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HSSE Policy Statement

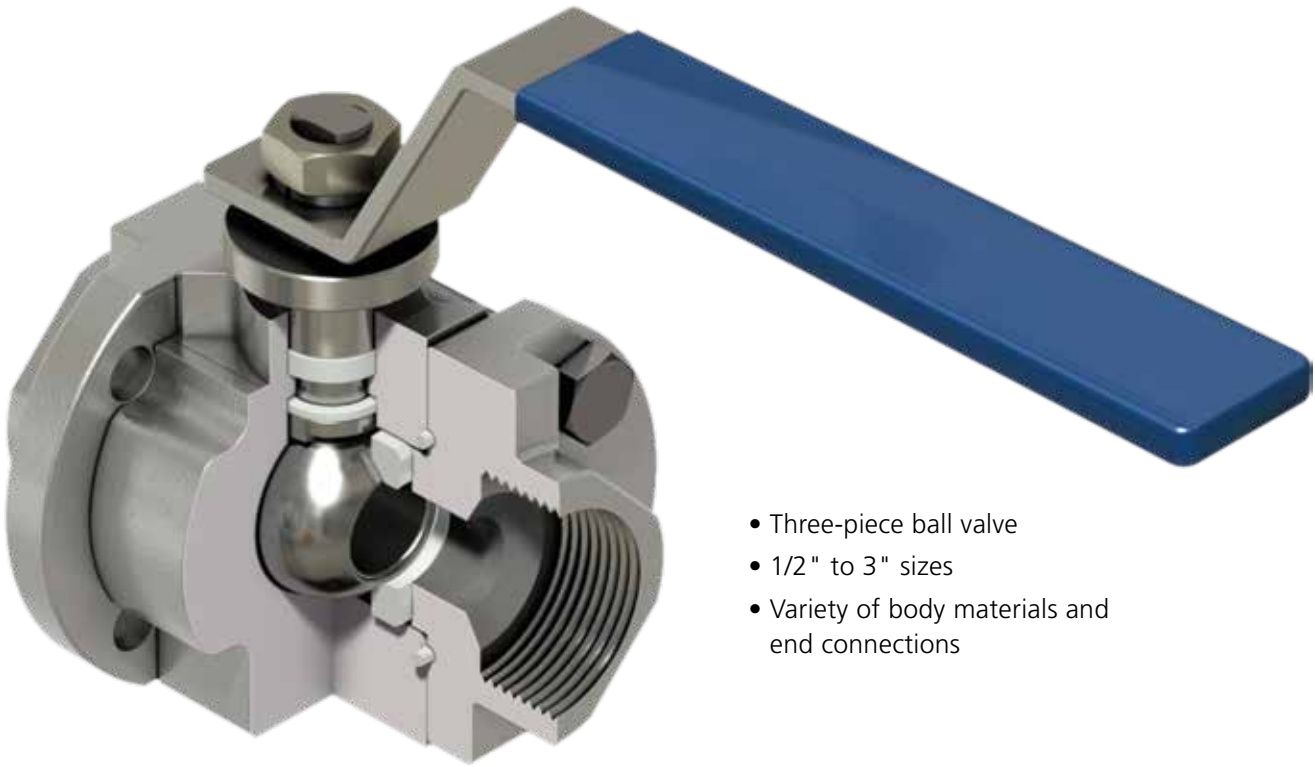
At Cameron, we are committed ethically, financially and personally to a working environment where no one gets hurt and nothing gets harmed.

TBV Series 1100 Three-Piece Ball Valve

TECHNOLOGY



TBV Series 1100 Ball Valve



- Three-piece ball valve
- 1/2" to 3" sizes
- Variety of body materials and end connections

Along with all of the features and versatility of a three-piece valve, Cameron's TBV™ Series 1100 valve incorporates a raised face on the seat-bearing side of the endplate which ensures positive alignment of the components and eliminates radial piping stresses.

The body seal is 100% encapsulated to eliminate cold flow of virgin PTFE body seals. Rugged construction features a heavy-duty handle and stop plate with a variety of bolting material options.

Available in a wide variety of materials with NPT, socket-weld and butt-weld end connections. Other special end connections are available upon request.

