown Service (ESD).

The body and the bolts are coated with special paint or coatings for corrosion resistance. In addition bonnet bolts feature special sealing caps for protection. A protective cap can also be provided onto the stem to prevent sea water ingress and allows for deployment of either manual or powered actuators.

“P” DESIGN FOR HIGH TEMPERATURE SERVICE

The BT Series P-type valve is the high temperature version of the GROVE Top Entry ball valve and is suitable for service temperatures up to 716°F (380°C).

“L” DESIGN FOR LOW TEMPERATURE SERVICE

The BT Series L-type is the low temperature version of the GROVE Top Entry ball valve and is suited for temperature down to -193°F (-125°C).

The L-type valves utilize special materials, parts dimensions, surface finishing, gaskets and stem connections that are specifically designed to suit low temperature conditions.

The BT Series L-type valves are supplied with an extended bonnet allowing the stem seal to be positioned away from the low temperature zone, enhancing the sealing performance.



Full consideration has been given to mitigate the possibility of galvanic corrosion in critical sealing areas by means of weld overlay in stainless steel or nickel alloys. Upon customer request, or if required by the service conditions, the weld overlay can be extended to all wetted areas.

The corrosion resistance of the overlay can be verified by chemical analysis of test specimens and components.

The stem and external sealing areas are protected with additional gaskets sealing against sea water ingress.

The valves are suited to heavy cycling under alternating conditions of temperatures and pressures (for example sequencing service). Sealing performance is ensured by metal/graphite gaskets and metal to metal seats.

Valves are provided with stem extensions which allows the stem seal to lie far from the high temperature zone.

The drive train is designed to withstand high torque values resulting from the Metal-to-Metal seats in high temperature conditions. Trim and bolting are suited to high temperature service.

The valves are fitted with special lip gaskets specifically designed for low temperature application.

Seat insert materials are selected in accordance with the process conditions and testing parameters.

Body and trim are usually made of austenitic stainless steel grades.

Bonnet bolting is made of ASTM A320/194 grade B8M/8MA or A453 grade 660.

BT1 & BT2 SPECIAL PROCESS AND MATERIALS FOR SPECIAL APPLICATIONS

MATERIALS SELECTION

The quality of the valve depends on the materials selection.

The BT Series valves are designed in accordance with material requirements in API Standard 6D and allows for the selection of various combinations. After reviewing the service conditions, the selection is carried out to suit the mechanical and chemical characteristics of the materials.

A complete bill of materials is submitted at the quotation stage addressing each component.

IN HOUSE SPECIAL PROCESS

GROVE has in-house special process capabilities to produce valves for most critical applications.

Electroless Nickel Plating (ENP) capability. ASTM B733 is the standard used for plating control.

Strict quality control procedures for critical process conditions and for the plated components maintain plating consistency.

High Velocity Oxy Fuel (HVOF) capability to provide Tungsten Carbide coating and provide wear and corrosion resistance to the Metal-to-Metal valves.

WELD OVERLAYS

In case of corrosive service, sealing surfaces or other critical parts of the valve can be robotically overlaid.

Commonly used materials for weld overlay are AISI 316 and Inconel 625.

The process is qualified so that the final thickness after machining can guarantee the chemical composition per the relevant ASTM standard.

Non-Destructive testing (NDT) is then carried out using the dye penetrant method.

NACE REQUIREMENTS

On request GROVE Top Entry ball valves can be supplied in accordance with NACE MR0175 & ISO 15156 requirements.

SEVERE WET SOUR GAS SERVICE

In addition to compliance with requirements in NACE MR0175, for resistance to sulfide stress cracking, the following specifications can be met:

- NACE TM0284 (stepwise cracking induced by hydrogen adsorption)
- NACE TM0177 (sulfide stress cracking at 720 hours)

DUPLEX

STAINLESS STEELS

METALLURGY

For Duplex (22Cr 2Ni) and Super Duplex (25Cr 5Ni) stainless steel the following requirements are met:

- Pitting corrosion
PRE = 33 min. for Duplex,
40 min. for Super Duplex
- Ferrite content 40 to 60%
per ASTM E 562
In addition the following
corrosion resistance
qualification tests are
available:
- Chloride corrosion per
ASTM G48
(104°F (40°C), 72 hours)
- Cracking per ASTM G36
(302°F (150°C), 500 hours)



BT1 MATERIALS SPECIFICATION

MATERIALS SELECTION

The GROVE BT1 Ball Valve has been designed for use with various materials or combinations of materials depending on the service conditions.

The following is a typical listing of materials for valves ASME Class 150 - 2500 for standard applications.

PRESSURE RETAINING PARTS

Body	A216 WCB, A216 WCC, A352 LCB, A352 LCC
Bonnet	A350 LF2
Stem	AISI 4140, A564 Gr. 630 (17-4 PH)
Bolting	A193 B7, A194 2H, A193 B7M, A194 2HM, A320 L7, A194 Gr.7, A320 L7M, A194 Gr. 7M

INTERNAL PARTS

Ball	AISI 4140, A350 LF2, A694 F65, AISI 316, A564 Gr 630 (17-4 PH)
Seats	AISI 4140, A350 LF2, A694 F65, AISI 316, A564 Gr 630 (17-4 PH)
Springs	AISI 302, Inconel (different grades), Elgiloy

SEALING MATERIALS

Stem Gasket:	NBR (Nitrile) FKM (Viton different grades) HNBR (Hydrogenated Nitrile)
Seat/ Bonnet Gasket:	NBR (Nitrile) FKM (Viton different grades) HNBR (Hydrogenated Nitrile)

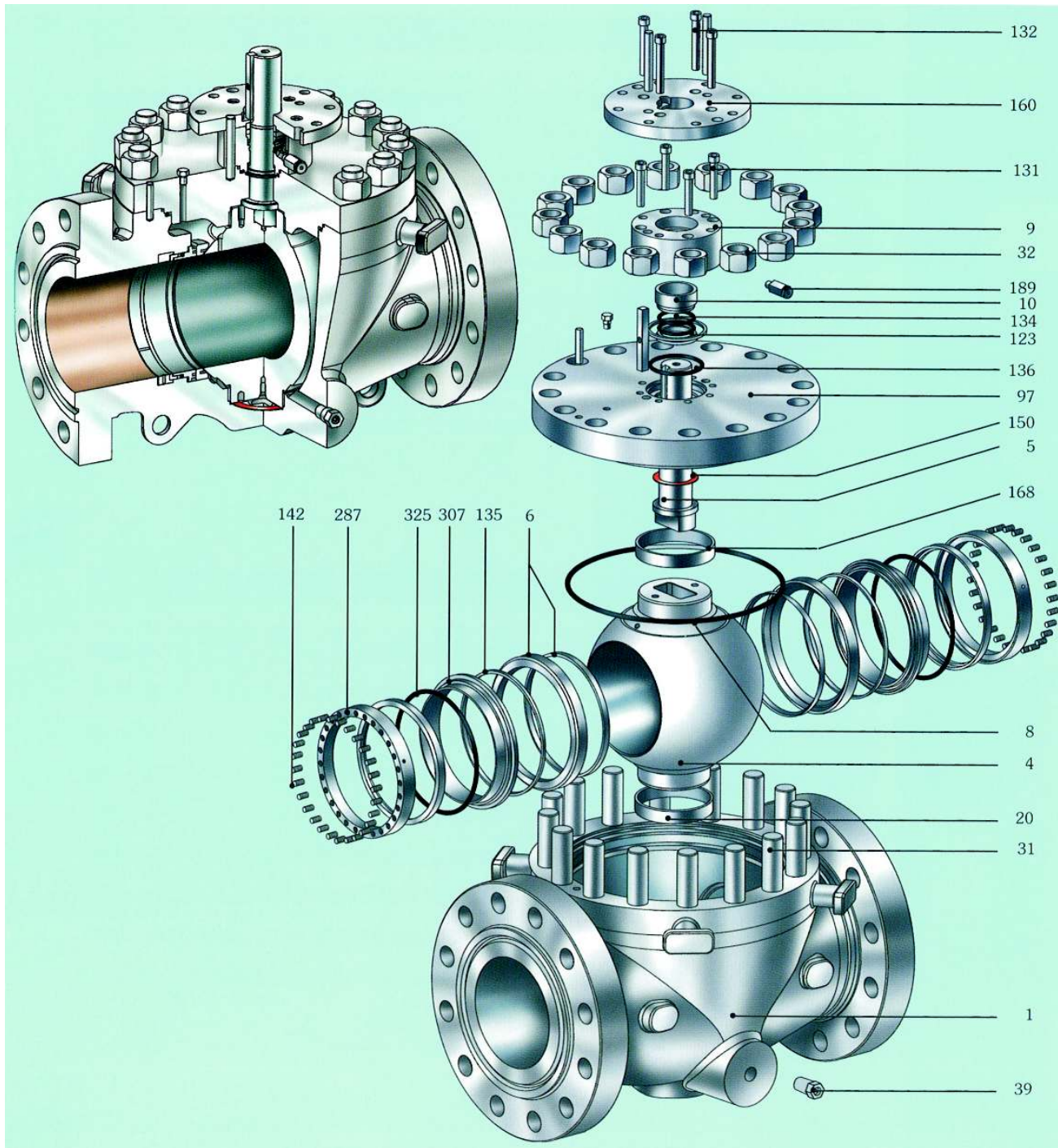
PLATING/COATING

0.001 inch	25 microns ENP Electroless Nickel Plating
0.003 inch	75 microns ENP Electroless Nickel Plating

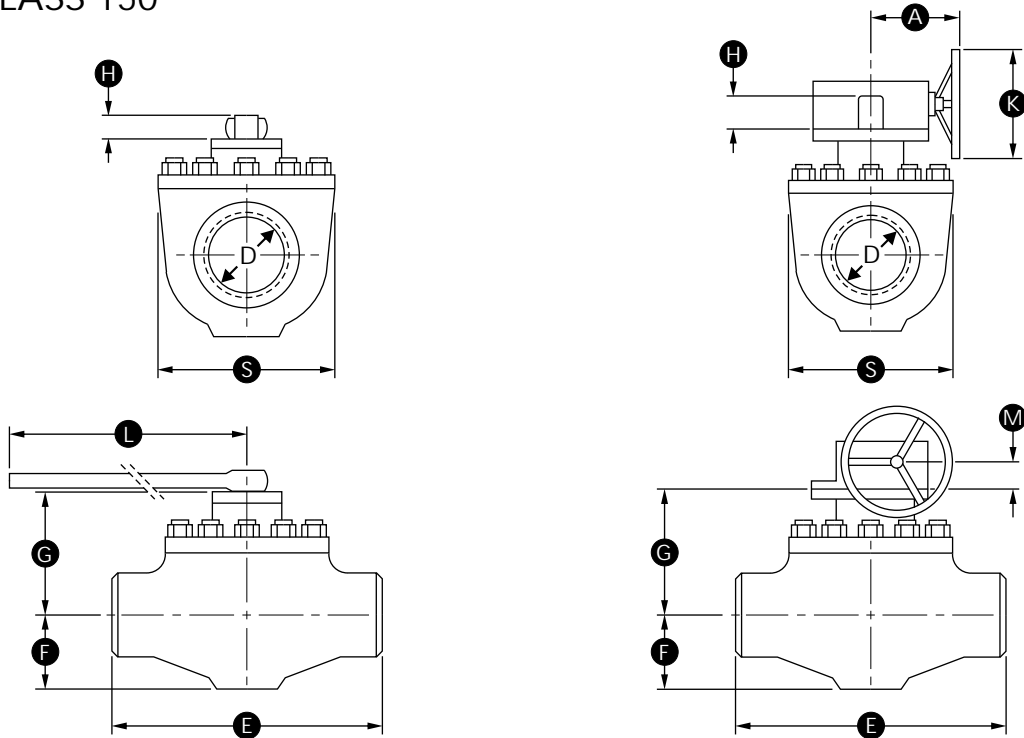
NACE REQUIREMENTS

GROVE BT1 Ball Valves can be supplied in accordance with NACE MR0175 / ISO 15156
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BT1 VALVE ASSEMBLY & CROSS SECTION



Item	Description	31	Body Stud	136	Bonnet Cover O-Ring
1	Body	32	Body Nut	142	Spring
4	Ball	39	Drain Valve	150	Upper Washer
5	Stem	97	Bonnet	160	Adapter Plate
6	Seat Ring with Insert	123	Stem Key	168	Upper Bearing
8	Body O-Ring	131	Bonnet Cover Capscrew	189	Stem Grease Fitting
9	Bonnet Cover	132	Adapter Plate Capscrew	287	Spring Holder Ring
10	Bushing	134	Stem O-Ring	307	Seat Thrust Ring
20	Lower Bearing	135	Seat O-Ring	325	Seat Thrust Ring Gasket

BT1 DIMENSIONS AND WEIGHTS
 ASME CLASS 150


SIZE	in. (mm)	D	E			F	G	S	H	L	A	K	M	WEIGHT	
			WE	RF	RTJ									WE	RF/RTJ
1 1/2	(40)	1 1/2 (38)	10 1/4 (260)	10 1/4 (260)	10 3/8 (264)	2 1/2 (63)	5 3/4 (145)	6 1/2 (165)	2 3/8 (61)	12 (305)	-	-	-	35 (16)	62 (28)
2 x 1 1/2 x 2	(50 x 40 x 50)	1 1/2 (38)	11 1/2 (292)	11 1/2 (292)	11 5/8 (295)	2 1/2 (63)	5 3/4 (145)	6 1/2 (165)	2 3/8 (61)	12 (305)	-	-	-	55 (25)	66 (30)
2	(50)	2 (51)	11 1/2 (292)	11 1/2 (292)	11 5/8 (295)	3 1/8 (78)	6 3/4 (170)	7 1/4 (185)	2 3/8 (61)	12 (305)	-	-	-	62 (28)	88 (40)
3 x 2 x 3	(80 x 50 x 80)	2 (51)	14 (356)	14 (356)	14 1/8 (359)	3 1/8 (78)	6 3/4 (170)	7 1/4 (185)	2 3/8 (61)	12 (305)	-	-	-	90 (41)	110 (50)
3	(80)	3 (76)	14 (356)	14 (356)	14 1/8 (359)	3 7/8 (100)	8 3/8 (212)	9 1/2 (240)	2 3/8 (61)	17 3/4 (450)	-	-	-	99 (45)	143 (65)
4 x 3 x 4	(100 x 80 x 100)	3 (76)	17 (432)	17 (432)	17 1/8 (435)	3 7/8 (100)	8 3/8 (212)	9 1/2 (240)	2 3/8 (61)	17 3/4 (450)	-	-	-	150 (68)	176 (80)
4	(100)	4 (102)	17 (432)	17 (432)	17 1/8 (435)	4 3/4 (120)	9 1/4 (236)	11 5/8 (296)	2 3/8 (61)	36 (915)	-	-	-	187 (85)	243 (110)
6 x 4 x 6	(150 x 100 x 150)	4 (102)	22 (559)	22 (559)	22 1/8 (562)	4 3/4 (120)	9 1/4 (236)	11 5/8 (296)	2 3/8 (61)	36 (915)	-	-	-	220 (100)	287 (130)
6	(150)	6 (152)	22 (559)	22 (559)	22 1/8 (562)	6 3/8 (162)	10 5/8 (271)	15 3/8 (390)	3 1/8 (80)	-	8 3/4 (223)	13 3/4 (350)	2 5/8 (67)	430 (195)	463 (210)
8 x 6 x 8	(200 x 150 x 200)	6 (152)	26 (660)	26 (660)	26 1/8 (664)	6 3/8 (162)	10 5/8 (271)	15 3/8 (390)	3 1/8 (80)	-	8 3/4 (223)	13 3/4 (350)	2 5/8 (67)	459 (208)	511 (232)
8	(200)	8 (203)	26 (660)	26 (660)	26 1/8 (664)	8 1/8 (207)	12 1/8 (308)	18 1/2 (470)	3 1/8 (80)	-	8 3/4 (223)	13 3/4 (350)	2 5/8 (67)	772 (350)	827 (375)
10 x 8 x 10	(250 x 200 x 250)	8 (203)	31 (787)	31 (787)	31 1/8 (791)	8 1/8 (207)	12 1/8 (308)	18 1/2 (470)	3 1/8 (80)	-	8 3/4 (223)	13 3/4 (350)	2 5/8 (67)	849 (385)	930 (422)
10	(250)	10 (254)	31 (787)	31 (787)	31 1/8 (791)	9 5/8 (244)	13 3/4 (348)	22 1/4 (566)	4 1/8 (105)	-	8 3/4 (223)	13 3/4 (350)	2 5/8 (67)	882 (400)	1019 (462)
12 x 10 x 12	(300 x 250 x 300)	10 (254)	33 (838)	33 (838)	33 1/8 (841)	9 5/8 (244)	13 3/4 (348)	22 1/4 (566)	4 1/8 (105)	-	8 3/4 (223)	13 3/4 (350)	2 5/8 (67)	970 (440)	1091 (495)
12	(300)	12 (305)	33 (838)	33 (838)	33 1/8 (841)	11 3/8 (290)	15 1/8 (385)	24 3/4 (630)	4 1/8 (105)	-	8 3/4 (223)	13 3/4 (350)	2 5/8 (67)	1213 (550)	1455 (660)
16 x 12 x 16	(400 x 300 x 400)	12 (305)	39 (991)	39 (991)	39 1/8 (994)	11 3/8 (290)	15 1/8 (385)	24 3/4 (630)	4 1/8 (105)	-	8 3/4 (223)	13 3/4 (350)	2 5/8 (67)	1543 (700)	1764 (800)

