

# TBV Series 2000 Flanged Ball Valve

TECHNOLOGY





## TBV Series 2000 Flanged Ball Valve

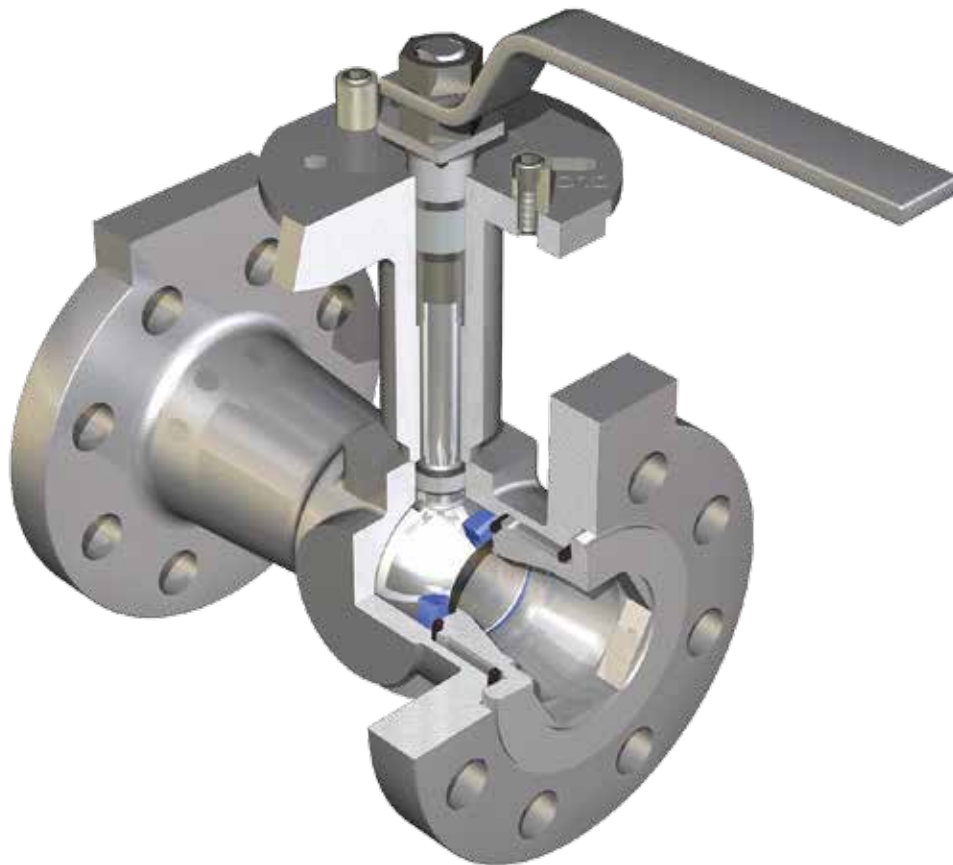
Cameron's TBV™ Series 2000 flanged ball valve is a unique standard port flanged ball valve, offering almost unlimited versatility with respect to materials, features and modifiers to satisfy today's sophisticated process valve requirements.

The valve body is designed to facilitate ease of automation by including both body and flange boss mounting capabilities as standard.

Valve safety also is addressed by a standard blowout-proof system and lock-out device in conjunction with optional features such as an oval safety handle or fugitive emission.

As with all TBV valves, quality, flexibility, long service life and safety make this valve the best choice for integrity and application satisfaction.

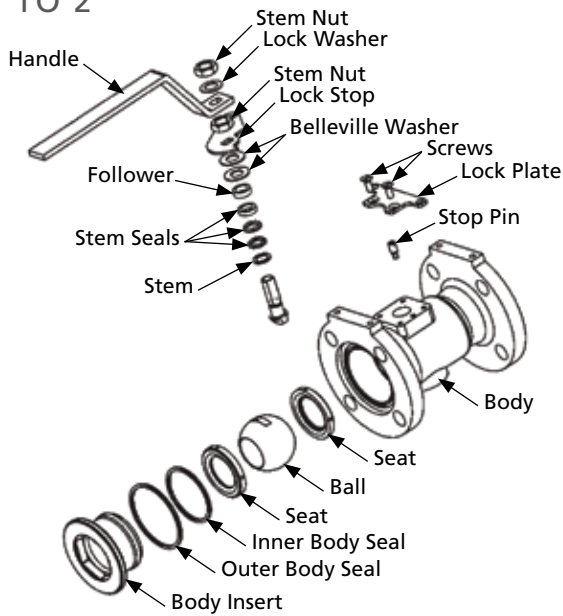
- High integrity unibody construction
- Wide choice of investment cast materials
- Available as "L" or "T" side or bottom port diverter
- Standard lock-out capability
- Complies with API 607 standards upon request



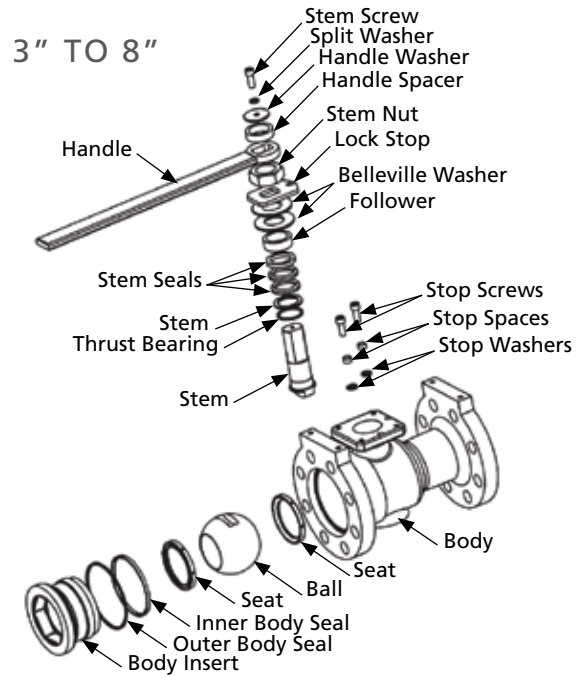
Series 2000, shown with fugitive emissions bonnet