DIMENSIONAL DATA

Major Dimensions

Valve Size	PORT	A1	A2	A3	B1	B2	B3	C	D	E
1/2"	0.50*	3.14	3.08	3.08	1.57	1.54	1.54	2.50	2.93	1.81
3/4"	0.50*	3.14	3.08	3.08	1.57	1.54	1.54	2.50	2.93	1.81
1"	0.81	3.75	3.69	3.67	1.88	1.85	1.84	3.25	3.32	2.29
1-1/2"	1.25	4.76	4.70	4.70	2.38	2.35	2.35	4.12	4.20	2.99
2"	1.50	5.06	4.92	5.00	2.53	2.46	2.50	4.36	4.36	3.18
3"	2.50	8.25	8.25	8.25	4.13	4.13	4.13	7.25	5.97	5.91

Major Dimensions

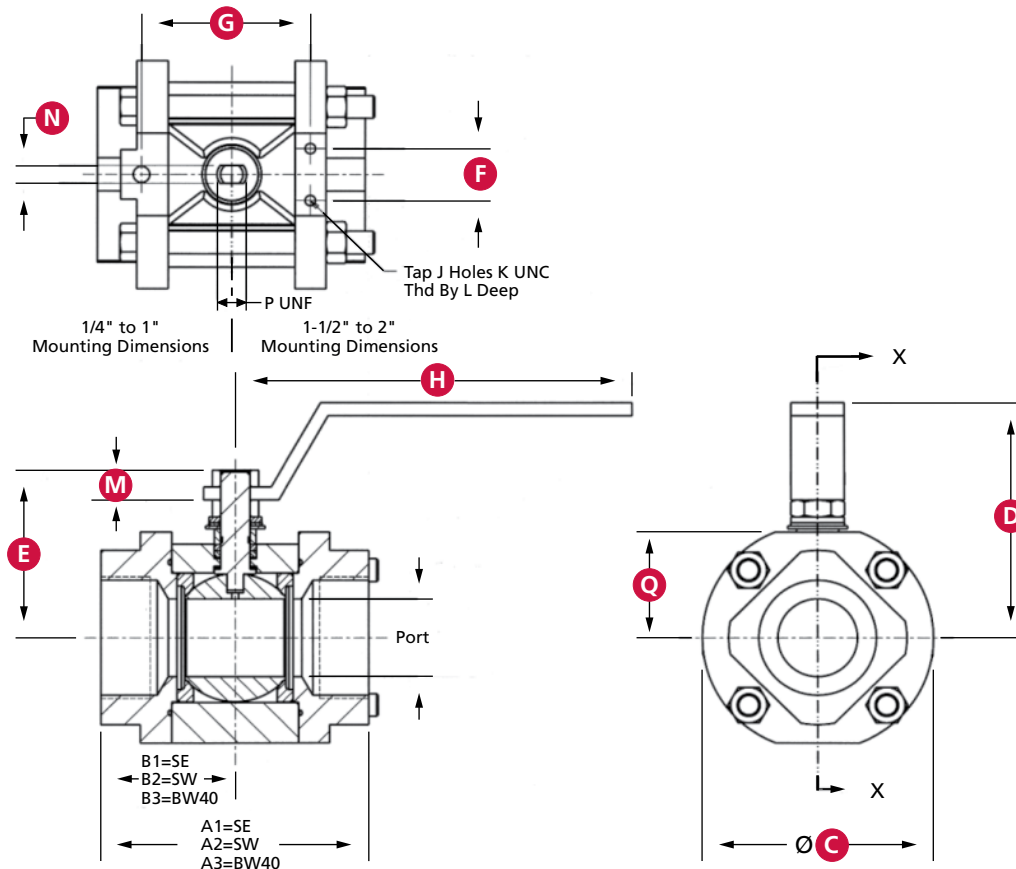
Valve Size	F	G	H	J	K UNC	L	M	N	P UNF	Q	WEIGHT
1/2"	-	1.77	5.50	2	5/16 - 18	0.30	0.30	0.230	3/8 - 24	1.09	2 lb
3/4"	-	1.77	5.50	2	5/16 - 18	0.30	0.30	0.230	3/8 - 24	1.09	2 lb
1"	-	2.01	5.50	2	5/16 - 18	0.40	0.48	0.296	7/16 - 20	1.56	5 lb
1-1/2"	1.00	2.68	7.55	4	1/4 - 20	0.50	0.65	0.340	9/16 - 18	1.90	12 lb
2"	1.00	2.98	7.55	4	1/4 - 20	0.50	0.71	0.340	9/16 - 18	2.03	12 lb
3"	-	-	18.50	-	-	-	-	-	-	-	-

*1/2" valves are full port as standard.

Note: TBV Series 1100 ball valves are available to 10".

Please consult Cameron for dimensions above 3".