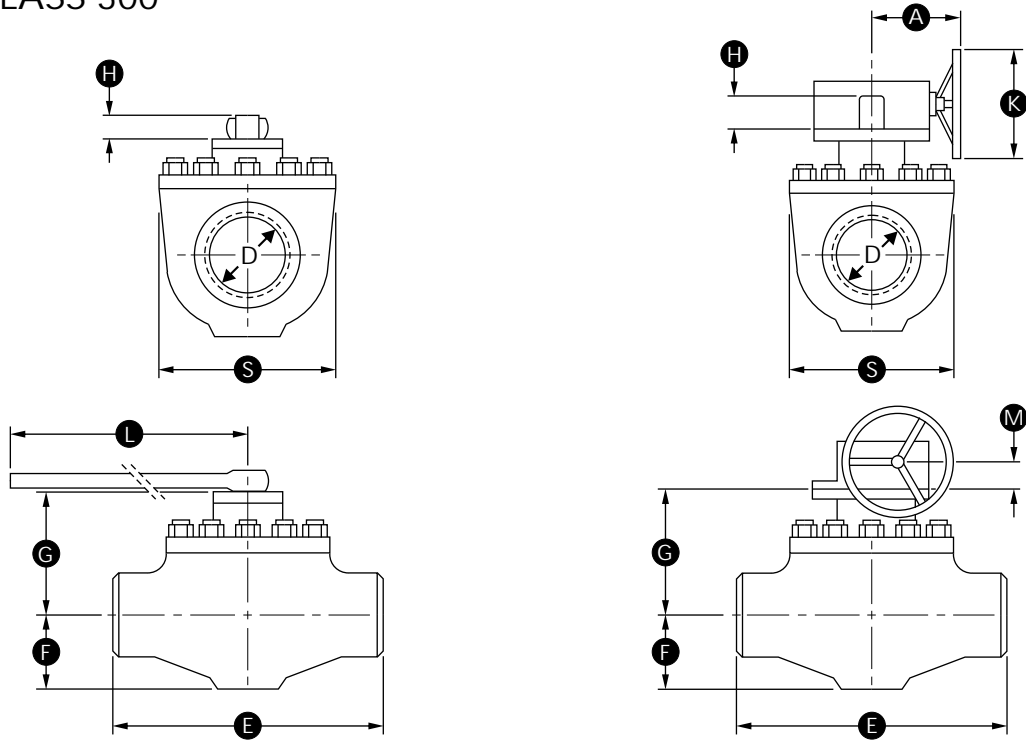
Flanges in accordance with ASME B16.5.

Butt Welding Ends according to ASME B16.25.

Dimensions and Weights are indicative and will be confirmed at the time of the order.

Shaded bore sizes (D) according to ISO 14313.

Shaded End-to-End Dimensions (E) according to ISO 14313 Class 600.

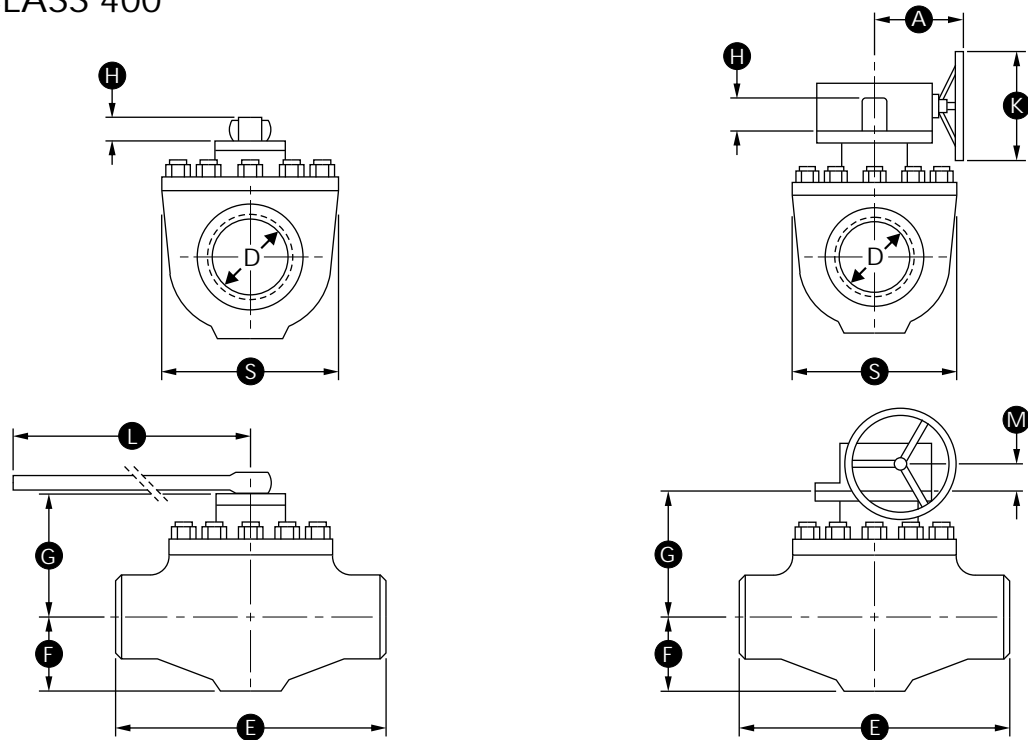
BT1 DIMENSIONS AND WEIGHTS
 ASME CLASS 300


SIZE in. (mm)	D	E			F	G	S	H	L	A	K	M	WEIGHT	
		WE	RF	RTJ									WE	RF/RTJ
1 1/2 (40)	1 1/2 (38)	10 1/4 (260)	10 1/4 (260)	10 3/8 (264)	2 1/2 (63)	5 3/4 (145)	6 1/2 (165)	2 3/8 (61)	12 (305)	-	-	-	40 (18)	66 (30)
2 x 1 1/2 x 2 (50 x 40 x 50)	1 1/2 (38)	11 1/2 (292)	11 1/2 (292)	11 5/8 (295)	2 1/2 (63)	5 3/4 (145)	6 1/2 (165)	2 3/8 (61)	12 (305)	-	-	-	62 (28)	71 (32)
2 (50)	2 (51)	11 1/2 (292)	11 1/2 (292)	11 5/8 (295)	3 1/8 (78)	6 3/4 (170)	7 1/4 (185)	2 3/8 (61)	17 3/4 (450)	-	-	-	68 (31)	88 (40)
3 x 2 x 3 (80 x 50 x 80)	2 (51)	14 (356)	14 (356)	14 1/8 (359)	3 1/8 (78)	6 3/4 (170)	7 1/4 (185)	2 3/8 (61)	17 3/4 (450)	-	-	-	93 (42)	108 (49)
3 (80)	3 (76)	14 (356)	14 (356)	14 1/8 (359)	3 7/8 (100)	8 3/8 (212)	9 1/2 (240)	2 3/8 (61)	36 (915)	-	-	-	110 (50)	143 (65)
4 x 3 x 4 (100 x 80 x 100)	3 (76)	17 (432)	17 (432)	17 1/8 (435)	3 7/8 (100)	8 3/8 (212)	9 1/2 (240)	2 3/8 (61)	36 (915)	-	-	-	161 (73)	187 (85)
4 (100)	4 (102)	17 (432)	17 (432)	17 1/8 (435)	4 3/4 (120)	9 1/4 (236)	11 5/8 (296)	2 3/8 (61)	51 1/8 (1300)	-	-	-	209 (95)	276 (125)
6 x 4 x 6 (150 x 100 x 150)	4 (102)	22 (559)	22 (559)	22 1/8 (562)	4 3/4 (120)	9 1/4 (236)	11 5/8 (296)	2 3/8 (61)	51 1/8 (1300)	-	-	-	258 (117)	320 (145)
6 (150)	6 (152)	22 (559)	22 (559)	22 1/8 (562)	6 3/8 (162)	10 5/8 (271)	15 3/8 (390)	4 1/8 (105)	-	8 3/4 (223)	13 3/4 (350)	2 5/8 (67)	481 (218)	611 (277)
8 x 6 x 8 (200 x 150 x 200)	6 (152)	26 (660)	26 (660)	26 1/8 (664)	6 3/8 (162)	10 5/8 (271)	15 3/8 (390)	4 1/8 (105)	-	8 3/4 (223)	13 3/4 (350)	2 5/8 (67)	518 (235)	622 (282)
8 (200)	8 (203)	26 (660)	26 (660)	26 1/8 (664)	8 1/8 (207)	12 1/8 (308)	18 1/2 (470)	4 1/8 (105)	-	8 3/4 (223)	13 3/4 (350)	2 5/8 (67)	794 (360)	897 (407)
10 x 8 x 10 (250 x 200 x 250)	8 (203)	31 (787)	31 (787)	31 1/8 (791)	8 1/8 (207)	12 1/8 (308)	18 1/2 (470)	4 1/8 (105)	-	8 3/4 (223)	13 3/4 (350)	2 5/8 (67)	904 (410)	966 (438)
10 (250)	10 (254)	31 (787)	31 (787)	31 1/8 (791)	9 5/8 (244)	13 3/4 (348)	21 5/8 (550)	5 1/8 (130)	-	11 1/2 (292)	13 3/4 (350)	3 (75)	904 (410)	1067 (484)
12 x 10 x 12 (300 x 250 x 300)	10 (254)	33 (838)	33 (838)	33 1/8 (841)	9 5/8 (244)	13 3/4 (348)	21 5/8 (550)	5 1/8 (130)	-	11 1/2 (292)	13 3/4 (350)	3 (75)	1036 (470)	1243 (564)
12 (300)	12 (305)	33 (838)	33 (838)	33 1/8 (841)	11 3/8 (290)	15 1/8 (385)	24 3/4 (630)	5 1/8 (130)	-	11 1/2 (292)	13 3/4 (350)	3 (75)	1243 (564)	1464 (664)
16 x 12 x 16 (400 x 300 x 400)	12 (305)	39 (991)	39 (991)	39 1/8 (994)	11 3/8 (290)	15 1/8 (385)	24 3/4 (630)	5 1/8 (130)	-	11 1/2 (292)	13 3/4 (350)	3 (75)	1984 (900)	2280 (1034)

Flanges in accordance with ASME B16.5.
 Butt Welding Ends according to ASME B16.25.

Shaded bore sizes (D) according to ISO 14313.
 Shaded End-to-End Dimensions (E) according to ISO 14313 Class 600.

Dimensions and Weights are indicative and will be confirmed at the time of the order.

BT1 DIMENSIONS AND WEIGHTS
 ASME CLASS 400


SIZE	in. (mm)	D	E			F	G	S	H	L	A	K	M	WEIGHT	
			WE	RF	RTJ									WE	RF/RTJ
1 1/2	(40)	1 1/2 (38)	10 1/4 (260)	10 1/4 (260)	10 3/8 (264)	2 1/2 (63)	5 3/4 (145)	6 1/2 (165)	2 3/8 (61)	12 (305)	-	-	-	44 (20)	71 (32)
2 x 1 1/2 x 2	(50 x 40 x 50)	1 1/2 (38)	11 1/2 (292)	11 1/2 (292)	11 5/8 (295)	2 1/2 (63)	5 3/4 (145)	6 1/2 (165)	2 3/8 (61)	12 (305)	-	-	-	62 (28)	75 (34)
2	(50)	2 (51)	11 1/2 (292)	11 1/2 (292)	11 5/8 (295)	3 1/8 (78)	6 3/4 (170)	7 1/4 (185)	2 3/8 (61)	17 3/4 (450)	-	-	-	71 (32)	93 (42)
3 x 2 x 3	(80 x 50 x 80)	2 (51)	14 (356)	14 (356)	14 1/8 (359)	3 1/8 (78)	6 3/4 (170)	7 1/4 (185)	2 3/8 (61)	17 3/4 (450)	-	-	-	95 (43)	123 (56)
3	(80)	3 (76)	14 (356)	14 (356)	14 1/8 (359)	3 7/8 (100)	8 3/8 (212)	9 1/4 (240)	2 3/8 (61)	36 (915)	-	-	-	121 (55)	154 (70)
4 x 3 x 4	(100 x 80 x 100)	3 (76)	17 (432)	17 (432)	17 1/8 (435)	3 7/8 (100)	8 3/8 (212)	9 1/4 (240)	2 3/8 (61)	36 (915)	-	-	-	170 (77)	203 (92)
4	(100)	4 (102)	17 (432)	17 (432)	17 1/8 (435)	4 3/4 (120)	9 1/4 (236)	11 5/8 (296)	2 3/8 (61)	51 1/8 (1300)	-	-	-	238 (108)	291 (132)
6 x 4 x 6	(150 x 100 x 150)	4 (102)	22 (559)	22 (559)	22 1/8 (562)	4 3/4 (120)	9 1/4 (236)	11 5/8 (296)	2 3/8 (61)	51 1/8 (1300)	-	-	-	287 (130)	337 (153)
6	(150)	6 (152)	22 (559)	22 (559)	22 1/8 (562)	6 3/8 (162)	10 5/8 (271)	15 3/8 (390)	4 1/8 (105)	-	8 3/4 (223)	13 3/4 (350)	2 5/8 (67)	518 (235)	522 (237)
8 x 6 x 8	(200 x 150 x 200)	6 (152)	26 (660)	26 (660)	26 1/8 (664)	6 3/8 (162)	10 5/8 (271)	15 3/8 (390)	4 1/8 (105)	-	8 3/4 (223)	13 3/4 (350)	2 5/8 (67)	553 (251)	681 (309)
8	(200)	8 (203)	26 (660)	26 (660)	26 1/8 (664)	8 1/8 (207)	12 1/8 (308)	18 1/2 (470)	5 1/8 (130)	-	11 1/2 (292)	13 3/4 (350)	3 (75)	807 (366)	935 (424)
10 x 8 x 10	(250 x 200 x 250)	8 (203)	31 (787)	31 (787)	31 1/8 (791)	8 1/8 (207)	12 1/8 (308)	18 1/2 (470)	5 1/8 (130)	-	11 1/2 (292)	13 3/4 (350)	3 (75)	941 (427)	1116 (506)
10	(250)	10 (254)	31 (787)	31 (787)	31 1/8 (791)	9 5/8 (244)	13 3/4 (348)	21 5/8 (550)	5 1/8 (130)	-	11 1/2 (292)	13 3/4 (350)	3 (75)	1131 (513)	1305 (592)
12 x 10 x 12	(300 x 250 x 300)	10 (254)	33 (838)	33 (838)	33 1/8 (841)	9 5/8 (244)	13 3/4 (348)	21 5/8 (550)	5 1/8 (130)	-	11 1/2 (292)	13 3/4 (350)	3 (75)	1252 (568)	1508 (684)
12	(300)	12 (305)	33 (838)	33 (838)	33 1/8 (841)	11 3/8 (290)	15 1/8 (385)	24 3/4 (630)	5 1/8 (130)	-	11 1/2 (292)	13 3/4 (350)	3 (75)	1484 (673)	1739 (789)
16 x 12 x 16	(400 x 300 x 400)	12 (305)	39 (991)	39 (991)	39 1/8 (994)	11 3/8 (290)	15 1/8 (385)	24 3/4 (630)	5 1/8 (130)	-	11 1/2 (292)	13 3/4 (350)	3 (75)	2094 (950)	2458 (1115)

