

# TBV Instrumentation Valves

TECHNOLOGY





# TBV Instrumentation Valves

Cameron's TBV™ instrumentation valves were developed in response to concerns expressed by plant engineers. Common problems such as irregular center-to-center spacing in differential pressure installations, visual position indication, plugging of impulse lines and tamper-proofing have been reduced by our instrumentation valve line. For example, TBV valves reduce issues with center-to-center spacing through its ability to be installed on 2-1/8" (54 mm) centers by simply removing the valve handle. This leaves the valve's pressure vessel integrity intact.

Cameron's tamper-proof TBV instrumentation valve also includes safety features. The oval safety handle has a visual position indicator, which allows its position to be easily identified while reducing the possibility of accidental operations. The valve's welded design ensures the body parts can never be separated.

## FEATURES

- Various end connections available
- Internal entry blowout-proof stem
- High-strength forged or investment cast body
- Oval safety handles
- Welded tamper-proof construction



## SERIES 4100 – CAST BODY

### Welded Instrumentation Valve with Female Ends

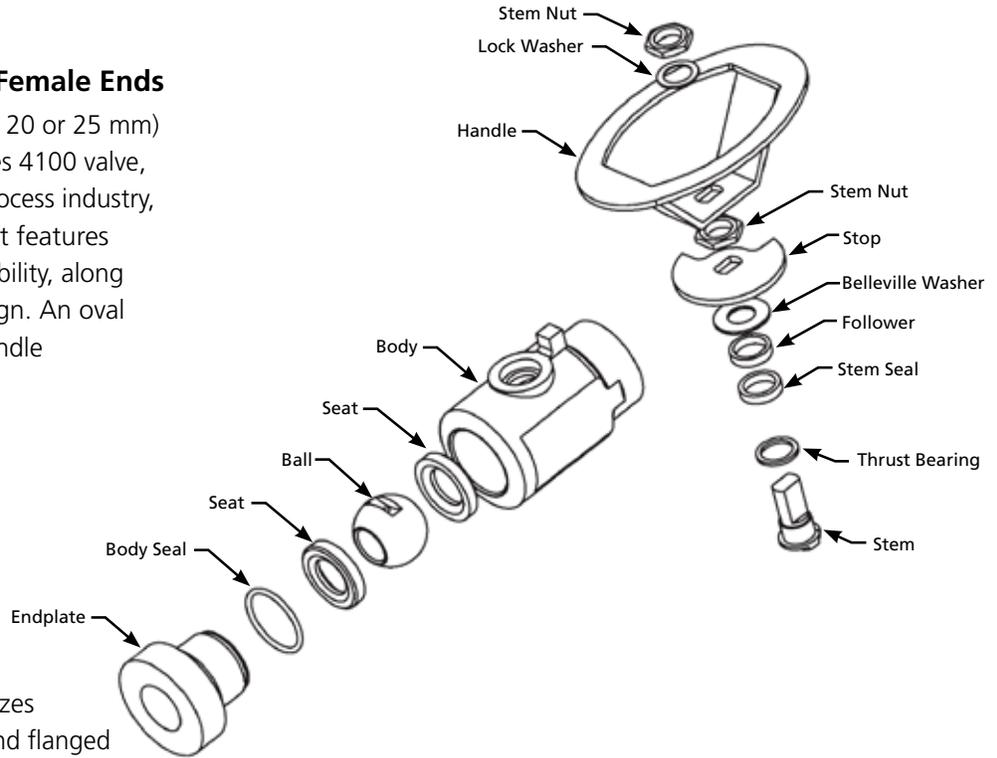
3/4" (19 mm) body with 1/2", 3/4" or 1" (15, 20 or 25 mm) endplates are available. The welded TBV Series 4100 valve, designed specifically for the petrochemical process industry, focuses on safety as a prime consideration. It features tamper-proof construction and rod-out capability, along with a TBV standard internal entry stem design. An oval safety handle also is standard and a lever handle is optional.