## MATERIALS LIST

1/2" TO 2"



3" TO 8"



Part Description	Alloy 20	Carbon Steel	Hastelloy C	Monel	Nickel	316SS	Duplex SS
Body	ASTM 351 Type CN7M	ASTM 351 Type LCB	ASTM A352 Type CW-12MW	ASTM A494 Type M-30C	ASTM A494 Type CZ-100	ASTM 351 Type CF8M	UNS 31803
Body Insert	ASTM 351 Type CN7M	ASTM 351 Type LCB	ASTM A352 Type CW-12MW	ASTM A494 Type M-30C	ASTM A494 Type CZ-100	ASTM 351 Type CF8M	UNS 31803
Ball	ASTM B473	ASTM B479 Type 316	ASTM B574 UNS N10276	ASTM B164 UNS NO4400	ASTM B160 UNS NO2200	ASTM A479 Type 316	UNS 31803
Stem	ASTM B473	ASTM B479 Type 316	ASTM B574 UNS N10276	ASTM B164 UNS NO4400	ASTM B160 UNS NO2200	ASTM A479 Type 316	UNS 31803
Follower	Same Parent Material as Selected Item						
*Seat	PTFE, Glass Filled PTFE, Ultrafil, UHMWP, Thermafil, FEP, PFA, Metal or as Specified						
*Stem Seal	PTFE, UHMWP, Grafoil or as Specified						
*Body Seal	PTFE, UHMWPE, Grafoil or as Specified						
Stop	300 Series Stainless Steel as Specified						
Handle	Carbon Steel, Galvanized or 300 Series Stainless Steel as Specified						
*Thrust Bearing	25% Glass Filled PTFE, Thermafil or as Specified						
*Body Seal	PTFE, UHMWP, Grafoil or as Specified						
Stem Nut	Stainless Steel						
Stop Pin (1/2" to 2")	300 Series Stainless Steel						
Belleville Washer	17 - 7 PH Stainless Steel, Inconel X750 or as Specified						
Lock Wash	410 Stainless Steel						
Stop Washer (3" to 6")	300 Series Stainless Steel						
Stop Spacer (3" to 6")	300 Series Stainless Steel						
Seal Washer	ASTM B473	ASTM A479 Type 316	ASTM B754 UNS N10276	ASTM B164 UNS NO4400	ASTM B160 UNS NO2200	ASTM A479 Type 316	UNS 31803
Handle Spacer	300 Series Stainless Steel						
Retainer Washer	300 Series Stainless Steel						
Stop Washer (3" to 6")	300 Series Stainless Steel						
Retainer Bolt	300 Series Stainless Steel						
Locking Bkt	300 Series Stainless Steel						
Lock Bkt Screws	300 Series Stainless Steel						

NOTE: \* Repair Kit Items: Seats, stem seal, body seals and thrust bearing. When ordering a repair kit, customer must provide Valve Code and Production Order Number stamped on body of valve. Example: Repair kit for 10S 20 150 6L36 TT 0 (Part Number); PR# 110902193 (Production Order Number).