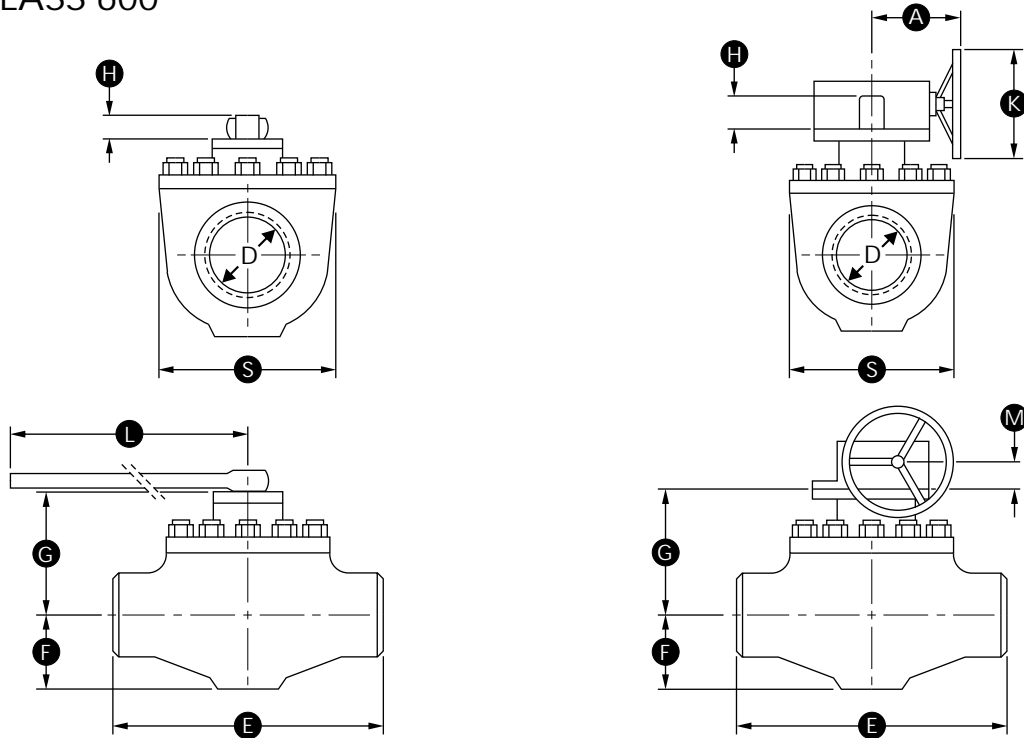
Flanges in accordance with ASME B16.5.

Butt Welding Ends according to ASME B16.25.

Dimensions and Weights are indicative and will be confirmed at the time of the order.

Shaded bore sizes (D) according to ISO 14313.

Shaded End-to-End Dimensions (E) according to ISO 14313 Class 600.

BT1 DIMENSIONS AND WEIGHTS
 ASME CLASS 600


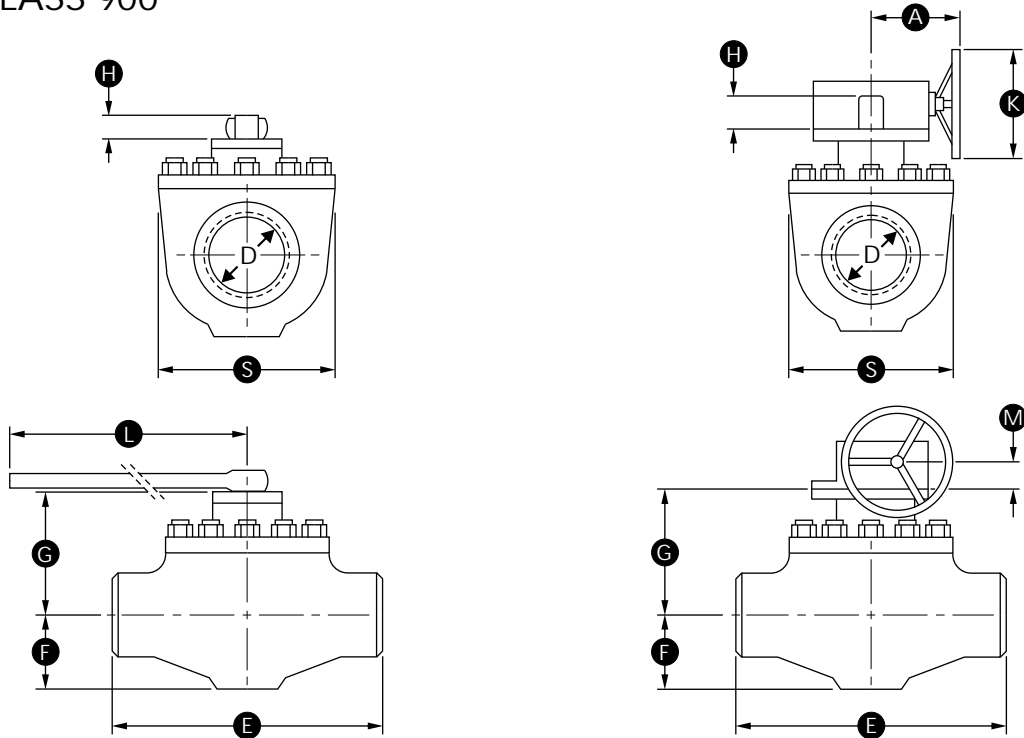
SIZE in. (mm)	D	E			F	G	S	H	L	A	K	M	WEIGHT	
		WE	RF	RTJ									WE	RF/RTJ
1 1/2 (40)	1 1/2 (38)	10 1/4 (260)	10 1/4 (260)	10 3/8 (264)	2 1/2 (63)	5 3/4 (145)	6 1/2 (165)	2 3/8 (61)	12 (305)	-	-	-	55 (25)	77 (35)
2 x 1 1/2 x 2 (50 x 40 x 50)	1 1/2 (38)	11 1/2 (292)	11 1/2 (292)	11 5/8 (295)	2 1/2 (63)	5 3/4 (145)	6 1/2 (165)	2 3/8 (61)	12 (305)	-	-	-	66 (30)	93 (42)
2 (50)	2 (51)	11 1/2 (292)	11 1/2 (292)	11 5/8 (295)	3 1/8 (78)	6 3/4 (170)	7 1/4 (185)	2 3/8 (61)	17 3/4 (450)	-	-	-	75 (34)	110 (50)
3 x 2 x 3 (80 x 50 x 80)	2 (51)	14 (356)	14 (356)	14 1/8 (359)	3 1/8 (78)	6 3/4 (170)	7 1/4 (185)	2 3/8 (61)	17 3/4 (450)	-	-	-	99 (45)	130 (59)
3 (80)	3 (76)	14 (356)	14 (356)	14 1/8 (359)	3 7/8 (100)	8 3/8 (212)	9 1/2 (240)	2 3/8 (61)	36 (915)	-	-	-	132 (60)	165 (75)
4 x 3 x 4 (100 x 80 x 100)	3 (76)	17 (432)	17 (432)	17 1/8 (435)	3 7/8 (100)	8 3/8 (212)	9 1/2 (240)	2 3/8 (61)	36 (915)	-	-	-	183 (83)	220 (100)
4 (100)	4 (102)	17 (432)	17 (432)	17 1/8 (435)	4 3/4 (120)	9 1/4 (236)	11 5/8 (296)	3 1/8 (80)	-	8 3/4 (223)	13 3/4 (350)	2 5/8 (67)	265 (120)	342 (155)
6 x 4 x 6 (150 x 100 x 150)	4 (102)	22 (559)	22 (559)	22 1/8 (562)	4 3/4 (120)	9 1/4 (236)	11 5/8 (296)	3 1/8 (80)	-	8 3/4 (223)	13 3/4 (350)	2 5/8 (67)	386 (175)	441 (200)
6 (150)	6 (152)	22 (559)	22 (559)	22 1/8 (562)	6 3/8 (162)	10 5/8 (271)	15 3/8 (390)	4 1/8 (105)	-	8 3/4 (223)	13 3/4 (350)	2 5/8 (67)	551 (250)	639 (290)
8 x 6 x 8 (200 x 150 x 200)	6 (152)	26 (660)	26 (660)	26 1/8 (664)	6 3/8 (162)	10 5/8 (271)	15 3/8 (390)	4 1/8 (105)	-	8 3/4 (223)	13 3/4 (350)	2 5/8 (67)	595 (270)	750 (340)
8 (200)	8 (203)	26 (660)	26 (660)	26 1/8 (664)	8 1/8 (207)	12 1/8 (308)	18 1/2 (470)	4 1/8 (105)	-	8 3/4 (223)	13 3/4 (350)	3 (75)	882 (400)	1058 (480)
10 x 8 x 10 (250 x 200 x 250)	8 (203)	31 (787)	31 (787)	31 1/8 (791)	8 1/8 (207)	12 1/8 (308)	18 1/2 (470)	4 1/8 (105)	-	8 3/4 (223)	13 3/4 (350)	3 (75)	1036 (470)	1279 (580)
10 (250)	10 (254)	31 (787)	31 (787)	31 1/8 (791)	9 5/8 (244)	13 3/4 (348)	21 5/8 (550)	5 1/8 (130)	-	11 1/2 (292)	13 3/4 (350)	3 (75)	1146 (520)	1565 (710)
12 x 10 x 12 (300 x 250 x 300)	10 (254)	33 (838)	33 (838)	33 1/8 (841)	9 5/8 (244)	13 3/4 (348)	21 5/8 (550)	5 1/8 (130)	-	11 1/2 (292)	13 3/4 (350)	3 (75)	1565 (710)	1874 (850)
12 (300)	12 (305)	33 (838)	33 (838)	33 1/8 (841)	11 3/8 (290)	15 1/8 (385)	24 3/4 (630)	5 1/8 (130)	-	11 1/2 (292)	13 3/4 (350)	3 (75)	1984 (900)	2315 (1050)
16 x 12 x 16 (400 x 300 x 400)	12 (305)	39 (991)	39 (991)	39 1/8 (994)	11 3/8 (290)	15 1/8 (385)	24 3/4 (630)	5 1/8 (130)	-	11 1/2 (292)	13 3/4 (350)	3 (75)	2315 (1050)	2646 (1200)

Flanges in accordance with ASME B16.5.

Butt Welding Ends according to ASME B16.25.

Shaded Dimensions according to ISO 14313.

Dimensions and Weights are indicative and will be confirmed at the time of the order.