TOP AND SIDE VIEWS SERIES 1100 – 1/2" TO 2"

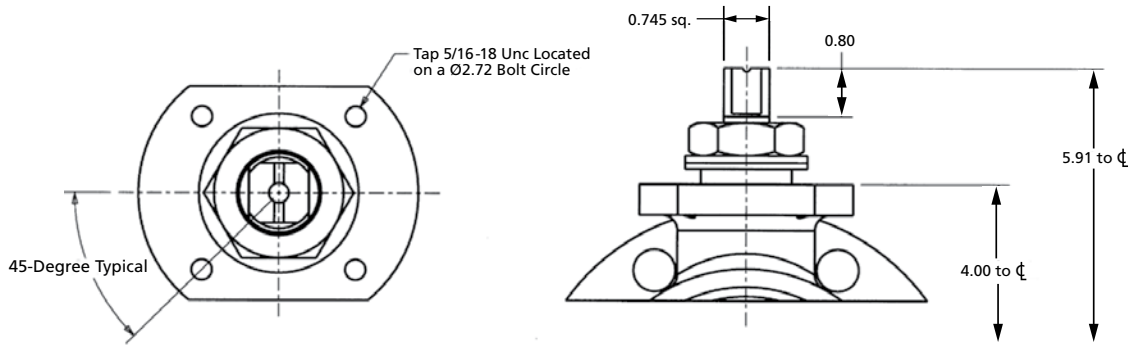


Oval safety handles available up to 1-1/2" size.

Full port sizes are available.

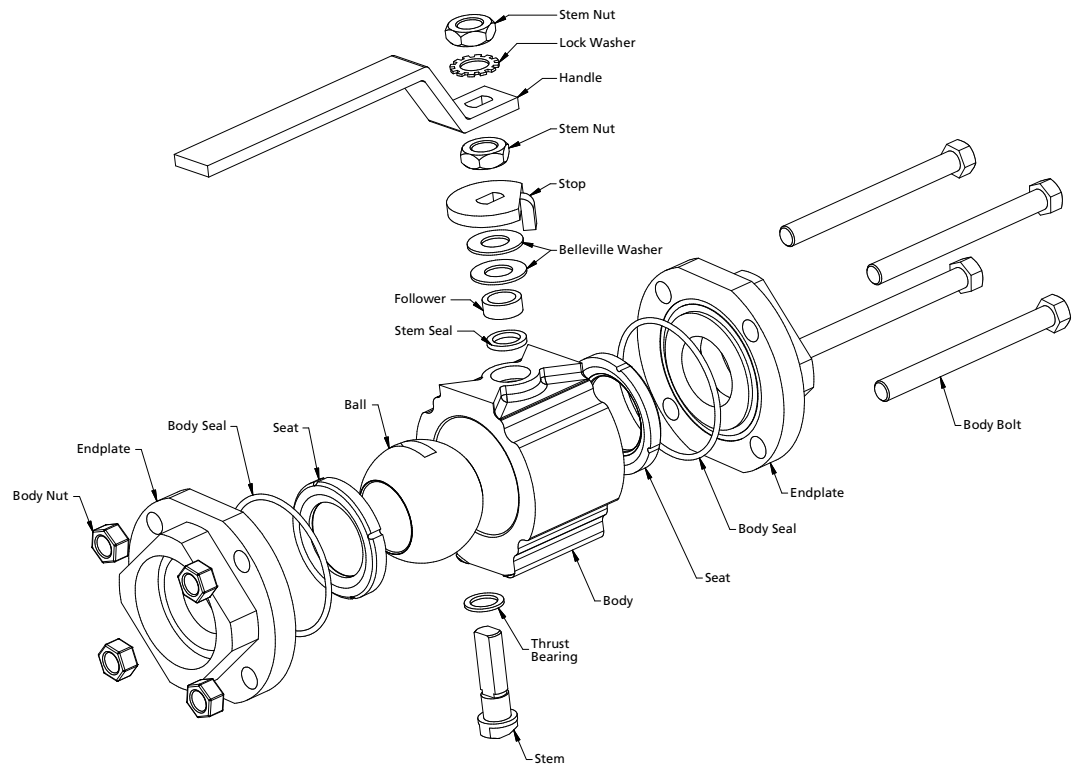
Illustration applies to standard cast products only.