## ENGINEERING DATA

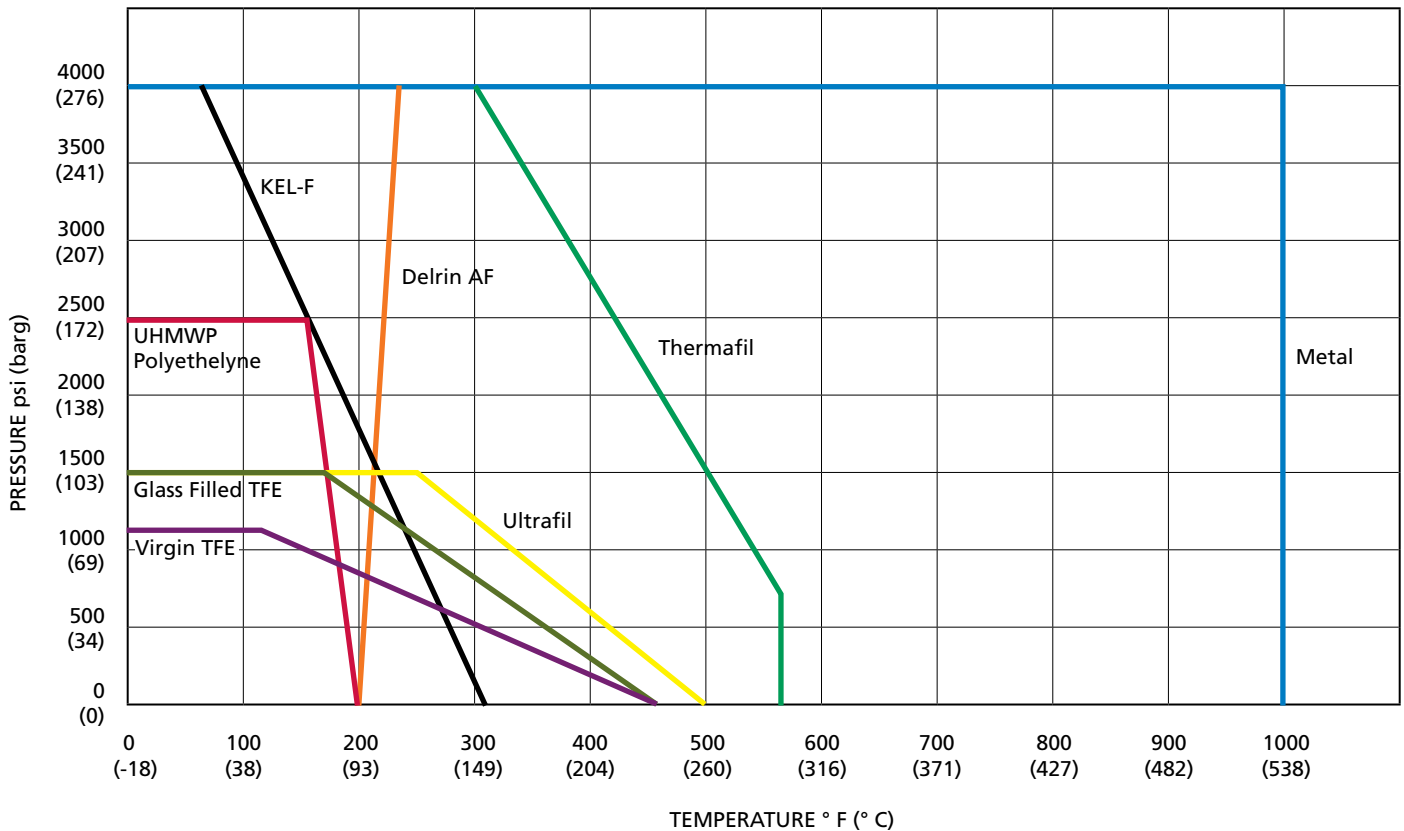
### C<sub>v</sub> Flow Coefficients

Size (in.)	C <sub>v</sub>
1/2	8
3/4	13
1	33
1-1/2	85
2	133
3	370
4	720
6	1050

#### NOTES FOR TORQUE INFORMATION

C<sub>v</sub> values are based on the flow of water at 60° F (16° C) and 14.7 psig through the valve in US gal/min at a pressure drop of 1 psi.

### SEAT RATING CHART



- Extended pressures and temperatures can be achieved by altering design for specific applications. Consult Cameron with service conditions.
- The valve rating is the lesser of the body rating and the seat rating.
- Cameron's TBV brand features an extensive line of high-pressure valves capable of the full seat ratings shown. Consult Cameron for details.

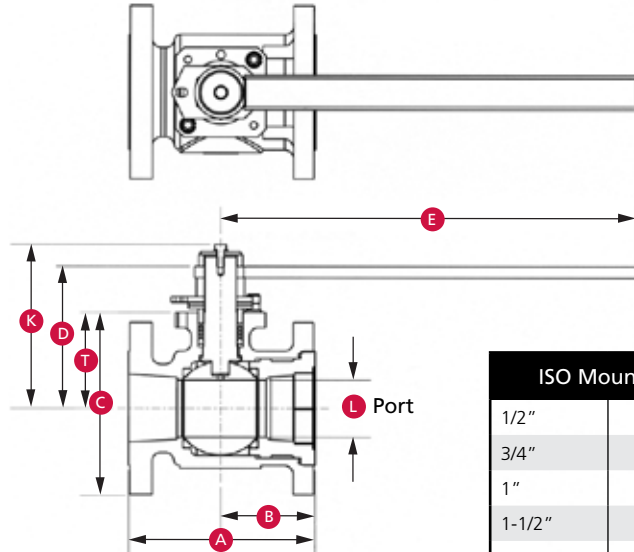
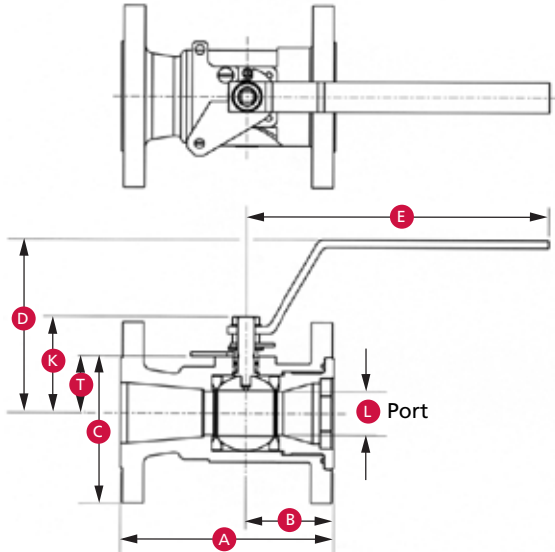
#### Seat Material Identification Code

T – Virgin PTFE..... White	P – UHMWP ..... Translucent White
G – Reinforced PTFE ..... White with Red Speckles	D – Delrin..... Dark Brown
U – Ultrafil ..... Black	K – CTFE ..... Translucent
F – Thermafil (Carbon Filled PEEK) .. Black	M – Metal..... Silver