BT1 DIMENSIONS AND WEIGHTS
 ASME CLASS 900


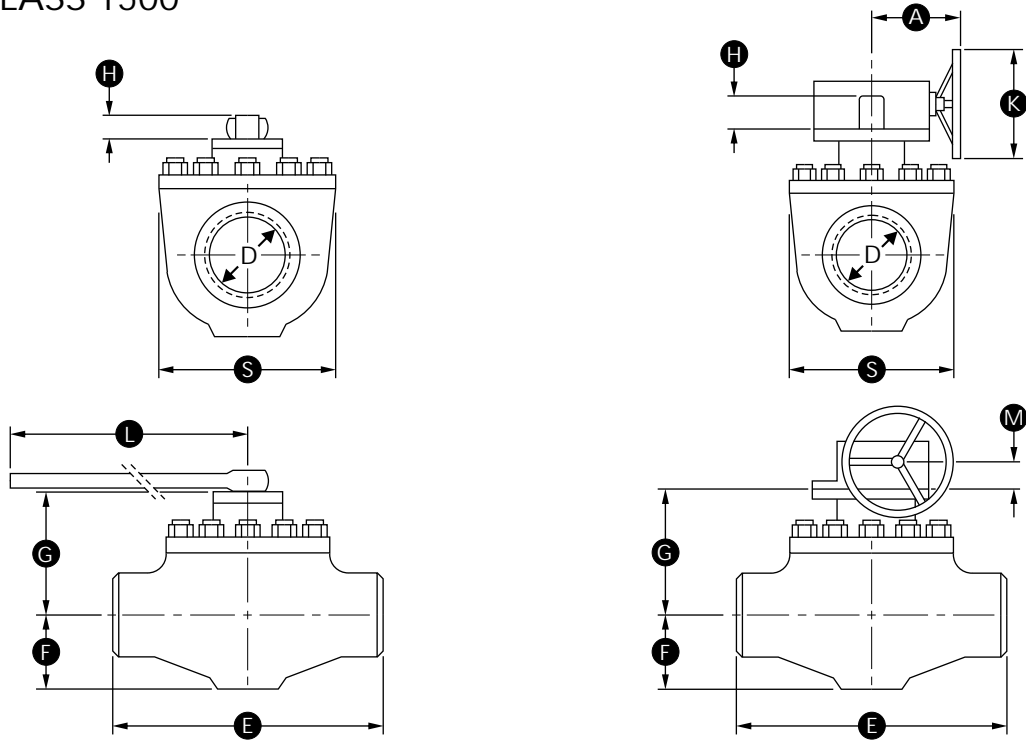
SIZE	in. (mm)	D	E			F	G	S	H	L	A	K	M	WEIGHT	
			WE	RF	RTJ									WE	RF/RTJ
1 1/2	(40)	1 1/2 (38)	14 1/4 (362)	14 1/4 (362)	14 3/8 (365)	2 5/8 (68)	6 3/4 (173)	7 1/2 (190)	2 3/8 (61)	17 3/4 (450)	-	-	-	68 (25)	99 (35)
2 x 1 1/2 x 2	(50 x 40 x 50)	1 1/2 (38)	14 1/2 (368)	14 1/2 (368)	14 5/8 (371)	2 5/8 (68)	6 3/4 (173)	7 1/2 (190)	2 3/8 (61)	17 3/4 (450)	-	-	-	88 (40)	132 (60)
2	(50)	2 (51)	14 1/2 (368)	14 1/2 (368)	14 5/8 (371)	3 1/4 (83)	7 1/2 (190)	8 5/8 (218)	2 3/8 (61)	24 (610)	-	-	-	104 (47)	148 (67)
3 x 2 x 3	(80 x 50 x 80)	2 (51)	15 (381)	15 (381)	15 1/8 (384)	3 1/4 (83)	7 1/2 (190)	8 5/8 (218)	2 3/8 (61)	24 (610)	-	-	-	117 (53)	165 (75)
3	(80)	3 (76)	15 (381)	14 (356)	15 1/8 (384)	4 3/8 (110)	8 7/8 (225)	10 (255)	3 1/8 (80)	51 1/8 (1300)	-	-	-	143 (65)	198 (90)
4 x 3 x 4	(100 x 80 x 100)	3 (76)	18 (457)	18 (457)	18 1/8 (460)	4 3/8 (110)	8 7/8 (225)	10 (255)	3 1/8 (80)	51 1/8 (1300)	-	-	-	254 (83)	265 (120)
4	(100)	4 (102)	18 (457)	18 (457)	18 1/8 (460)	5 (127)	10 1/2 (268)	12 1/8 (308)	3 1/8 (80)	-	8 3/4 (223)	13 3/4 (350)	2 5/8 (67)	287 (130)	408 (185)
6 x 4 x 6	(150 x 100 x 150)	4 (102)	24 (610)	24 (610)	24 1/8 (613)	5 (127)	10 1/2 (268)	12 1/8 (308)	3 1/8 (80)	-	8 3/4 (223)	13 3/4 (350)	2 5/8 (67)	331 (150)	595 (270)
6	(150)	6 (152)	24 (610)	24 (610)	24 1/8 (613)	6 3/4 (170)	12 5/8 (321)	15 3/4 (400)	5 1/8 (130)	-	11 1/2 (292)	13 3/4 (350)	3 (75)	595 (270)	838 (380)
8 x 6 x 8	(200 x 150 x 200)	6 (152)	29 (737)	29 (737)	29 1/8 (740)	6 3/4 (170)	12 5/8 (321)	15 3/4 (400)	5 1/8 (130)	-	11 1/2 (292)	13 3/4 (350)	3 (75)	728 (330)	1014 (460)
8	(200)	8 (203)	29 (737)	29 (737)	29 1/8 (740)	8 7/8 (225)	14 1/4 (361)	20 3/8 (516)	5 1/8 (130)	-	11 1/2 (292)	13 3/4 (350)	3 (75)	1036 (470)	1367 (620)
10 x 8 x 10	(250 x 200 x 250)	8 (203)	33 (838)	33 (838)	33 1/8 (841)	8 7/8 (225)	14 1/4 (361)	20 3/8 (516)	5 1/8 (130)	-	11 1/2 (292)	13 3/4 (350)	3 (75)	1499 (455)	1631 (740)
10	(250)	10 (254)	33 (838)	33 (838)	33 1/8 (841)	10 1/4 (260)	14 1/2 (368)	23 7/8 (608)	7 1/8 (180)	-	11 1/2 (292)	13 3/4 (350)	3 (75)	1653 (620)	1940 (880)
12 x 10 x 12	(300 x 250 x 300)	10 (254)	38 (965)	38 (965)	38 1/8 (968)	10 1/4 (260)	14 1/2 (368)	23 7/8 (608)	7 1/8 (180)	-	11 1/2 (292)	13 3/4 (350)	3 (75)	1874 (850)	2469 (1120)
12	(300)	12 (305)	38 (965)	38 (965)	38 1/8 (968)	12 1/4 (310)	18 1/8 (460)	27 7/8 (708)	7 1/8 (180)	-	11 1/2 (292)	13 3/4 (350)	3 (75)	2833 (900)	2998 (1360)
16 x 12 x 16	(400 x 300 x 400)	12 (305)	44 1/2 (1130)	44 1/2 (1130)	44 7/8 (1140)	12 1/4 (310)	18 1/8 (460)	27 7/8 (708)	7 1/8 (180)	-	11 1/2 (292)	13 3/4 (350)	3 (75)	2756 (1250)	3616 (1640)

Flanges in accordance with ASME B16.5.

Butt Welding Ends according to ASME B16.25.

Dimensions and Weights are indicative and will be confirmed at the time of the order.

Shaded Dimensions according to ISO 14313.

BT1 DIMENSIONS AND WEIGHTS
 ASME CLASS 1500


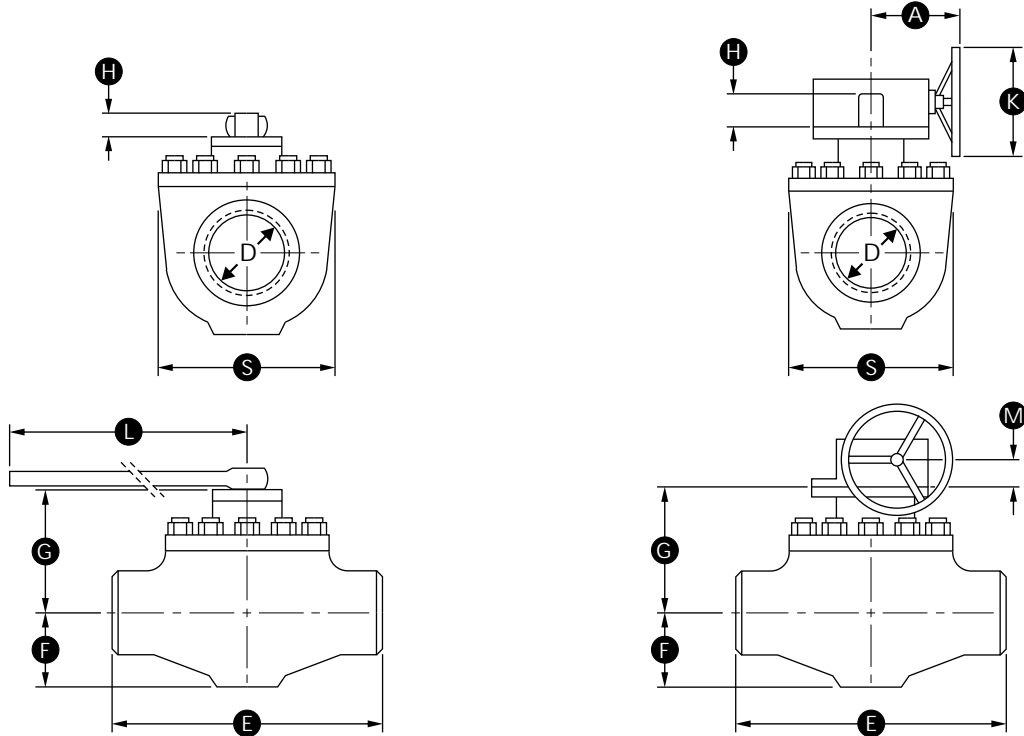
SIZE in. (mm)	D	E			F	G	S	H	L	A	K	M	WEIGHT	
		WE	RF	RTJ									WE	RF/RTJ
1 1/2 (40)	1 1/2 (38)	14 1/4 (362)	14 1/4 (362)	14 3/8 (365)	2 5/8 (68)	6 3/4 (173)	7 1/2 (190)	2 3/8 (61)	24 (610)	-	-	-	79 (36)	110 (50)
2 x 1 1/2 x 2 (50 x 40 x 50)	1 1/2 (38)	14 1/2 (368)	14 1/2 (368)	14 5/8 (371)	2 5/8 (68)	6 3/4 (173)	7 1/2 (190)	2 3/8 (61)	24 (610)	-	-	-	93 (42)	132 (60)
2 (50)	2 (51)	14 1/2 (368)	14 1/2 (368)	14 5/8 (371)	3 1/4 (83)	7 1/2 (190)	8 5/8 (218)	2 3/8 (61)	36 (915)	-	-	-	104 (47)	148 (67)
3 x 2 x 3 (80 x 50 x 80)	2 (51)	18 1/2 (470)	18 1/2 (470)	18 5/8 (473)	3 1/4 (83)	7 1/2 (190)	8 5/8 (218)	2 3/8 (61)	36 (915)	-	-	-	132 (60)	183 (83)
3 (80)	3 (76)	18 1/2 (470)	18 1/2 (470)	18 5/8 (473)	4 3/8 (110)	9 5/8 (243)	10 7/8 (275)	3 1/8 (80)	-	8 3/4 (223)	13 3/4 (350)	2 5/8 (67)	220 (100)	287 (130)
4 x 3 x 4 (100 x 80 x 100)	3 (76)	21 1/2 (546)	21 1/2 (546)	21 5/8 (549)	4 3/8 (110)	9 5/8 (243)	10 7/8 (275)	3 1/8 (80)	-	8 3/4 (223)	13 3/4 (350)	2 5/8 (67)	254 (115)	397 (180)
4 (100)	4 (102)	21 1/2 (546)	21 1/2 (546)	21 5/8 (549)	5 5/8 (142)	11 3/8 (290)	13 3/4 (350)	4 1/8 (105)	-	8 3/4 (223)	13 3/4 (350)	2 5/8 (67)	397 (180)	573 (260)
6 x 4 x 6 (150 x 100 x 150)	4 (102)	27 3/4 (705)	27 3/4 (705)	28 (711)	5 5/8 (142)	11 3/8 (290)	13 3/4 (350)	4 1/8 (105)	-	8 3/4 (223)	13 3/4 (350)	2 5/8 (67)	507 (230)	816 (370)
6 (150)	5 3/4 (146)	27 3/4 (705)	27 3/4 (705)	28 (711)	7 3/8 (188)	14 1/4 (361)	17 5/8 (448)	5 1/8 (130)	-	11 1/2 (292)	13 3/4 (350)	3 (75)	882 (400)	1235 (560)
8 x 6 x 8 (200 x 150 x 200)	5 3/4 (146)	32 3/4 (832)	32 3/4 (832)	33 1/8 (841)	7 3/8 (188)	14 1/4 (361)	17 5/8 (448)	5 1/8 (130)	-	11 1/2 (292)	13 3/4 (350)	3 (75)	1058 (480)	1477 (670)
8 (200)	7 5/8 (194)	32 3/4 (832)	32 3/4 (832)	33 1/8 (841)	9 7/8 (250)	16 7/8 (430)	21 1/4 (540)	7 1/8 (180)	-	11 1/2 (292)	13 3/4 (350)	3 (75)	1455 (660)	1918 (870)
10 x 8 x 10 (250 x 200 x 250)	7 5/8 (194)	39 (991)	39 (991)	39 3/8 (1000)	9 7/8 (250)	16 7/8 (430)	21 1/4 (540)	7 1/8 (180)	-	11 1/2 (292)	13 3/4 (350)	3 (75)	1786 (810)	2381 (1080)
10 (250)	9 1/2 (241)	39 (991)	39 (991)	39 3/8 (1000)	11 3/4 (300)	19 3/8 (493)	25 1/4 (640)	7 1/8 (180)	-	11 1/2 (292)	13 3/4 (350)	3 (75)	2227 (1010)	3042 (1380)
12 x 10 x 12 (300 x 250 x 300)	9 1/2 (241)	44 1/2 (1130)	44 1/2 (1130)	45 1/8 (1146)	11 3/4 (300)	19 3/8 (493)	25 1/4 (640)	7 1/8 (180)	-	11 1/2 (292)	13 3/4 (350)	3 (75)	2668 (1210)	3924 (1780)
12 (300)	11 3/8 (289)	44 1/2 (1130)	44 1/2 (1130)	45 1/8 (1146)	13 3/4 (350)	21 3/4 (553)	29 1/8 (740)	7 1/8 (180)	-	15 3/4 (400)	23 5/8 (600)	4 3/8 (110)	3682 (1670)	5049 (2290)
16 x 12 x 16 (400 x 300 x 400)	11 3/8 (289)	54 1/2 (1384)	54 1/2 (1384)	55 3/8 (1407)	13 3/4 (350)	21 3/4 (553)	29 1/8 (740)	7 1/8 (180)	-	15 3/4 (400)	23 5/8 (600)	4 3/8 (110)	4343 (1970)	6393 (2900)

Flanges in accordance with ASME B16.5.

Butt Welding Ends according to ASME B16.25.

Shaded Dimensions according to ISO 14313.

Dimensions and Weights are indicative and will be confirmed at the time of the order.

BT1 DIMENSIONS AND WEIGHTS
 ASME CLASS 2500


SIZE in. (mm)	D	E			F	G	S	H	L	A	K	M	WEIGHT	
		WE	RF	RTJ									WE	RF/RTJ
1 1/2 (40)	1 1/2 (38)	15 1/8 (384)	15 1/8 (384)	15 1/4 (387)	3 (75)	8 1/4 (208)	8 5/8 (220)	2 3/8 (61)	24 (610)	-	-	-	108 (49)	150 (68)
2 x 1 1/2 x 2 (50 x 40 x 50)	1 1/2 (38)	17 3/4 (451)	17 3/4 (451)	17 7/8 (454)	3 (75)	8 1/4 (208)	8 5/8 (220)	2 3/8 (61)	24 (610)	-	-	-	119 (54)	179 (81)
2 (50)	1 3/4 (44)	17 3/4 (451)	17 3/4 (451)	17 7/8 (454)	3 3/4 (95)	9 (230)	10 (255)	2 3/8 (61)	36 (915)	-	-	-	247 (112)	212 (96)
3 x 2 x 3 (80 x 50 x 80)	1 3/4 (44)	22 3/4 (578)	22 3/4 (578)	23 (584)	3 3/4 (95)	9 (230)	10 (255)	2 3/8 (61)	36 (915)	-	-	-	276 (125)	353 (160)
3 (80)	2 1/2 (64)	22 3/4 (578)	22 3/4 (578)	23 (584)	5 (128)	11 1/8 (282)	12 1/2 (319)	3 1/8 (80)	-	8 3/4 (223)	13 3/4 (350)	2 5/8 (67)	298 (135)	388 (176)
4 x 3 x 4 (100 x 80 x 100)	2 1/2 (64)	26 1/2 (673)	26 1/2 (673)	26 7/8 (683)	5 (128)	11 1/8 (282)	12 1/2 (319)	3 1/8 (80)	-	8 3/4 (223)	13 3/4 (350)	2 5/8 (67)	342 (155)	536 (243)
4 (100)	3 1/2 (89)	26 1/2 (673)	26 1/2 (673)	26 7/8 (683)	6 1/2 (165)	13 1/4 (336)	16 (406)	4 1/8 (105)	-	11 1/2 (292)	13 3/4 (350)	3 (75)	536 (243)	774 (351)
6 x 4 x 6 (150 x 100 x 150)	3 1/2 (89)	36 (914)	36 (914)	36 1/2 (927)	6 1/2 (165)	13 1/4 (336)	16 (406)	4 1/8 (105)	-	11 1/2 (292)	13 3/4 (350)	3 (75)	686 (311)	1102 (500)

Flanges in accordance with ASME B16.5.