TOP AND SIDE VIEWS SERIES 1100 – 3"



Bill of Materials

Part	Quantity
Body	1
Endplate	2
Ball	1
Stem	1
Follower	1
Seat*	2
Stem Seal*	1
Body Seal*	2
Stop	1
Handle	1
Thrust Bearing*	1
Stem Nut	2
Body Nut	4
Body Bolt	4
Lock Washer	1
Belleilve Washer	2



*Recommended spares available as kits.

Features	Benefits
Raised face endplates	Positive alignment; elimination of radial stresses
Totally encapsulated body seals	Elimination of cold flow; high performance over wide temperature and pressure range
Variety of seating materials	Wide range of process media and service conditions
Flexible lip seat design	Low operating torque
Integral actuation bosses (optional)	Ease of automation
Live loaded stem	Pressure and temperature recovery, stem seal integrity with a low operating torque
Blowout-proof stem	Operator safety
Heavy-duty handle and stop	Ease of operation, long life cycle
Fully traceable materials	Certification of all pressure retaining parts available for stringent specification requirements
Metal and graphite seats	Available for abrasive services and temperatures to 1200° F (649° C). Consult Cameron for recommendation
Modular design	Diverse valve configurations to meet a variety of piping requirements

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 also 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.

A wide variety of other product configurations and sizes, up to 10" line size, are available on application.

Design Specifications Available	
ASME B1.20.1	NPT Pipe Threads
ASME B16.11	Socket-Weld Ends (diameter and depth)
ASME B16.25	Butt-Weld Ends
ASME B16.34	Steel Valves (performance and design)
ASME B31.1	Power Piping (application)
ASME B31.3	Process Piping (application)
MSS SP25	Valve Marking
API 598	Pressure Testing
API 607	Fire Test for Soft Seated Valves
NACE MR0175/ISO 15156	Sour Gas Service Applications

Materials and Construction Notes

1. Standard materials for these components include Titanium, Monel, Hastelloy, Alloy 20, 316L and Nickel. Other materials are available on request.
2. Standard soft seat materials include PTFE (Virgin and Filled), Thermafil (PEEK), PCTFE (KEL F), CTFE and UHMW Polyethylene. Other seat materials are available including metal seats. Consult Cameron.
3. Lubrication: A non-silicone fluorocarbon grease is normally applied to seats and seals. An anti-galling substance is applied to external threads where necessary. No other lubrication is used or recommended.
4. Optional static-grounding springs can be supplied between stem and body.
5. Fugitive emission bonnets are available.

Body Rating

Material	Cold Working Pressure
Carbon Steel	1480 psig
Stainless Steel	1440 psig
Alloy 20	1200 psig
Monel	1200 psig
Hastelloy C	1500 psig
Titanium	1230 psig
Nickel	720 psig

These ratings are based on ASME/ANSI Class 600 limits and are for standard cast products.

Important: The valve rating is the lesser of the body rating and the seat rating. Cameron manufactures an extensive line of high-pressure TBV valves capable of the full seat ratings shown. Consult Cameron for details.

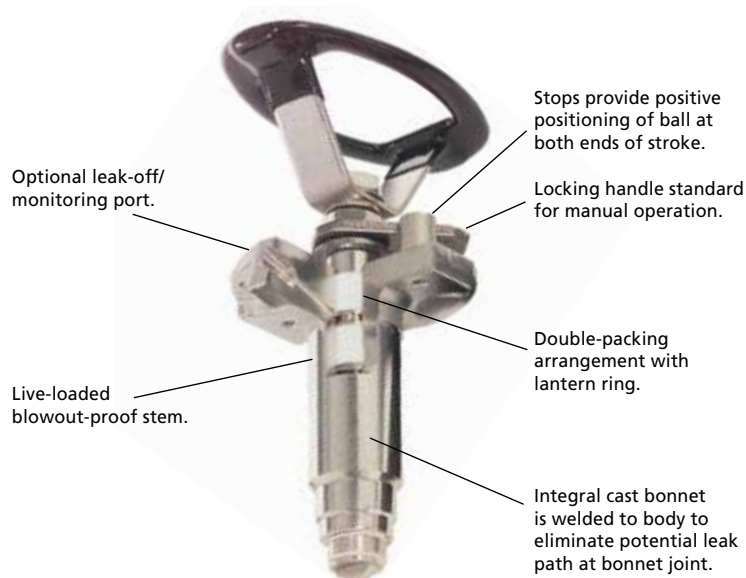
FUGITIVE EMISSIONS BONNET

For applications where fugitive emission of toxic compounds and hazardous air pollutants cannot be tolerated, Cameron 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 standard design of the TBV valve 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 the TBV fugitive emissions bonnet the best solution for hazardous media.