## DIMENSIONS

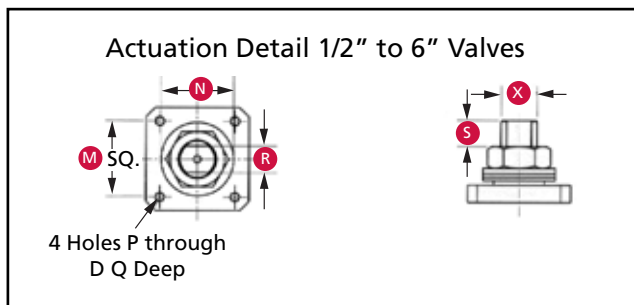
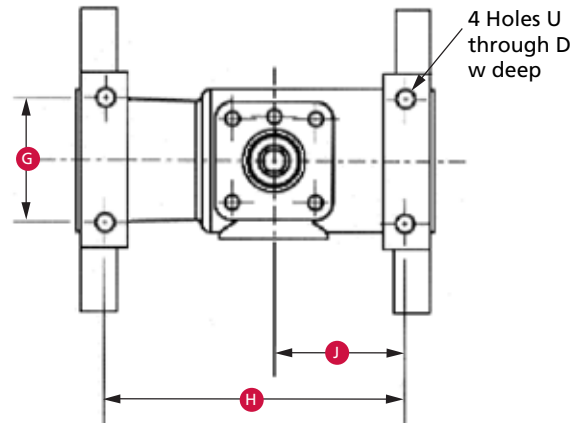
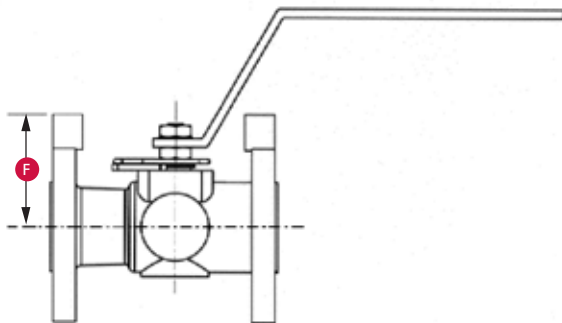
1/2" TO 2"

3" TO 8"



ISO Mounting	
1/2"	N/A
3/4"	N/A
1"	N/A
1-1/2"	F05
2"	F05
3"	F10
4"	F10
6"	F12

## 1/2" TO 1" OPTIONAL FLANGE MOUNTING CONFIGURATION



## ENGINEERING DATA

### Design Specifications Available

ASME B16.5	Pipe Flanges and Flanged Fitting
ASME B16.10	Face-to-face Dimensions of Ferrous Valves
ASME B16.34	Steel Valves (performance and design)
ASME B31.1	Power Piping (application)
ASME B31.3	Process Piping (application)
Chlorine Institute Pamphlet 6	Piping System, Dry Chlorine
NACE MR0175/ ISO 15156	Sour Gas Service Application
API 607	Fire Test for Soft Seated Valves
API 598	Valve Inspection and Testing
Norsok M630	Norsok Material compliance

### ASME Class 150

Size in.	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	W	X
1/2	4.25	2.12	3.5	3.6	5.5	2.13	1	3.63	1.81	1.53	0.38	0.95	0.75	10-24 UNC	0.19	0.23	0.3	0.81	1/4-20 UNC	0.38	0.38
3/4	4.62	2.31	3.88	3.88	5.5	2.25	1	4	2	1.81	0.41	0.95	0.75	10-24 UNC	0.19	0.23	0.3	1.09	1/4-20 UNC	0.38	0.38
1	5	2.25	4.25	4.89	6	2.5	1.75	4.19	1.84	2.29	0.81	1.17	0.88	1/4-20 UNC	0.31	0.296	0.5	1.25	5/16-18 UNC	0.63	0.44
1-1/2	6.5	2.5	5	5.51	7.65	2.5	1.75	5.62	2.07	2.99	1.25	1.41	1.13	1/4-20 UNC	0.31	0.34	0.63	1.69	5/16-18 UNC	0.63	0.56
2	7	2.92	6	5.7	7.65	3	2.25	6.19	2.52	3.18	1.5	1.41	1.13	1/4-20 UNC	0.31	0.34	0.63	1.88	5/16-18 UNC	0.63	0.56
3	8	4.06	7.5	7	18	3.75	3.5	7.12	3.64	7.21	2.5	2.84	3	3/8-16 UNC	0.66	0.995	0.82	4.18	3/8-16 UNC	0.75	1.38
4	9	4.5	9	7.63	18	5	4	8	4	7.94	3.25	2.84	3	3/8-16 UNC	0.66	0.995	0.82	4.77	3/8-16 UNC	0.75	1.38
6	10.5	5.25	11	10.08	21.5	-	-	-	-	10.25	4.38	3.48	3.25	7/16-14 UNC	0.75	1.246	1.06	7	-	-	1.75
8	11.50	5.50	-	GO	GO	-	-	-	-	11.83	6.00	3.48	3.48	0.44-14 UNC	-	-	1.31	-	-	-	1.74

GO = Gear Operator Required

### ASME Class 300

Size in.	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	W	X
1/2	5.5	2.12	3.75	3.6	5.5	2.13	1	4.88	1.82	1.53	0.38	0.95	0.75	10-24 UNC	0.19	0.23	0.3	0.81	1/4-20 UNC	0.38	0.38
3/4	6	2.31	4.62	3.88	5.5	2.31	1	5.31	1.97	1.81	0.41	0.95	0.75	10-24 UNC	0.19	0.23	0.3	1.09	1/4-20 UNC	0.38	0.38
1	6.5	2.25	4.88	4.89	8.5	2.75	1.75	5.69	1.84	2.29	0.75	1.17	0.88	1/4-20 UNC	0.31	0.296	0.5	1.25	5/16-18 UNC	0.63	0.44
1-1/2	7.5	2.51	6.12	5.51	9.9	3.06	1.75	6.56	1.99	2.99	1.81	1.41	1.13	1/4-20 UNC	0.31	0.34	0.63	1.69	5/16-18 UNC	0.63	0.56
2	8.5	2.92	6.5	5.7	9.9	3.62	2.25	7.5	2.42	3.18	1.44	1.41	1.13	1/4-20 UNC	0.31	0.34	0.63	1.88	5/16-18 UNC	0.63	0.56
3	11.12	4.07	8.25	6.26	17.88	4.5	3.5	9.88	3.44	6.58	2.5	2.84	2.75	3/8-16 UNC	0.66	0.995	0.82	4.18	3/8-16 UNC	0.75	1.38
4	12	4.51	10	6.89	17.88	5.38	4	10.69	3.84	7.21	3.25	2.84	2.75	3/8-16 UNC	0.66	0.995	0.82	4.77	3/8-16 UNC	0.75	1.38
6	15.88	5.25	12.5	10.08	21.5	-	-	-	-	10.25	4.38	3.48	3.25	7/16-14 UNC	0.75	1.246	1.06	7	-	-	1.75
8	16.5	5.5	-	GO	GO	-	-	-	-	11.83	6	3.48	3.48	0.44-14 UNC	-	-	1.31	-	-	-	1.74