Butt Welding Ends according to ASME B16.25.

Dimensions and Weights are indicative and will be confirmed at the time of the order.

Shaded Dimensions according to ISO 14313.

BT2 MATERIALS SPECIFICATION

MATERIALS SELECTION

The GROVE BT2 Ball Valve has been designed for use with various materials or combination of materials depending on the service conditions.

The following is a typical listing of materials for valves ASME Class 150 - 2500 for standard applications.

PRESSURE RETAINING PARTS

Body	A216 WCB, A216 WCC, A352 LCB, A352 LCC
Bonnet	A350 LF2
Stem	AISI 4140, A564 Gr. 630 (17-4 PH)
Bolting	A193 B7, A194 2H, A193 B7M, A194 2HM, A320 L7, A194 Gr.7, A320 L7M, A194 Gr. 7M

INTERNAL PARTS

Ball	A350 LF2, A694 F65, AISI 316, A564 Gr 630 (17-4 PH)
Seats	A350 LF2, A694 F65, AISI 316, A564 Gr 630 (17-4 PH)
Springs	AISI 302, Inconel (different grades), Elgiloy

SEALING MATERIALS

Stem Gasket:	NBR (Nitrile) FKM (Viton different grades) HNBR (Hydrogenated Nitrile)
Seat/ Bonnet Gasket:	NBR (Nitrile) FKM (Viton different grades) HNBR (Hydrogenated Nitrile)

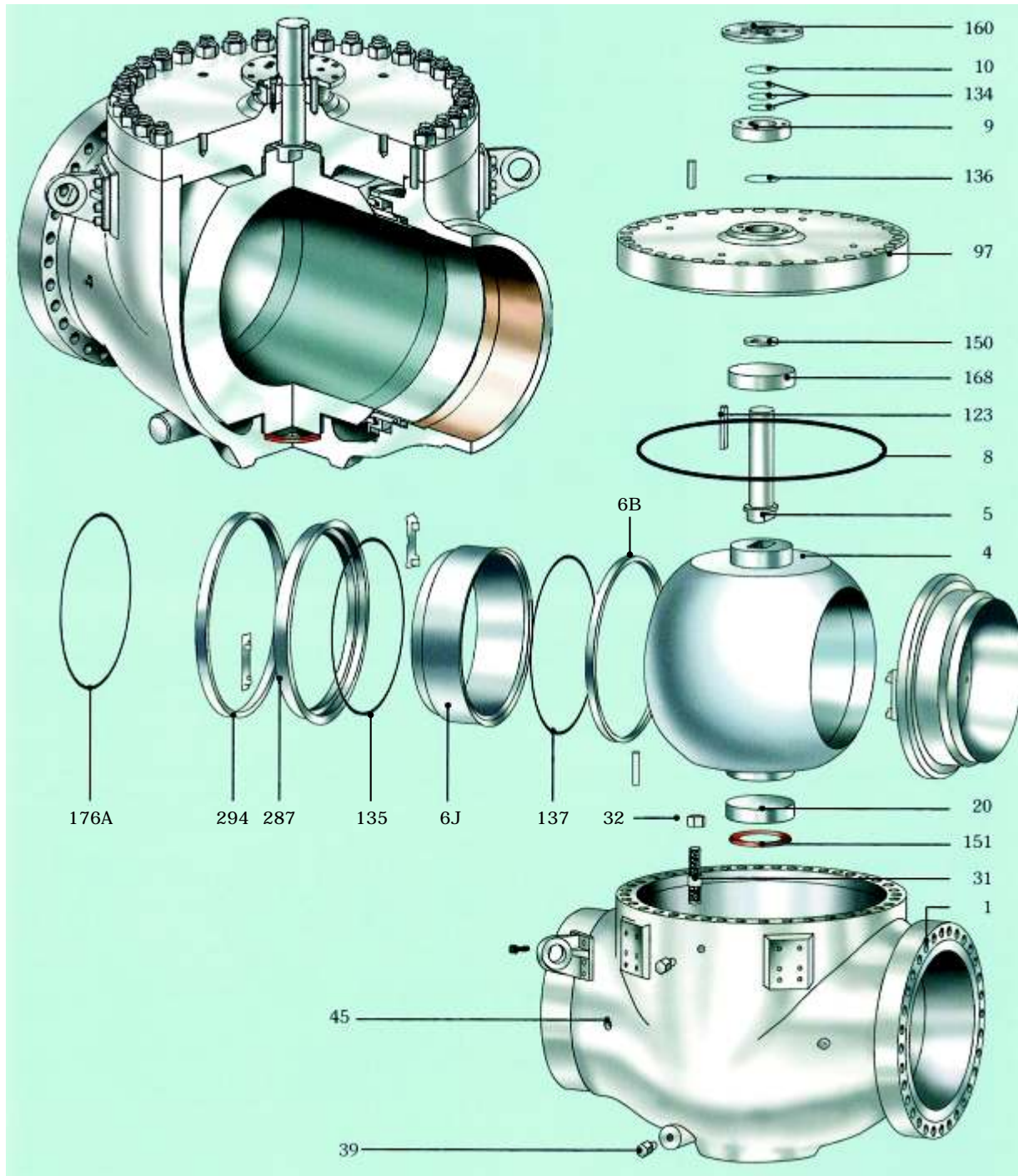
PLATING/COATING

0.001 inch	25 microns ENP Electroless Nickel Plating
0.003 inch	75 microns ENP Electroless Nickel Plating

NACE REQUIREMENTS

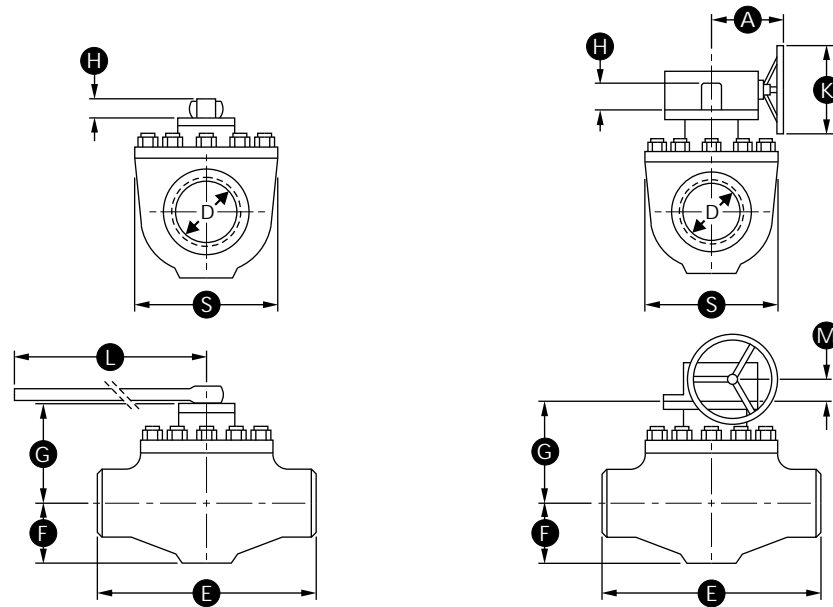
GROVE BT2 Ball Valves can be supplied in accordance with NACE MR0175 / ISO 15156
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BT2 VALVE ASSEMBLY & CROSS SECTION



Item	Description	20	Lower Bearing	136	Bonnet Cover O-Ring
1	Body	31	Body Stud	137	Seal O-Ring
4	Ball	32	Body Nut	150	Upper Thrust Washer
5	Stem	39	Drain Valve	151	Lower Thrust Washer
6B	Outer Seat Ring	45	Grease Fitting	160	Adapter Plate
6J	Inner Seat Ring	97	Bonnet	168	Upper Bearing
8	Body O-Ring	123	Stem Key	176A	Grease Seal O-Ring
9	Bonnet Cover	134	Stem O-Rings	287	Spring Holder Ring
10	Gland Bushing	135	Seat Gasket O-Ring	294	Sector Spacer

BT2 DIMENSIONS AND WEIGHTS ASME CLASS 150



SIZE	in. (mm)	D	E			F	G	S	H	A	K	M	WEIGHT	
			WE	RF	RTJ								WE	RF/RTJ
14	(350)	13 1/4 (337)	35 (889)	35 (889)	35 1/8 (893)	14 5/8 (370)	15 5/8 (398)	26 3/8 (670)	3 3/4 (95)	11 1/2 (292)	13 3/4 (350)	3 (75)	1962 (890)	2050 (930)
16	(400)	15 1/4 (387)	39 (991)	39 (991)	39 1/8 (994)	16 (405)	16 5/8 (423)	28 3/8 (720)	3 3/4 (95)	11 1/2 (292)	13 3/4 (350)	3 (75)	2853 (1294)	2985 (1354)
18	(450)	17 1/4 (438)	43 (1093)	43 (1093)	43 1/8 (1096)	17 1/2 (445)	18 1/2 (470)	31 7/8 (810)	4 1/2 (115)	11 1/2 (292)	13 3/4 (350)	3 (75)	4431 (2010)	4630 (2100)
20	(500)	19 1/4 (489)	47 (1194)	47 (1194)	47 1/4 (1201)	21 1/4 (540)	20 3/4 (528)	37 (940)	4 1/2 (115)	11 1/2 (292)	13 3/4 (350)	3 (75)	5578 (2530)	5908 (2680)
22	(550)	21 1/4 (540)	51 (1296)	51 (1296)	51 3/8 (1305)	21 5/8 (550)	22 3/4 (578)	39 7/8 (1012)	7 1/8 (180)	15 3/4 (400)	23 5/8 (600)	4 3/8 (110)	7275 (3300)	7496 (3400)
24	(600)	23 1/4 (591)	55 (1397)	55 (1397)	55 3/8 (1407)	23 3/8 (595)	24 3/4 (630)	42 3/4 (1085)	7 1/8 (180)	21 5/8 (549)	31 1/2 (800)	4 3/8 (112)	8554 (3880)	9215 (4180)
26	(650)	25 (635)	57 (1448)	57 (1448)	57 1/2 (1461)	25 1/4 (640)	25 (635)	45 1/4 (1150)	7 1/8 (180)	21 5/8 (549)	31 1/2 (800)	4 3/8 (112)	10075 (4570)	10692 (4850)
28	(700)	27 (686)	61 (1550)	61 (1550)	61 1/2 (1563)	26 3/4 (680)	27 (685)	48 (1220)	7 1/8 (180)	21 5/8 (549)	31 1/2 (800)	4 3/8 (112)	12346 (5600)	12897 (5850)
30	(750)	29 (737)	65 (1651)	65 (1651)	65 1/2 (1664)	29 3/8 (745)	28 3/4 (720)	51 1/8 (1300)	7 1/8 (180)	21 5/8 (549)	31 1/2 (800)	4 3/8 (112)	13492 (6120)	14198 (6440)
32	(800)	30 3/4 (781)	70 (1778)	70 (1778)	70 5/8 (1794)	30 3/8 (770)	29 7/8 (760)	55 1/8 (1400)	7 1/8 (180)	21 3/4 (552)	23 5/8 (600)	5 3/8 (136)	16270 (7380)	17306 (7850)
34	(850)	32 3/4 (832)	76 (1931)	76 (1931)	76 5/8 (1947)	31 1/2 (800)	31 1/8 (790)	58 1/4 (1480)	7 1/8 (180)	21 3/4 (552)	23 5/8 (600)	5 3/8 (136)	17968 (8150)	18960 (8600)
36	(900)	34 1/2 (876)	82 (2083)	82 (2083)	82 5/8 (2099)	32 1/4 (820)	31 7/8 (810)	60 3/8 (1535)	7 1/8 (180)	21 3/4 (552)	23 5/8 (600)	5 3/8 (136)	20304 (9210)	21716 (9850)
40	(1000)	38 1/2 (978)	92 (2337)	92 (2337)	*	33 1/2 (850)	35 3/8 (900)	66 1/8 (1680)	8 1/8 (205)	21 3/4 (552)	23 5/8 (600)	5 3/8 (136)	29718 (13480)	31967 (14500)
42	(1050)	40 1/4 (1022)	*	*	*	35 (890)	36 5/8 (930)	70 7/8 (1800)	8 1/8 (205)	21 3/4 (552)	23 5/8 (600)	5 3/8 (136)	33576 (15230)	35605 (16150)
46	(1150)	44 (1118)	98 3/8 (2499)	98 3/8 (2499)	*	37 (940)	40 1/4 (1022)	80 3/8 (2040)	8 1/8 (205)	22 7/8 (580)	23 5/8 (600)	6 1/4 (160)	45812 (20780)	48722 (22100)
48	(1200)	46 (1168)	*	*	*	38 1/4 (970)	42 (1067)	81 1/8 (2060)	8 1/8 (205)	22 7/8 (580)	23 5/8 (600)	6 1/4 (160)	50706 (23000)	55115 (25000)
54	(1350)	51 3/4 (1314)	*	*	*	42 7/8 (1090)	46 1/2 (1180)	91 3/8 (2320)	9 5/8 (245)	-	-	-	66138 (30000)	77161 (35000)
56	(1400)	53 3/4 (1365)	*	*	*	44 1/8 (1120)	48 (1220)	94 1/2 (2400)	9 5/8 (245)	-	-	-	70547 (32000)	83775 (38000)
60	(1500)	57 1/2 (1461)	*	*	*	46 7/8 (1190)	51 1/8 (1300)	100 3/8 (2550)	9 5/8 (245)	-	-	-	83775 (38000)	97002 (44000)

* Dimensions on request.

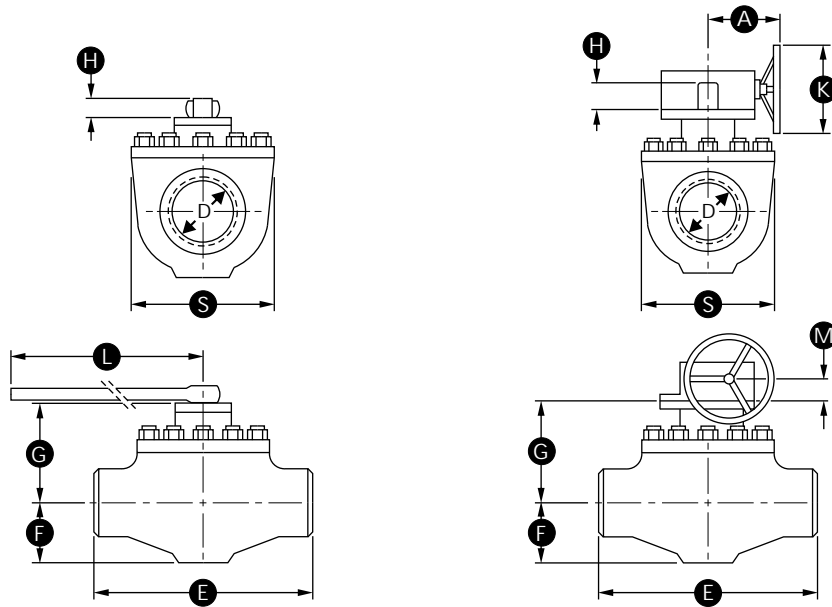
Flanges up to 24 inch (except 22 inch) in accordance with ASME B16.5; 22 inch and sizes above 24 inch in accordance with MSS-SP-44.

Butt Welding Ends according to ASME B16.25.