Fugitive Emission Options Available on all TBV Ball Valves

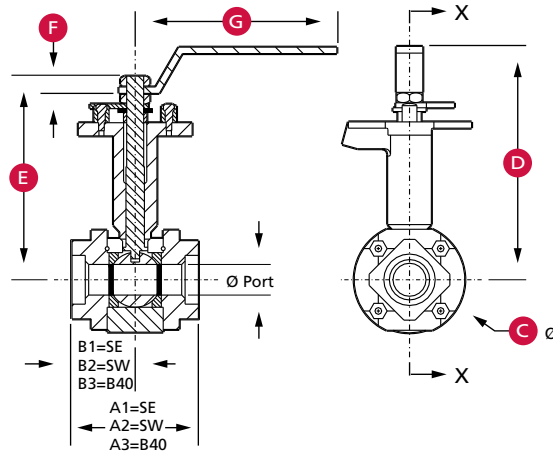
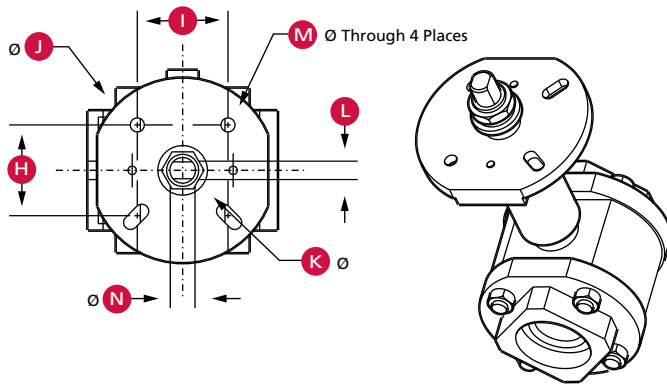
The TBV fugitive emission product line has provided the chemical and petrochemical industry with the maximum practical stem-seal arrangement for use with hazardous and hard-to-handle fluids. This design has proven itself in hundreds of installations in services such as phosgene and chlorine.

In addition to stem sealing, this design offers improved life cycle. This unique stem-seal arrangement can be integrally welded to every type and style of TBV valve. 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 a 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 the 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 emission valves can be easily automated because of the large mounting pad and oversized stem connection.



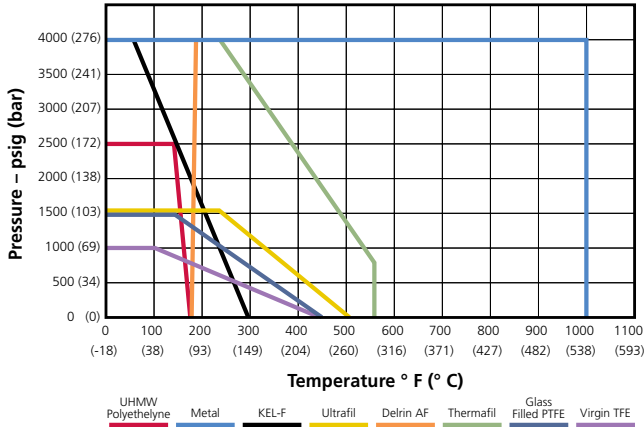
Major Dimensions for Standard Port and FE Three-Piece Valves

Size	PORT	A1	A2	A3	B1	B2	B3	C	D	E	F	G	H	I	J	K	L	M	N
1/2"	0.50"	3.14	3.08	3.08	1.57	1.54	1.54	2.50	7.24	6.43	0.50	5.50	2.25	2.25	3.75	0.875	0.435	0.34	7/16
3/4"	0.81"	3.14	3.08	3.08	1.57	1.54	1.54	2.50	7.24	6.43	0.50	5.50	2.25	2.25	3.75	0.875	0.296	0.34	7/16
1"	0.81"	3.75	3.69	3.67	1.88	1.85	1.84	3.25	8.15	6.90	0.63	7.55	2.25	2.25	4.62	1.125	0.435	0.34	9/16
1-1/2"	1.25"	4.76	4.70	4.70	4.70	2.38	2.38	4.12	8.80	7.71	0.63	7.55	2.25	2.25	4.62	1.25	0.435	0.34	5/8
2"	2.00"	5.06	4.92	5.00	2.53	2.46	2.50	4.50	8.98	7.90	0.63	7.55	2.25	2.25	4.62	1.25	0.435	0.34	5/8