GO = Gear Operator Required

### ASME Class 600

Size in.	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	W	X
1/2	6.50	2.32	-	3.67	5.50	2.13	1.00	5.50	1.82	1.53	0.38	0.95	0.95	10-24 UNC	0.19	0.23	0.30	-	0.250-20 UNC	0.38	0.38
3/4	7.50	2.50	-	3.85	5.50	2.31	1.00	6.44	1.97	1.81	0.41	0.95	0.95	10-24 UNC	0.19	0.23	0.30	-	0.250-20 UNC	0.38	0.38
1	8.50	2.44	-	4.87	8.50	2.75	1.75	7.28	1.84	2.29	0.75	1.17	1.17	0.250-20 UNC	0.31	0.30	0.50	-	0.312-18 UNC	0.63	0.44
1-1/2	9.50	2.70	-	5.48	9.90	2.75	1.75	8.08	1.99	2.99	1.18	1.41	1.41	0.250-20 UNC	0.31	0.34	0.63	-	0.312-18 UNC	0.63	0.56
2	11.50	3.11	-	5.69	9.90	3.62	2.25	10.12	2.42	3.18	1.44	1.41	1.41	0.250-20 UNC	0.31	0.34	0.63	-	0.312-18 UNC	0.63	0.56
3	14.00	4.26	-	6.33	17.88	Need	3.50	12.36	3.44	7.28	2.50	2.84	2.84	0.375-16 UNC	0.75	1.00	0.82	-	3/8-16 UNC	0.75	1.38
4	17.00	4.70	-	6.96	17.88	5.38	4.00	15.28	3.84	7.91	3.25	2.84	2.84	0.375-16 UNC	-	1.00	0.82	-	3/8-16 UNC	0.75	1.38
6	22.00	6.50	-	GO	GO	7.00	-	-	-	10.25	4.38	3.48	3.48	.438-14 UNC	-	1.25	1.06	-	-	-	1.75
8	26.00	7.69	-	GO	GO	8.20	-	-	-	11.86	6.00	3.89	3.89	.500-13 UNC	-	1.25	1.31	-	-	-	1.75

GO = Gear Operator Required



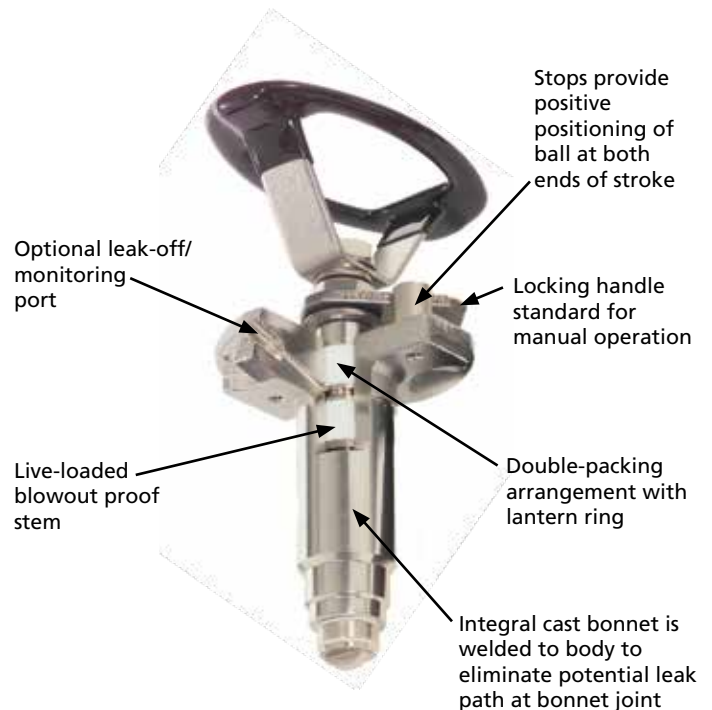
## FUGITIVE EMISSIONS BONNET

For applications where fugitive emission of toxic compounds and hazardous air pollutants cannot be tolerated, the TBV brand provides the fugitive emissions bonnet for use with all TBV valves.

Stem sealing is provided through the availability of several configurations (chevron v-ring, wedge packing and fire-safe grafoil packing).

The TBV valve's unique fugitive emissions bonnet is investment cast and utilizes Cameron's specially designed blowout-proof stem with an integral lock-out device and live loaded sealing. The valve's standard design is supplemented with a welded raw stock design when sizes or material requirements are a consideration.

The bonnet can be installed on any TBV valve by means of a full-penetration, fully ASME-qualified weld. As with all TBV products, quality, flexibility and safety make their fugitive emissions bonnet the best solution for hazardous media.



### Fugitive Emission Options Available On All TBV Ball Valves

The TBV fugitive emission product line has provided the chemical and petrochemical industry with a practical stem seal arrangement for use with hazardous and hard-to-handle fluids. This design has been itself in hundreds of installations in services such as phosgene and chlorine.

In addition to superior stem sealing, this design offers improved life cycle. This unique stem seal arrangement can be integrally welded to every type and style of valve that TBV valves offer. This flexibility is the cornerstone of our design philosophy. The stem is designed so that the packing is compressed between threads on top of the stem and a shoulder on the stem shank. In addition, the packing is kept under constant force by the use of Belleville washers. This design eliminates the effect of temperature cycle on stem packing compression.