Shaded bore sizes (D) according to ISO 14313.

Shaded End-to-End Dimensions (E) according to ISO 14313 Class 600.

Larger sizes available on request. Reduced bore valves also available.

BT2 DIMENSIONS AND WEIGHTS
 ASME CLASS 300


SIZE	in. (mm)	D	E			F	G	S	H	A	K	M	WEIGHT	
			WE	RF	RTJ								WE	RF/RTJ
14	350	13 1/4 (337)	35 (889)	35 (889)	35 1/8 (893)	14 5/8 (370)	15 5/8 (398)	26 3/8 (670)	4 1/2 (115)	11 1/2 (292)	13 3/4 (350)	3 (75)	2050 (930)	2337 (1060)
16	400	15 1/4 (387)	39 (991)	39 (991)	39 1/8 (994)	16 (405)	17 1/8 (436)	28 3/8 (720)	4 1/2 (115)	11 1/2 (292)	13 3/4 (350)	3 (75)	2844 (1290)	3197 (1450)
18	450	17 1/4 (438)	43 (1093)	43 (1093)	43 1/8 (1096)	17 1/2 (445)	18 7/8 (478)	31 7/8 (810)	4 1/2 (115)	15 1/2 (400)	23 5/8 (600)	4 3/8 (75)	4542 (2060)	4850 (2200)
20	500	19 1/4 (489)	47 (1194)	47 (1194)	47 1/4 (1201)	21 1/8 (537)	21 1/8 (536)	37 (940)	4 1/2 (115)	21 5/8 (549)	31 1/2 (800)	4 3/8 (112)	6967 (3160)	7496 (3400)
22	550	21 1/4 (540)	51 (1296)	51 (1296)	51 3/8 (1305)	21 5/8 (550)	23 5/8 (600)	39 7/8 (1012)	7 1/8 (180)	21 5/8 (549)	31 1/2 (800)	4 3/8 (112)	7716 (3500)	8708 (3950)
24	600	23 1/4 (591)	55 (1397)	55 (1397)	55 3/8 (1407)	23 3/8 (595)	25 3/8 (645)	42 3/4 (1085)	7 1/8 (180)	21 5/8 (549)	31 1/2 (800)	4 3/8 (112)	8818 (4000)	9700 (4400)
26	650	25 (635)	57 (1448)	57 (1448)	57 1/2 (1461)	25 1/4 (640)	25 5/8 (650)	45 1/4 (1150)	7 1/8 (180)	21 3/4 (552)	23 5/8 (600)	5 3/8 (136)	10780 (4890)	11927 (5410)
28	700	27 (686)	61 (1550)	61 (1550)	61 1/2 (1563)	26 3/4 (680)	27 7/8 (708)	48 (1220)	7 1/8 (180)	21 3/4 (552)	23 5/8 (600)	5 3/8 (136)	13228 (6000)	14639 (6640)
30	750	29 (737)	65 (1651)	65 (1651)	65 1/2 (1664)	29 3/8 (745)	29 7/8 (720)	51 1/8 (1300)	8 1/8 (205)	21 3/4 (552)	23 5/8 (600)	5 3/8 (136)	15476 (7020)	17152 (7780)
32	800	30 3/4 (781)	70 (1778)	70 (1778)	70 5/8 (1794)	30 3/8 (770)	30 7/8 (785)	55 1/8 (1400)	8 1/8 (205)	21 3/4 (552)	23 5/8 (600)	5 3/8 (136)	19004 (8620)	21054 (9550)
34	850	32 3/4 (832)	76 (1931)	76 (1931)	76 5/8 (1947)	31 1/2 (800)	32 1/8 (815)	58 1/4 (1480)	8 1/8 (205)	21 3/4 (552)	23 5/8 (600)	5 3/8 (136)	22575 (10240)	24758 (11230)
36	900	34 1/2 (876)	82 (2083)	82 (2083)	82 5/8 (2099)	31 1/2 (800)	33 3/8 (848)	60 3/8 (1535)	8 1/8 (205)	22 7/8 (580)	23 5/8 (600)	6 1/4 (160)	26213 (11890)	29057 (13180)
40	1000	38 1/2 (978)	*	*	*	33 1/2 (850)	36 3/4 (935)	66 1/8 (1680)	8 1/8 (205)	22 7/8 (580)	23 5/8 (600)	6 1/4 (160)	34392 (15600)	38162 (17310)
42	1050	40 1/4 (1022)	*	*	*	35 (890)	38 (965)	70 7/8 (1800)	9 5/8 (245)	22 7/8 (580)	23 5/8 (600)	6 1/4 (160)	38933 (17660)	43210 (19600)
46	1150	44 (1118)	98 3/8 (2499)	98 3/8 (2499)	*	37 (940)	44 1/4 (1125)	80 3/8 (2040)	9 5/8 (245)	22 7/8 (580)	23 5/8 (600)	6 1/4 (160)	48921 (22190)	54322 (24640)
48	1200	46 (1168)	*	*	*	38 1/4 (970)	44 1/2 (1130)	81 1/8 (2060)	9 5/8 (245)	-	-	-	52910 (24000)	57320 (26000)
54	1350	51 3/4 (1314)	*	*	*	42 7/8 (1090)	50 (1270)	91 3/8 (2320)	9 5/8 (245)	-	-	-	72752 (33000)	88184 (40000)
56	1400	53 3/4 (1365)	*	*	*	44 1/8 (1120)	51 5/8 (1310)	94 1/2 (2400)	9 5/8 (245)	-	-	-	81570 (37000)	99207 (45000)
60	1500	57 1/2 (1461)	*	*	*	46 7/8 (1190)	55 1/8 (1400)	100 3/8 (2550)	9 5/8 (245)	-	-	-	97002 (44000)	121253 (55000)

* Dimensions on request.

 Flanges up to 24 inch (except 22 inch) in accordance with ASME B16.5;
 22 inch and sizes above 24 inch in accordance with MSS-SP-44.

Butt Welding Ends according to ASME B16.25.

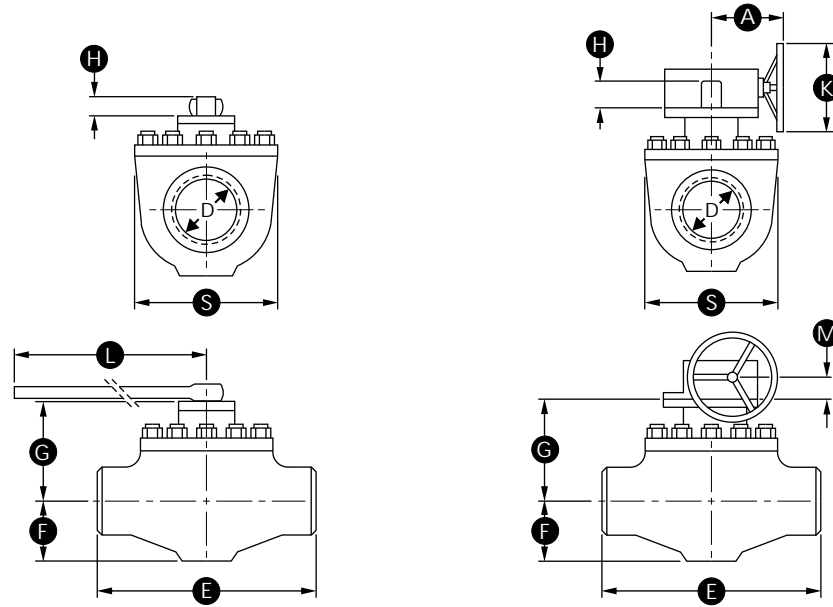
Dimensions and Weights are indicative and will be confirmed at the time of the order.

Shaded bore sizes (D) according to ISO 14313.

Shaded End-to-End Dimensions (E) according to ISO 14313 Class 600.

Larger sizes available on request. Reduced bore valves also available.

BT2 DIMENSIONS AND WEIGHTS ASME CLASS 400



SIZE	in. (mm)	D	E			F	G	S	H	A	K	M	WEIGHT	
			WE	RF	RTJ								WE	RF/RTJ
14	13 1/4 (350)	13 1/4 (337)	35 (889)	35 (889)	35 1/8 (893)	14 5/8 (370)	16 1/4 (413)	26 3/8 (670)	4 1/2 (115)	11 1/2 (292)	13 3/4 (350)	3 (75)	2161 (980)	2535 (1150)
16	15 1/4 (400)	15 1/4 (387)	39 (991)	39 (991)	39 1/8 (994)	16 (405)	18 (458)	29 7/8 (760)	4 1/2 (115)	11 1/2 (292)	13 3/4 (350)	3 (75)	2954 (1340)	3329 (1510)
18	17 1/4 (450)	17 1/4 (438)	43 (1093)	43 (1093)	43 1/8 (1096)	17 3/4 (450)	20 5/8 (525)	32 1/4 (820)	4 1/2 (115)	21 5/8 (549)	31 1/2 (800)	4 3/8 (75)	4674 (2120)	5181 (2350)
20	19 1/4 (500)	19 1/4 (489)	47 (1194)	47 (1194)	47 1/4 (1201)	20 7/8 (530)	22 1/2 (570)	37 (940)	7 1/8 (180)	21 5/8 (549)	31 1/2 (800)	4 3/8 (75)	7275 (3300)	7915 (3590)
22	21 1/4 (550)	21 1/4 (540)	51 (1296)	51 (1296)	51 3/8 (1305)	22 (560)	23 7/8 (605)	40 1/2 (1030)	7 1/8 (180)	21 5/8 (549)	31 1/2 (800)	4 3/8 (75)	8598 (3900)	9480 (4300)
24	23 1/4 (600)	23 1/4 (591)	55 (1397)	55 (1397)	55 3/8 (1407)	23 3/8 (595)	26 1/8 (663)	42 3/4 (1085)	8 1/8 (205)	21 3/4 (552)	23 5/8 (600)	5 3/8 (136)	9149 (4150)	10318 (4680)
26	25 (650)	25 (635)	57 (1448)	57 (1448)	57 1/2 (1461)	27 1/2 (650)	26 3/4 (678)	45 7/8 (1165)	8 1/8 (205)	21 3/4 (552)	23 5/8 (600)	5 3/8 (136)	11486 (5210)	12588 (5710)
28	27 (700)	27 (686)	61 (1550)	61 (1550)	61 1/2 (1563)	30 3/8 (700)	29 1/8 (740)	48 3/8 (1230)	8 1/8 (205)	21 3/4 (552)	23 5/8 (600)	5 3/8 (136)	14021 (6360)	15366 (6970)
30	29 (750)	29 (737)	65 (1651)	65 (1651)	65 1/2 (1664)	31 1/2 (800)	31 1/2 (800)	52 (1320)	8 1/8 (205)	21 3/4 (552)	23 5/8 (600)	5 3/8 (136)	17306 (7850)	18695 (8480)
32	30 3/4 (800)	30 3/4 (781)	70 (1778)	70 (1778)	70 5/8 (1794)	33 1/8 (840)	32 1/2 (827)	56 1/8 (1425)	8 1/8 (205)	22 7/8 (580)	23 5/8 (600)	6 3/8 (136)	20613 (9350)	22553 (10230)
34	32 3/4 (850)	32 3/4 (832)	76 (1931)	76 (1931)	76 5/8 (1947)	34 1/4 (870)	33 1/2 (850)	60 5/8 (1540)	8 1/8 (205)	22 7/8 (580)	23 5/8 (600)	6 3/8 (136)	23545 (10680)	25838 (11720)
36	34 1/2 (900)	34 1/2 (876)	82 (2083)	82 (2083)	82 5/8 (2099)	36 5/8 (930)	34 1/2 (875)	63 (1600)	8 1/8 (205)	22 7/8 (580)	23 5/8 (600)	6 1/4 (160)	27227 (12350)	29894 (13560)
40	38 1/2 (1000)	38 1/2 (978)	*	*	*	38 5/8 (980)	37 3/4 (960)	69 1/4 (1760)	8 1/8 (205)	22 7/8 (580)	23 5/8 (600)	6 1/4 (160)	35516 (16110)	39021 (17700)
42	40 1/4 (1050)	40 1/4 (1022)	*	*	*	40 1/8 (890)	41 (1040)	72 (1830)	9 5/8 (245)	22 7/8 (580)	23 5/8 (600)	6 1/4 (160)	40080 (18180)	44048 (19980)
46	44 (1150)	44 (1118)	98 3/8 (2499)	98 3/8 (2499)	*	41 3/8 (1020)	44 1/4 (1125)	80 3/8 (2040)	9 5/8 (245)	22 7/8 (580)	23 5/8 (600)	6 1/4 (160)	52735 (23920)	59084 (26800)
48	46 (1200)	46 (1168)	100 (2540)	100 (2540)	*	46 7/8 (1050)	45 1/8 (1145)	82 5/8 (2100)	9 5/8 (245)	-	-	-	57320 (26000)	63933 (29000)
54	51 3/4 (1350)	51 3/4 (1314)	*	*	*	42 7/8 (1190)	50 3/8 (1280)	93 1/4 (2370)	11 (280)	-	-	-	77161 (35000)	92593 (42000)
56	53 3/4 (1400)	53 3/4 (1365)	*	*	*	48 3/8 (1230)	52 (1320)	96 1/2 (2450)	11 3/4 (300)	-	-	-	83775 (38000)	103616 (47000)
60	57 1/2 (1500)	57 1/2 (1461)	*	*	*	51 1/8 (1300)	55 1/8 (1400)	103 1/8 (2620)	11 3/4 (300)	-	-	-	101412 (46000)	123458 (56000)

* Dimensions on request.

Flanges up to 24 inch (except 22 inch) in accordance with ASME B16.5;
22 inch and sizes above 24 inch in accordance with MSS-SP-44.

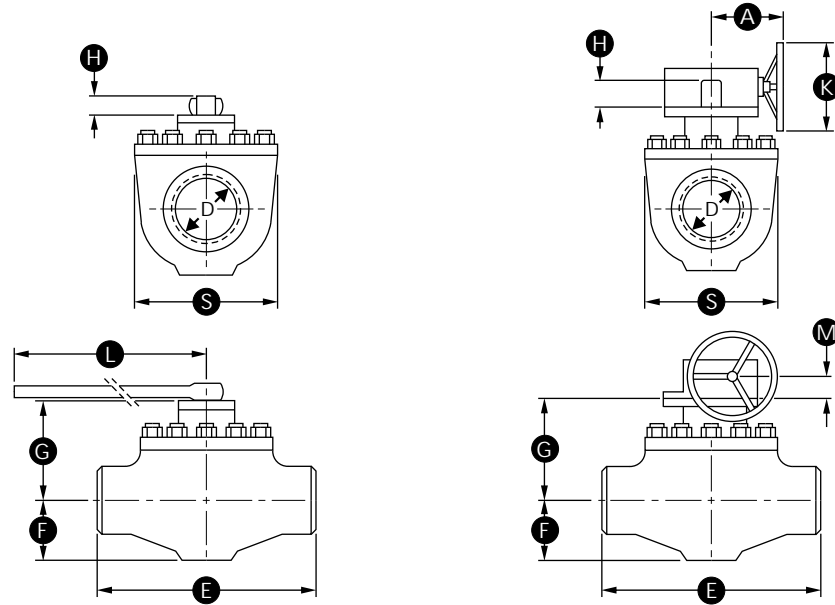
Butt Welding Ends according to ASME B16.25.