Major Dimensions for Full Port FE Three-Piece Valves

Size	PORT	A1	A2	A3	B1	B2	B3	C	D	E	F	G	H	I	J	K	L	M	N
1/2"	0.50"	3.14	3.08	3.08	1.57	1.54	1.54	2.50	7.24	6.43	0.50	5.50	2.25	2.25	3.75	0.875	0.296	0.34	7/16
3/4"	0.81"	3.75	3.69	3.67	1.88	1.85	1.84	3.25	8.15	6.90	0.63	7.55	2.25	2.25	3.75	1.125	0.343	0.34	9/16
1"	1.25"	4.76	4.70	4.70	4.70	2.38	2.38	4.12	8.80	7.71	0.63	7.55	2.25	2.25	4.62	1.25	0.435	0.34	5/8
1-1/2"	1.50"	5.06	4.92	5.00	2.53	2.46	2.50	4.50	8.98	7.90	0.63	7.55	2.25	2.25	4.62	1.25	0.435	0.34	5/8
2"	2.00"	6.50	6.92	6.50	3.25	3.46	2.90	6.50	10.00	9.09	0.80	11.54	2.475	2.475	4.50	1.50	0.504	0.34	3/4

Seat Rating Chart



C_v Values

Size	C _v
1/2	8
3/4	12
1	33
1-1/2	85
2	133
3	370

Seat Material Identification Code

Seat Material Identification Code	
T – Virgin PTFE	White
G – Reinforced PTFE	White with Red Speckles
U – Ultrafil	Black
F – Thermafil (carbon filled PEEK)	Black
P – UHMWP	Translucent White
D – Delrin	Dark Brown
K – CTFE	Translucent
M – Metal	Silver
H – Graphite	Black

HOW TO ORDER

Size	Porting	Series	End Connections	Ball/Stem Material Body/End Material	Seat Material	Seal Material	Bolting	Modifiers
02 = 1/4" 03 = 3/8" 05 = 1/2" 07 = 3/4" 10 = 1" 12 = 1-1/4" 15 = 1-1/2" 20 = 2" 30 = 3"	S = Standard Port F = Full Port 11 = Series 1100 Three-Piece	BWT = Butt weld Tube Butt weld B___ = Butt weld + Sched (B40 = Sched 40) FSE = Female NPT FSW = Female Socket Weld TCE = Ladish End TE_ = Tube End (K,L,M)	A2 = Alloy 20 AL = Aluminum BR = Brass CS = Carbon Steel DS = Duplex ST. STL HB = Hastelloy B HC = Hastelloy C IN = Inconel M4 = Monel 400 N2 = Nickel T2 = Titanium Gr.2 T5 = Titanium Gr.5 ZR = Zirconium 34 = 304 SS 36 = 316 SS 37 = 317 SS 4L = 304L SS 6L = 316L SS	F = Thermafil G = 15% GF PTFE K = CTFE M = Metal N = Nylon P = UHMWP T = Virgin PTFE U = Ultrafil	H = Grafoil T = Virgin PTFE 1 = Carbon Steel 2 = 300 SS 3 = ASTM A193, B7 x A194 2H 4 = ASTM A193, B8M x A194 8M 5 = Monel K-500 6 = Hastelloy C 7 = 316 SS 8 = Gr. 5 Titanium	AP = Prepared for Actuation CF = Cavity Filler CL = Chlorine Cleaning EE = Extended Ends EP = Electro Polish ES = Extended Stem FE = Fugitive Emissions FS = Fire-safe GO = Gear Operator GS = Grounding Spring LH = Locking Handle OH = Oval Handle OX = Oxygen Cleaned SC = Split Collar Stem SR = Spring Return Handle VB = Vented Ball		

For additional ordering information, see the TBV General Brochure, "TBV VALVES".

Example:

10S 11 FSE 3636 GT 2 = 1" three-piece female screwed end Series 1100, 316 SS body and end caps, 316 SS ball and stem; glass filled PTFE seats, PTFE body/stem seals; 300 stainless steel bolting.

Service Related Options

Steam Service –
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.

Vacuum Service –
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 cleaning are available.

Actuation and actuator prepping available – consult Cameron.

Leakage Rates –
Soft seats are bubble tight exceeding API 598 and Class VI requirements of ASME B16.104.

Special Services

Chlorine
Hydrofluoric Acid
Steam
Oxygen Service
Vacuum Service
High Pressure
High Temperature
Thermal Fluids
Hydraulics
Extended pressures and temperatures may be achieved by altering designs for specific applications. Consult Cameron with service conditions.