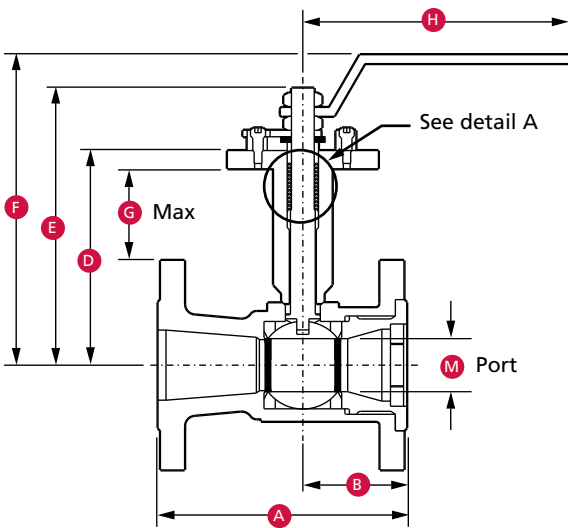
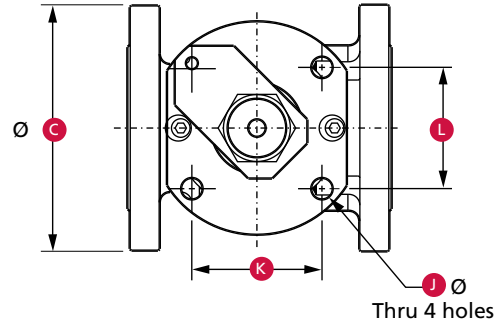
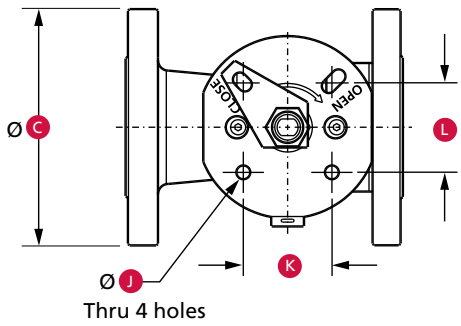
The bottom entry stem has a cross-sectional area equal to the next larger size of standard stem. This ensures that even the most severe service and high turning torque will not damage the ball-to-stem connection or round out the stem-to-handle slot.

For environmentally sensitive applications, a lantern ring option enables the user to monitor stem seal integrity, purge the packing box or lubricate the packing. TBV fugitive emissions valves can be easily automated because of the large mounting pad and oversize stem connection.

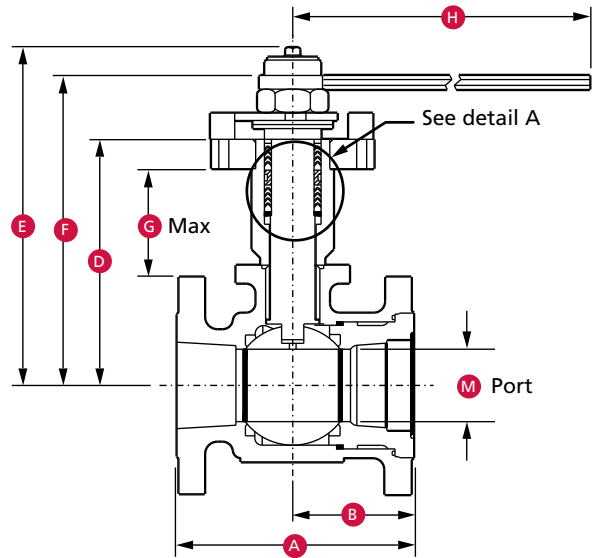
### Major Dimensions: ASME Classes 150 and 300, Standard Port Flange – Series 2000

Size in.	A 150	A 300	B	C 150	C 300	D	E	F	G 150	G 300	H	J	K	L	M	N	R	Thread
1/2	4.25	5.50	2.12	3.50	3.75	4.92	6.33	7.27	2.23	2.29	5.50	0.34 THRU	2.25	2.25	0.38	0.50	0.296	7/16 to 20 UNF
3/4	4.62	6.00	2.31	3.88	4.62	5.06	6.47	7.41	2.31	2.19	5.50	0.34 THRU	2.25	2.25	0.41	0.50	0.296	7/16 to 20 UNF
1	5.00	6.50	2.25	4.25	4.88	5.38	6.90	8.02	2.38	2.25	7.55	0.34 THRU	2.25	2.25	0.75	0.63	0.343	9/16 to 18 UNF
1-1/2	6.50	7.50	2.51	5.00	6.12	5.95	7.71	8.71	2.95	2.39	7.55	0.34 THRU	2.25	2.25	1.18	0.75	0.435	5/8 to 18 UNF
2	7.00	8.50	2.92	6.00	6.50	6.13	7.89	8.89	2.63	2.38	7.55	0.34 THRU	2.25	2.25	1.44	0.75	0.435	5/8 to 18 UNF
3	8.00	11.12	4.07	7.50	8.25	8.43	11.35	11.03	3.68	3.31	17.88	0.34 THRU	4.00	3.67	2.50	0.82	0.995	1-3/8 to 12 UNF
4	9.00	12.00	4.51	9.00	10.00	9.05	11.97	11.65	3.55	3.05	17.88	0.34 THRU	4.00	3.67	3.25	0.82	0.995	1-3/8 to 12 UNF
6	10.50	15.88	5.25	11.00	12.50	11.03	14.28	13.91	4.53	3.75	21.50	0.34 THRU	3.48	3.48	4.38	1.06	1.246	1-3/4 to 12 UNF