Shaded bore sizes (D) according to ISO 14313.

Shaded End-to-End Dimensions (E) according to ISO 14313 Class 600.

Larger sizes available on request. Reduced bore valves also available.

Dimensions and Weights are indicative and will be confirmed at the time of the order.

BT2 DIMENSIONS AND WEIGHTS
 ASME CLASS 600


SIZE	in. (mm)	D	E			F	G	S	H	A	K	M	WEIGHT	
			WE	RF	RTJ								WE	RF/RTJ
14	(350)	13 1/4 (337)	35 (889)	35 (889)	35 1/8 (893)	14 3/8 (365)	16 3/4 (425)	26 3/8 (670)	4 1/2 (115)	11 1/2 (292)	13 3/4 (350)	3 (75)	2954 (1340)	3373 (1530)
16	(400)	15 1/4 (387)	39 (991)	39 (991)	39 1/8 (994)	16 7/8 (430)	19 3/8 (493)	29 7/8 (760)	4 1/2 (115)	15 3/4 (400)	23 5/8 (600)	4 3/8 (112)	4079 (1850)	4365 (1980)
18	(450)	17 1/4 (438)	43 (1093)	43 (1093)	43 1/8 (1096)	18 3/4 (475)	20 7/8 (530)	32 1/4 (820)	7 1/8 (180)	21 5/8 (549)	31 1/2 (800)	4 3/8 (112)	4806 (2180)	5423 (2460)
20	(500)	19 1/4 (489)	47 (1194)	47 (1194)	47 1/4 (1201)	21 1/4 (540)	23 1/8 (588)	37 (940)	7 1/8 (180)	21 5/8 (549)	31 1/2 (800)	4 3/8 (112)	6570 (2980)	7540 (3420)
22	(550)	21 1/4 (540)	51 (1296)	51 (1296)	51 3/8 (1305)	22 7/8 (580)	25 3/8 (645)	40 1/2 (1030)	7 1/8 (180)	21 3/4 (549)	23 5/8 (600)	5 3/8 (136)	7870 (3570)	8885 (4030)
24	(600)	23 1/4 (591)	55 (1397)	55 (1397)	55 3/8 (1407)	24 3/8 (620)	26 3/4 (679)	44 1/8 (1120)	8 1/8 (205)	21 3/4 (552)	23 5/8 (600)	5 3/8 (136)	9789 (4440)	11045 (5010)
26	(650)	25 (635)	57 (1448)	57 (1448)	57 1/2 (1461)	25 3/4 (655)	29 3/4 (755)	45 7/8 (1165)	8 1/8 (205)	22 7/8 (580)	23 5/8 (600)	6 1/4 (160)	12412 (5630)	13977 (6340)
28	(700)	27 (686)	61 (1550)	61 (1550)	61 1/2 (1563)	28 3/4 (730)	30 3/8 (770)	48 3/8 (1230)	8 1/8 (205)	22 7/8 (580)	23 5/8 (600)	6 1/4 (160)	15873 (7200)	17813 (8080)
30	(750)	29 (737)	65 (1651)	65 (1651)	65 1/2 (1664)	31 1/2 (800)	34 1/4 (870)	52 (1320)	9 5/8 (245)	22 7/8 (580)	23 5/8 (600)	6 1/4 (160)	17835 (8090)	20172 (9150)
32	(800)	30 3/4 (781)	70 (1778)	70 (1778)	70 5/8 (1794)	32 5/8 (830)	35 1/4 (895)	56 1/8 (1425)	9 5/8 (245)	22 7/8 (580)	23 5/8 (600)	6 1/4 (160)	20944 (9500)	23721 (10760)
34	(850)	32 3/4 (832)	76 (1931)	76 (1931)	76 5/8 (1947)	34 1/4 (870)	37 1/4 (945)	60 5/8 (1540)	9 5/8 (245)	22 7/8 (580)	23 5/8 (600)	6 1/4 (160)	24515 (11120)	28109 (12750)
36	(900)	34 1/2 (876)	82 (2083)	82 (2083)	82 5/8 (2099)	35 3/8 (900)	40 1/8 (1020)	63 (1600)	9 5/8 (245)	22 7/8 (580)	23 5/8 (600)	6 1/4 (160)	29674 (13460)	33510 (15200)
40	(1000)	38 1/2 (978)	92 (2337)	92 (2337)	93 1/8 (2366)	37 3/4 (960)	45 7/8 (1165)	69 1/4 (1760)	9 5/8 (245)	22 7/8 (580)	23 5/8 (600)	6 1/4 (160)	37302 (16920)	42350 (19210)
42	(1050)	40 1/4 (1022)	96 (2439)	96 (2439)	97 1/8 (2467)	40 1/2 (1030)	47 1/2 (1205)	72 (1830)	9 5/8 (245)	-	-	-	43806 (19870)	48171 (21850)
46	(1150)	44 (1118)	109 1/2 (2782)	109 1/2 (2782)	*	42 1/2 (1080)	49 7/8 (1267)	80 3/8 (2041)	11 (280)	-	-	-	57100 (25900)	65124 (29540)
48	(1200)	46 (1168)	*	*	*	44 1/2 (1130)	51 1/2 (1307)	82 5/8 (2100)	11 (280)	-	-	-	61729 (28000)	72752 (33000)
54	(1350)	51 3/4 (1314)	*	*	*	51 1/8 (1300)	557 1/2 (1460)	94 1/2 (2400)	11 3/4 (300)	-	-	-	90389 (41000)	105821 (48000)
56	(1400)	53 3/4 (1365)	*	*	*	52 3/4 (1340)	59 1/2 (1510)	98 (2490)	11 3/4 (300)	-	-	-	99207 (45000)	116844 (53000)
60	(1500)	57 1/2 (1461)	*	*	*	56 1/4 (1430)	63 (1600)	105 1/8 (2670)	11 3/4 (300)	-	-	-	121253 (55000)	143299 (65000)

* Dimensions on request.

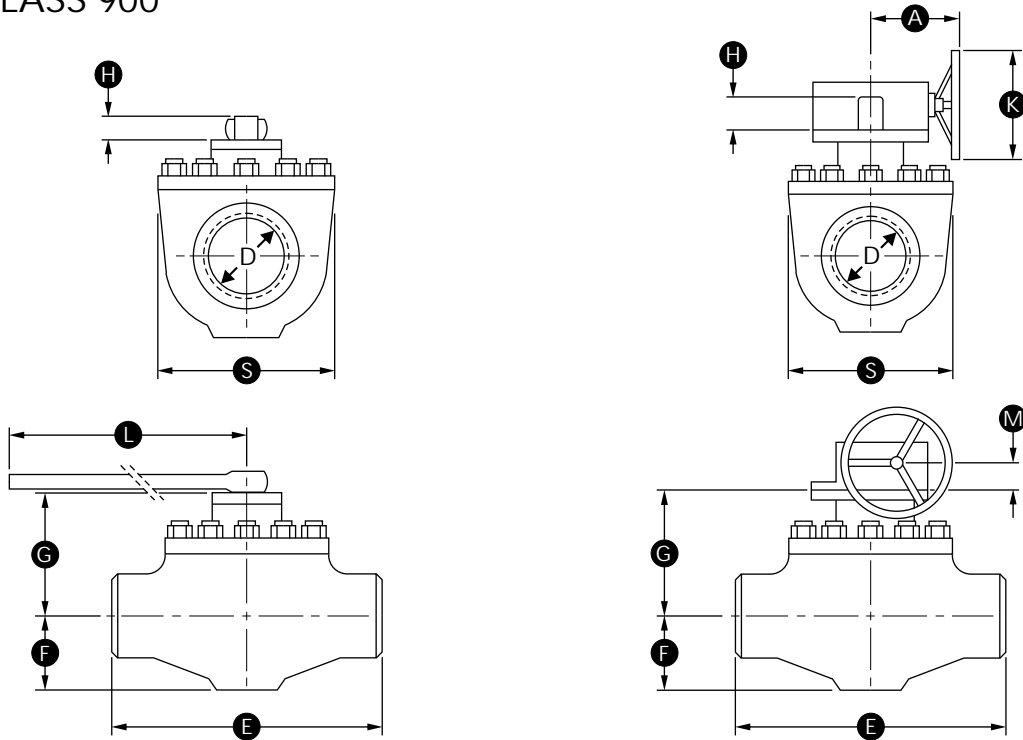
 Flanges up to 24 inch (except 22 inch) in accordance with ASME B16.5;
 22 inch and sizes above 24 inch in accordance with MSS-SP-44.

Butt Welding Ends according to ASME B16.25.

Shaded Dimensions according to ISO 14313.

Larger sizes available on request. Reduced bore valves also available.

Dimensions and Weights are indicative and will be confirmed at the time of the order.

BT2 DIMENSIONS AND WEIGHTS
 ASME CLASS 900


SIZE in. (mm)	D	E			F	G	S	H	A	K	M	WEIGHT	
		WE	RF	RTJ								WE	RF/RTJ
14 (350)	12 3/4 (324)	40 1/2 (1029)	40 1/2 (1029)	40 7/8 (1039)	15 1/2 (395)	17 1/4 (438)	27 3/4 (704)	4 1/2 (115)	15 3/4 (400)	23 5/8 (600)	4 3/8 (112)	3902 (1770)	4211 (1910)
16 (400)	14 3/4 (375)	44 1/2 (1131)	44 1/2 (1131)	44 7/8 (1140)	17 3/4 (450)	19 3/4 (503)	32 1/4 (820)	7 1/8 (180)	21 5/8 (549)	31 1/2 (800)	4 3/8 (112)	5512 (2500)	6151 (2790)
18 (450)	16 3/4 (425)	48 (1220)	48 (1220)	48 1/2 (1232)	19 7/8 (505)	23 1/4 (590)	34 5/8 (880)	7 1/8 (180)	21 5/8 (549)	31 1/2 (800)	4 3/8 (112)	7385 (3350)	8245 (3740)
20 (500)	18 5/8 (473)	52 (1321)	52 (1321)	52 1/2 (1334)	22 1/4 (565)	26 1/8 (665)	38 1/4 (970)	8 1/8 (205)	21 3/4 (552)	23 5/8 (600)	5 3/8 (136)	9259 (4200)	10141 (4600)
22 (550)	20 5/8 (524)	56 (1423)	56 (1423)	56 5/8 (1439)	24 3/8 (620)	29 1/2 (750)	42 1/2 (1080)	8 1/8 (205)	22 7/8 (580)	23 5/8 (600)	6 1/4 (160)	12214 (5540)	13558 (6150)
24 (600)	22 1/2 (572)	61 (1550)	61 (1550)	61 3/4 (1569)	26 (660)	31 1/4 (793)	46 1/8 (1170)	9 5/8 (245)	22 7/8 (580)	23 5/8 (600)	6 1/4 (160)	15498 (7030)	17306 (7850)
26 (650)	24 3/8 (619)	65 (1651)	65 (1651)	65 7/8 (1674)	27 (685)	35 1/4 (895)	51 1/8 (1300)	9 5/8 (245)	22 7/8 (580)	23 5/8 (600)	6 1/4 (160)	18695 (8480)	24030 (10900)
28 (700)	26 1/4 (667)	69 (1753)	69 (1753)	69 7/8 (1775)	25 1/4 (640)	33 1/4 (843)	53 1/2 (1360)	9 5/8 (245)	22 7/8 (580)	23 5/8 (600)	6 1/4 (160)	22267 (10100)	27558 (12500)
30 (750)	28 1/8 (714)	74 (1880)	74 (1880)	74 7/8 (1902)	32 5/8 (830)	37 3/8 (950)	56 3/4 (1440)	9 5/8 (245)	22 7/8 (580)	23 5/8 (600)	6 1/4 (160)	25904 (11750)	28990 (13150)
32 (800)	30 (762)	80 (2032)	80 (2032)	81 3/8 (2067)	34 5/8 (880)	39 3/8 (1000)	61 3/8 (1560)	9 5/8 (245)	22 7/8 (580)	23 5/8 (600)	6 1/4 (160)	30578 (13870)	41667 (18900)
34 (850)	31 7/8 (810)	85 (2159)	85 (2159)	87 (2210)	36 5/8 (930)	41 1/8 (1043)	64 1/8 (1630)	9 5/8 (245)	22 7/8 (580)	23 5/8 (600)	6 1/4 (160)	36156 (16400)	38603 (17510)
36 (900)	33 3/4 (857)	90 (2286)	90 (2286)	91 1/8 (2315)	37 3/4 (960)	43 1/8 (1096)	65 3/8 (1660)	11 (280)	-	-	-	41778 (18950)	46297 (21000)
40 (1000)	37 5/8 (956)	*	*	*	42 7/8 (1090)	48 7/8 (1240)	74 3/8 (1890)	11 (280)	-	-	-	50706 (23000)	57320 (26000)
42 (1050)	39 5/8 (1006)	*	*	*	44 7/8 (1140)	51 1/8 (1300)	78 (1980)	11 (280)	-	-	-	57320 (26000)	66138 (30000)
46 (1150)	43 3/8 (1102)	*	*	*	48 7/8 (1240)	55 7/8 (1420)	85 (2160)	11 3/4 (300)	-	-	-	70547 (32000)	79366 (36000)
48 (1200)	45 1/4 (1149)	*	*	*	50 3/4 (1290)	58 1/4 (1480)	88 5/8 (2250)	11 3/4 (300)	-	-	-	77161 (35000)	88184 (40000)

* Dimensions on request.

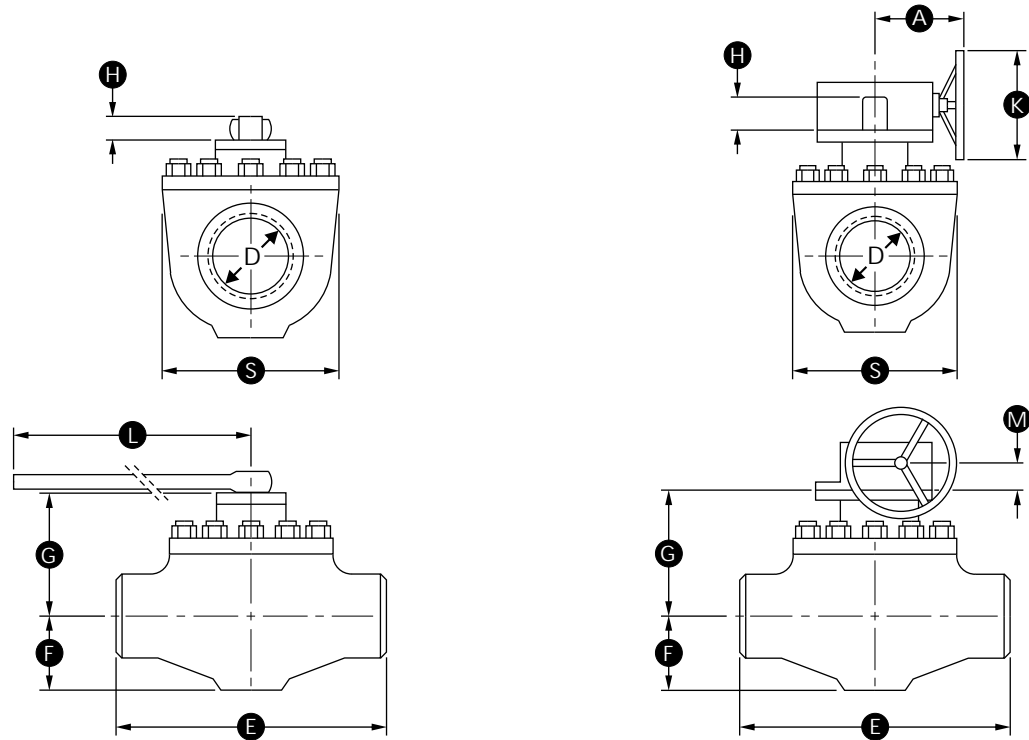
 Flanges up to 24 inch (except 22 inch) in accordance with ASME B16.5;
 22 inch and sizes above 24 inch in accordance with MSS-SP-44.