#### APPLICATIONS:

- Root valve
- Gauge valve
- Isolation valve
- Drain valve

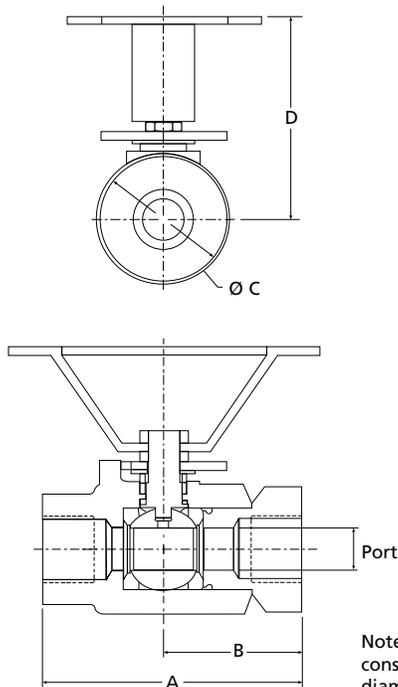
#### End Connections Available

- 1/2", 3/4" and 1" (15, 20 and 25 mm) sizes in butt weld, female socket weld, FNPT and flanged
- ASME Classes 150, 300, 600 and 900
- 2000 psi WOG rating



#### Major Dimensions

Valve Size in.					
DN Size (mm)	Port	A	B	C	D
1/4	0.44	2.77	1.35	1.50	2.40
(8)	(11.2)	(70.44)	(34.3)	(38.1)	(61.0)
3/8	0.44	2.89	1.47	1.50	2.40
(10)	(11.2)	(73.4)	(37.3)	(38.1)	(61.0)
1/2	0.50	3.07	1.65	1.50	2.40
(15)	(12.7)	(78.0)	(41.9)	(38.1)	(61.0)
3/4	0.50	3.89	1.97	1.50	2.40
(20)	(12.7)	(98.8)	(50.0)	(38.1)	(61.0)
1	0.81	4.33	2.25	2.00	3.90
(25)	(20.6)	(110.0)	(57.2)	(50.8)	(99.1)
1-1/2	1.25	5.00	2.72	3.00	4.50
(40)	(31.8)	(127.0)	(69.0)	(76.2)	(114.3)
2	1.50	6.25	3.40	3.60	4.70
(50)	(38.1)	(158.8)	(86.4)	(91.4)	(119.4)



Note: If fire-safe is required, consult Cameron for port diameter.