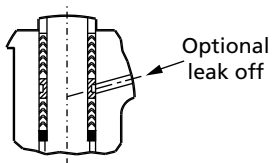
SERIES 2000



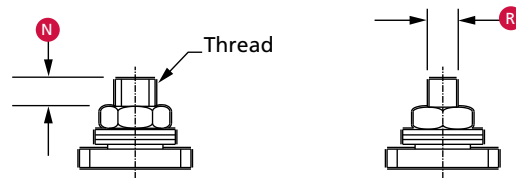
1/2" to 2" Valves



3" to 6" Valves



Detail A  
shown 90 degrees out of position

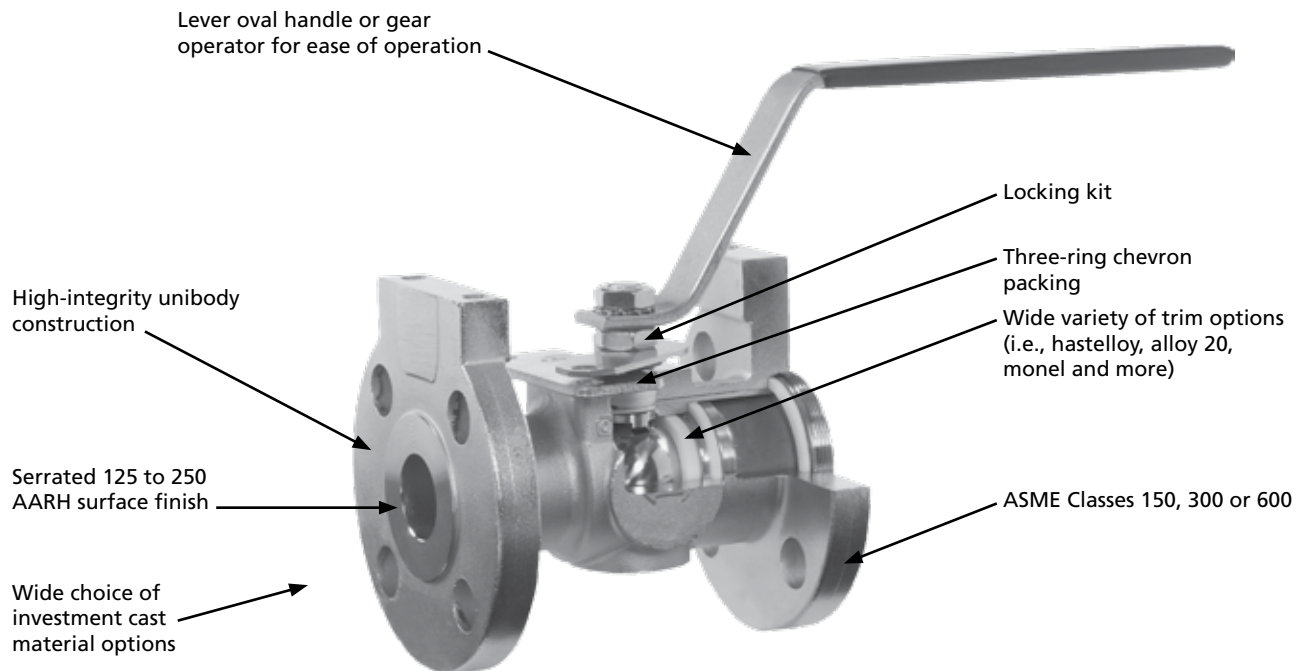


Stem Actuation Detail

# TBV Series 2000 Flanged Ball Valve

## FEATURES AND BENEFITS

Features	Benefits
Three-ring chevron standard stem seals	Stem seal integrity
Totally encapsulated body seals	Elimination of cold flow; high performance over wide temperature and pressure range
Flanged actuation base	Ease of automation
Variety of seating materials	Wide range of process media and service conditions
-50° F (10° C) rated LCB carbon steel	Extended temperature range, which is preferred for chlorine service
Live loaded stem	Pressure and temperature recovery; stem seal integrity with a low operating torque
API wall thickness	Extra corrosion allowance for long life
Investment cast	High-quality casting
Body insert removal using standard hex tool	Ease of maintenance
Fully traceable materials	Certification of all pressure-retaining parts available for stringent specification requirements



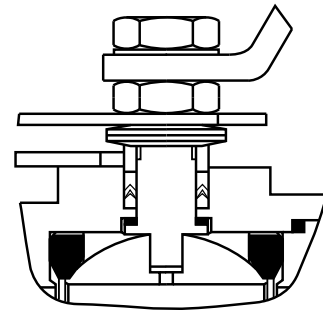
Available as "L" or "T" port diverter, side or bottom

The TBV Series 2000 flanged ball valve provides versatility to meet the requirements of virtually any severe or conventional service application. In ASME Classes 150, 300 and 600, the TBV Series 2000 valve provides body, seat and stem seal integrity in a unibody, investment cast design that sets new standards for flanged valve performance.

The TBV Series 2000 valve addresses today's demands for durable, trouble-free and adjustment-free process. Actuable by a variety of methods, the long life cycle and general ruggedness of this valve assures that your process, whether chlorine, HF, monomer, toxic or conventional, will remain secure and functional. Additional features and a wide material selection also make the TBV Series 2000 valve the choice for dependable operation. Whether for steam, petrochemical products, abrasive fluids, cryogenic, viscous services, vacuum or high-cycle applications, the TBV Series 2000 valve can provide the performance you need.