Butt Welding Ends according to ASME B16.25.

Shaded Dimensions according to ISO 14313.

Larger sizes available on request. Reduced bore valves also available.

Dimensions and Weights are indicative and will be confirmed at the time of the order.

BT2 DIMENSIONS AND WEIGHTS
 ASME CLASS 1500


SIZE in. (mm)	D	E			F	G	S	H	A	K	M	WEIGHT	
		WE	RF	RTJ								WE	RF/RTJ
14 (350)	12 1/2 (318)	49 1/2 (1258)	49 1/2 (1258)	50 1/4 (1277)	17 3/4 (440)	23 3/8 (593)	33 1/8 (840)	7 1/8 (180)	21 5/8 (549)	31 1/2 (800)	4 3/8 (112)	5247 (2380)	6371 (2890)
16 (400)	14 1/4 (362)	54 1/2 (1385)	54 1/2 (1385)	55 3/8 (1407)	18 1/8 (460)	25 3/8 (643)	35 (890)	7 1/8 (180)	21 5/8 (549)	31 1/2 (800)	4 3/8 (112)	8267 (3750)	10362 (4700)
18 (450)	16 (406)	60 1/2 (1537)	69 1/2 (1537)	61 3/8 (1559)	22 (560)	28 1/8 (713)	37 3/4 (960)	8 1/8 (205)	21 3/4 (552)	23 5/8 (600)	5 3/8 (136)	10604 (4810)	13195 (5985)
20 (500)	17 7/8 (454)	65 1/2 (1664)	65 1/2 (1664)	66 3/8 (1686)	24 1/4 (615)	31 3/4 (805)	42 3/8 (1075)	9 5/8 (245)	21 3/4 (552)	23 5/8 (600)	5 3/8 (136)	14088 (6390)	17130 (7770)
22 (550)	19 5/8 (500)	71 5/8 (1820)	71 5/8 (1820)	72 1/2 (1842)	27 3/4 (695)	33 1/4 (845)	47 1/4 (1200)	9 5/8 (245)	22 7/8 (580)	23 5/8 (600)	6 1/4 (160)	18563 (8420)	22575 (10240)
24 (600)	21 1/2 (546)	80 3/8 (2042)	80 3/8 (2040)	81 1/2 (2071)	24 3/4 (620)	34 5/8 (878)	50 3/4 (1290)	9 5/8 (245)	22 7/8 (580)	23 5/8 (600)	6 1/4 (160)	23479 (10650)	28616 (12980)
26 (650)	23 1/2 (597)	*	*	*	31 1/2 (800)	39 (990)	56 1/4 (1430)	9 5/8 (245)	22 7/8 (580)	23 5/8 (600)	6 1/4 (160)	28660 (13000)	35274 (16000)
28 (700)	25 1/4 (641)	*	*	*	33 1/8 (840)	41 3/4 (1060)	60 1/4 (1530)	11 (280)	-	-	-	35274 (16000)	41887 (19000)
30 (750)	27 1/8 (689)	*	*	*	34 1/4 (870)	45 1/4 (1150)	66 7/8 (1700)	11 (280)	-	-	-	39683 (18000)	50706 (23000)
32 (800)	29 (737)	*	*	*	37 3/8 (950)	47 1/4 (1200)	68 1/8 (1730)	11 (280)	-	-	-	48501 (22000)	59524 (27000)
34 (850)	30 3/4 (781)	*	*	*	39 3/8 (1000)	49 1/4 (1250)	71 5/8 (1820)	11 (280)	-	-	-	55115 (25000)	70547 (32000)
36 (900)	32 5/8 (829)	*	*	*	41 3/8 (1050)	52 3/8 (1330)	76 3/8 (1940)	11 3/4 (300)	-	-	-	63933 (29000)	79366 (36000)
40 (1000)	36 1/2 (927)	*	*	*	45 5/8 (1160)	57 1/2 (1460)	84 5/8 (2150)	11 3/4 (300)	-	-	-	79366 (36000)	103616 (47000)
42 (1050)	40 (1016)	114 1/8 (2900)	*	*	47 1/48 (1200)	60 (1525)	88 5/8 (2250)	11 3/4 (300)	-	-	-	90389 (41000)	119048 (54000)

* Dimensions on request.

 Flanges up to 24 inch (except 22 inch) in accordance with ASME B16.5;
 22 inch and sizes above 24 inch in accordance with MSS-SP-44.

Butt Welding Ends according to ASME B16.25.

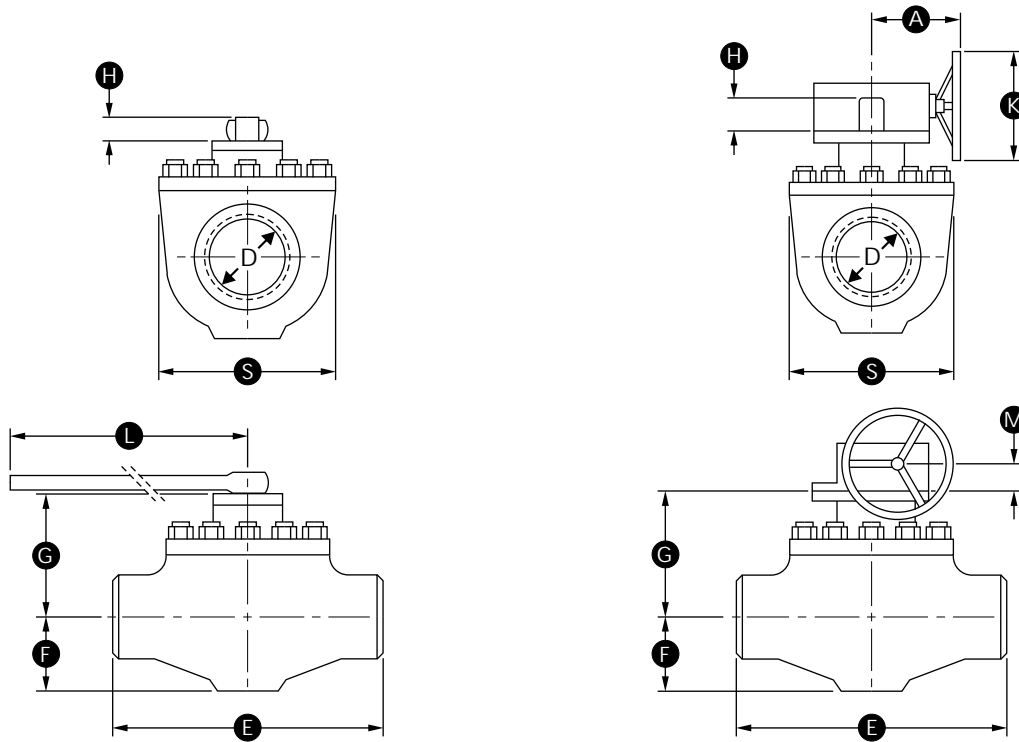
Dimensions and Weights are indicative and will be confirmed at the time of the order.

Shaded Dimensions according to ISO 14313.

Larger sizes available on request. Reduced bore valves also available.

BT2 DIMENSIONS AND WEIGHTS

ASME CLASS 2500



SIZE	in. (mm)	D	E			F	G	S	H	A	K	M	WEIGHT	
			WE	RF	RTJ								WE	RF/RTJ
6	150	5 1/5 (133)	36 (914)	36 (914)	36 1/2 (927)	9 5/8 (245)	14 3/4 (375)	19 1/4 (490)	5 1/8 (130)	15 3/4 (400)	23 5/8 (600)	4 3/8 (112)	1709 (775)	2094 (950)
8	200	7 1/8 (181)	40 1/4 (1022)	40 1/4 (1022)	40 7/8 (1038)	12 3/8 (315)	18 1/8 (460)	24 1/4 (615)	5 1/2 (140)	15 3/4 (400)	23 5/8 (600)	4 3/8 (112)	3219 (1460)	3946 (1790)
10	250	8 7/8 (225)	50 (1270)	50 (1270)	50 7/8 (1292)	13 3/4 (350)	20 1/4 (513)	28 3/8 (720)	5 1/2 (140)	21 5/8 (549)	31 1/2 (600)	4 3/8 (112)	4740 (2150)	5842 (2650)
12	300	10 1/2 (267)	56 (1422)	56 (1422)	56 7/8 (1445)	16 1/8 (410)	23 (583)	30 3/8 (770)	5 7/8 (150)	21 5/8 (549)	31 1/2 (800)	4 3/8 (112)	6261 (2840)	7694 (3490)
14	350	12 1/4 (292)	*	*	*	16 3/4 (425)	23 7/8 (605)	31 1/2 (800)	8 1/8 (205)	21 3/4 (552)	23 5/8 (600)	5 3/8 (136)	8157 (3700)	10582 (4800)
16	400	13 1/8 (333)	*	*	*	20 1/2 (520)	28 3/4 (730)	40 1/2 (1030)	9 5/8 (245)	21 3/4 (552)	23 5/8 (600)	5 3/8 (136)	10362 (4700)	13228 (6000)
18	450	14 3/4 (374)	*	*	*	22 7/8 (580)	31 1/2 (800)	44 7/8 (1140)	9 5/8 (245)	22 7/8 (580)	23 5/8 (600)	6 1/4 (160)	12125 (5500)	16535 (7500)
20	500	16 1/2 (419)	*	*	*	25 5/8 (650)	34 1/4 (870)	49 1/4 (1250)	9 5/8 (245)	22 7/8 (580)	23 5/8 (600)	6 1/4 (160)	14330 (6500)	19400 (8800)
22	550	*	*	*	*	*	*	*	*	*	*	*	*	*
24	600	*	*	*	*	*	*	*	*	*	*	*	*	*
26	650	*	*	*	*	*	*	*	*	*	*	*	*	*
28	700	*	*	*	*	*	*	*	*	*	*	*	*	*
30	750	*	*	*	*	*	*	*	*	*	*	*	*	*

* Dimensions on request.

Flanges up to 24 inch (except 22 inch) in accordance with ASME B16.5;

22 inch and sizes above 24 inch in accordance with MSS-SP-44.

Butt Welding Ends according to ASME B16.25.

Shaded Dimensions according to ISO 14313.

Larger sizes available on request. Reduced bore valves also available.

Dimensions and Weights are indicative and will be confirmed at the time of the order.

BT1 & BT2 QUALITY SYSTEM

QUALITY ASSURANCE PROGRAM

Cameron runs a high level quality control program to insure all products are manufactured to the highest standards available using the latest technology.

INTERNATIONAL APPROVALS

Cameron is an authorized licensee of the American Petroleum Institute (API) and is approved to monogram products for specifications API 6D and API 6A at its Voghera, Italy operations.

The Quality Assurance Program encompasses the entire operation, from order entry to final inspection and field service.

The Quality Assurance Program conforms to:

ISO 9001

API Q1

API 6D

API 6A

94/9/EC (ATEX Directive)

97/23/EC (PED Directive)

EN 729-2 (Quality Requirement for Welding)

SIL Approved to IEC 61508 (Functional Safety of Electrical/Electronic/Programmable Electronic Safety Related Systems).



INSPECTION

The Quality Assurance Program is based on the Quality Manual. The Quality Control Department verifies all processes from material receipt to final customer inspection, including the liaison with approved inspection and certifying authorities.

All products can be supplied with certified test reports which include pressure testing, NDT and chemical and physical analysis, along with any other specified special test certification.

The material certification of the valve parts can be furnished in accordance with EN 10204 - 3.1 (as a standard) or 3.2.



BT1 & BT2 QUALIFICATION AND TESTING

QUALIFICATION & TESTING LAB

GROVE valves are designed in accordance with the most stringent industry procedures and are subjected to full in-house qualification testing.

In-house testing facilities together with the participation of major Oil and Gas Company's testing programs allow GROVE to supply products reflecting state-of-the-art technology.

Hydrostatic and high pressure gas tests, functional tests, cycling tests, bending tests, are all carried out on prototype valves.

This test program ensures that the design safety factors and the leak tightness are met.

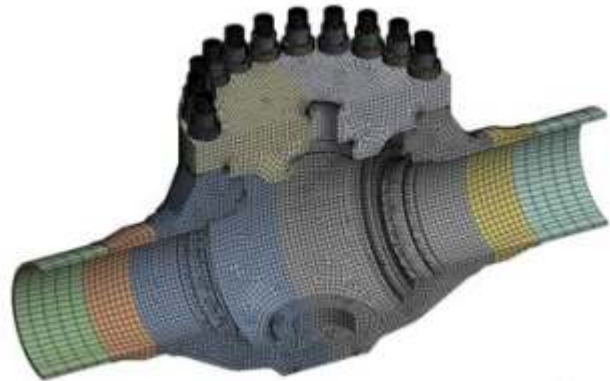


BT2 38 in. (950 mm) API 5000 cladded in all wetted parts during bending test.

STRUCTURAL VERIFICATION

The GROVE Engineering department operates the most advanced 3D computerized graphic system (CAD) and conducts Finite Element Analysis (FEA) to simulate various load conditions to determine the suitability of the components for the intended service.

On request the GROVE Engineering department can carry out the seismic analysis on extended valves through a modal analysis and spectrum load analysis using the most advance FEA programs.



These tools are routinely used throughout the design process to allow an effective evaluation of the possible alternatives (sensitivity analyses).

Stress test by strain gauges are also systematically carried out to validate FEA models.

HIGH PRESSURE GAS TESTING

Customer specifications may dictate more severe testing in addition to conventional hydrostatic testing. GROVE is fully equipped to carry enhanced gas tests at ambient, low and high temperature using specially equipped bunkers.

Testing can be performed at temperature ranging from -196 °C to 400 °C (-320 °F to 752 °F). External leakages are assessed by means of mass-spectrometers; leakages through the seats are verified by calibrated flow meters.

CYCLING TESTS

Grove is fully equipped to carry out PR2 tests as per API 6A code or others cycling tests as per customer requirements, also Fugitive Emission tests with 100% of helium can be carried out upon request.

FIRE SAFE TESTS AND CERTIFICATION

GROVE conducts in-house Fire Safe Testing and GROVE valves are certified in accordance with API Standard 6FA and BS 6755 part 2 as well as with API standard 607.

A complete list of qualified and certified valves can be made available upon request.

TRADEMARK INFORMATION

GROVE® is a registered trademark which is owned by Cameron.

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Trademark	Owner
CELCON	Hoechst Celanese Corporation
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NORDEL	E.I. DuPont De Nemours & Company
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VITON	E.I. DuPont De Nemours & Company

**VALVES & MEASUREMENT**

3250 Briarpark Drive, Suite 300
Houston, Texas 77042
USA Toll Free 800 323 9160

For the most current contact and location information go to: www.c-a-m.com/valvesandmeasurement