### Stem Seal

The TBV Series 2000 valve embodies a total seal integrity concept to eliminate the most common causes of ball valve malfunction. Leak-free stem sealing is provided by a unified stem system design. The blowout-proof stem has self-compensating adjustability through the use of Belleville spring washers. The packing adjustment nut is captured between two stem keyed components, virtually guaranteeing that the nut cannot loosen. Multiring chevron PTFE seals are optimally contained against controlled finish surfaces by a loading system designed for adjustment-free life.

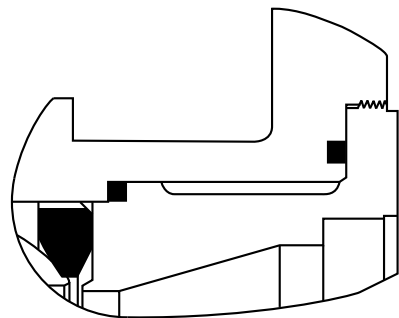


### Body Seal

The TBV valve's total seal integrity concept extends to its body seal performance. Dual, fully encapsulated body seals are contained by a screw-in end plug with a continuous raised face. The end plug effectively loads both seals when tightened against an internal metal-to-metal stop.

There is no guess work involved and there are no torque requirements. Maintenance is simplified through the use of standard hex dimensions and conventional tools. Additionally, all raised-face surfaces meet the latest ASME B16.5 surface finish requirements to facilitate leak-free installation within the user's pipeline.

TBV Series 2000 valves have a standard secondary fire lip and can be ordered as fire safe to API 607 by specifying graphite stem and body seals. As with the variety of other seal materials available, the graphite option affords similar leak-free performance.



### Actuation

The TBV Series 2000 valve provides two methods of actuation mounting, depending on system configuration and customer preference. Integral bosses are cast, drilled and tapped on each flange to facilitate actuator mounting remote from the bonnet area. This approach provides greater strength and better access to stem packing adjustments and often is simpler and less expensive to implement. Conventional bonnet mounting also is accommodated by the ISO actuation pattern, furnished as standard. Both electric and pneumatic actuators are easily installed by either mounting method. The advanced stem seal design of the TBV Series 2000 valve permits leak-free actuation by field or factory personnel.

## HOW TO ORDER

Size	Porting	Series	End Connections	Ball/Stem Material Body/End Material	Seat Material	Seal Material	Bolting	Modifiers
05 = 1/2" 07 = 3/4" 10 = 1" 15 = 1-1/2" 20 = 2" 30 = 3" 40 = 4" 60 = 6"	S = Standard Port  20 = Series 2000 Unibody Flanged	150 = ASME Class 150 RF 300 = ASME Class 300 RF	A2 = Alloy 20 LC = Carbon Steel HC = Hastelloy C M4 = Monel 400 36 = 316 SS Consult factory for other materials.	D = Delrin AF F = Thermafil G = 15% GF PTFE K = CTFE M = Metal P = UHMWP T = Virgin PTFE U = Ultrafil 25	H = Grafoil T = Virgin PTFE  0 = No Bolting	AP = Prepared for Actuation CF = Cavity Filler CL = Chlorine Cleaning EP = Electro Polish FE = Fugitive Emissions FS = Fire-safe GO = Gear Operator GS = Grounding Spring LH = Locking Handle OH = Oval Handle OX = Oxygen Cleaned VB = Vented Ball		

**Example:**

10S 20 300 LCM4M5 TT OCLVB = 1" Flanged ASME Class 300, LCB Carbon Steel body, Monel ball and stem, Virgin PTFE seats and seals, chlorine cleaned and vented ball.

\* If ball and stem are different materials, expand code to show ball first, stem second.  
For additional ordering information, see the TBV General Brochure, TBV Valves.

## HOW TO ORDER (Cont.)

Service Related Options
<b>Steam Service –</b> Saturated steam can be handled within the following limits: 250 psi/406° F with Ultrafil seats 450 psi/459° F with Thermafil seats Super heated steam up to 489° F can be handled at lower pressures.
<b>Vacuum Service –</b> Standard TBV valves rated up to 20 microns of absolute pressure, specially prepared valves rated to 0.01 microns.
Oxygen, chlorine cleaning and other special service cleanings are available.
Actuation and actuator prepping available – consult factory.
<b>Leakage Rates –</b> Soft seats are bubble tight exceeding API 598 and Class VI requirements of ASME B16.104.
<b>Cryogenic service to -425° F</b> <b>Diverter Valves –</b> For normal and cryogenic application 90° or 180° operation with side or bottom porting
<b>Fugitive Emission –</b> Bonnet for critical applications

Special Services
Oxygen service
Hydrofluoric acid
High temp. to 1000° F
Block-and-bleed
Slurries
Throttling control with characterized seats
Body cavity fillers
Vacuum sealing
Toxic service
Erosive media
Monomers
Category M

### Fugitive Emission Bonnet



### Certifications



### Designed for Positive Bubble-tight Integrity

TBV valves are designed to comply with industry standard requirements. Due to the specialized nature of some valve applications, in terms of material and configuration, deviations sometimes are encountered. Several TBV valve specifications typically supplied are listed. Please consult engineering for any specification issues.

In addition to the options and features shown, the TBV brand features ball valves designed and manufactured for a wide variety of special applications. They are known for their ability to solve difficult applications with severe service valves that perform where others have failed.

Extended bonnets are available to meet stringent fugitive emission requirements. A wide variety of special materials also are available for severe or exotic services. Special material testing, such as corrosion evaluation, is available as well. Complete material certification packages can be provided to meet extensive specification requirements.

Consult Cameron's extensive library of TBV valve designs that have proven to give top-notch performances in the most severe services.



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Learn more about TBV at:  
[www.c-a-m.com/valves](http://www.c-a-m.com/valves)



#### **HSE Policy Statement**

At Cameron, we are committed ethically, financially and personally to a working environment where no one gets hurt and nothing gets harmed.