## SERIES 4600 – CAST BODY, BAR STOCK END

### Welded Instrumentation Valve with One Male End and One Female End

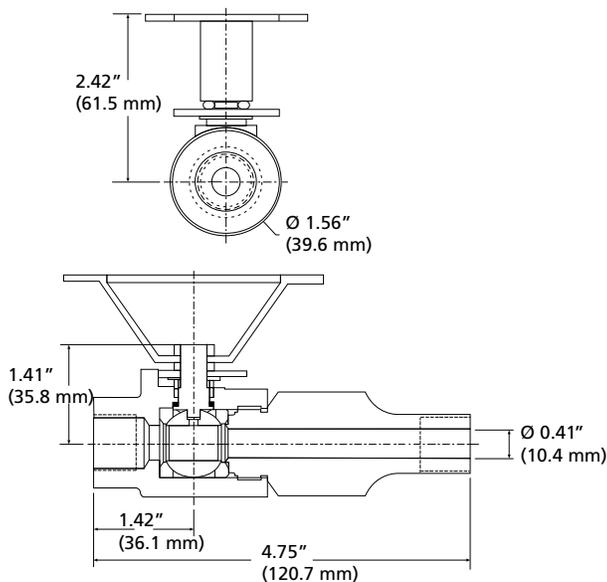
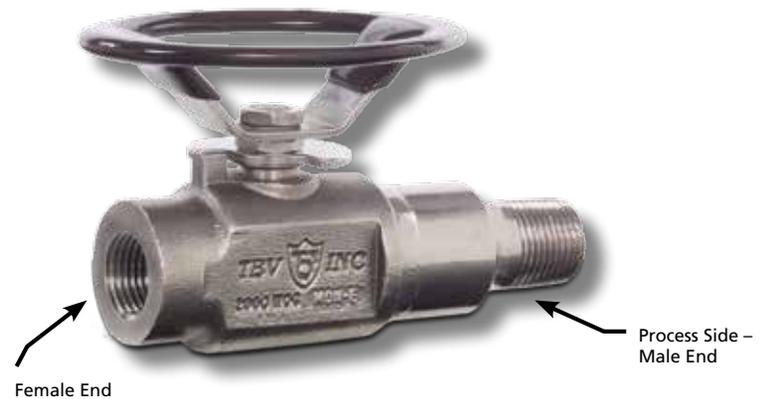
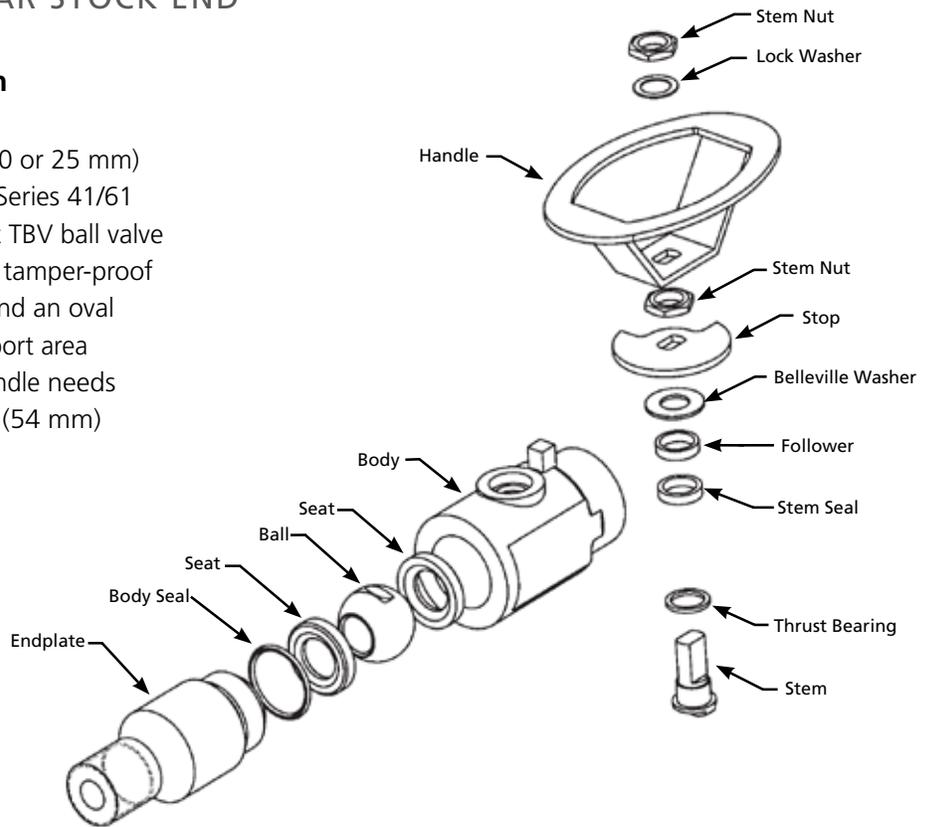
1/4", 1/2", 1/2" x 3/4" or 1" (8, 15, 15 x 20 or 25 mm) standard endplates are available. The TBV Series 41/61 valve is uniquely designed with all inherent TBV ball valve features, including quarter-turn operation, tamper-proof welded construction, internal entry stem and an oval safety handle. The large straight-through port area permits easy rod-out capability. Only the handle needs to be removed when installing on 2-1/8" (54 mm) center-to-center applications.

#### APPLICATIONS:

- Root valve
- Gauge valve
- Isolation valve
- Drain valve
- Orifice valve

#### End Connections Available

- 1/4", 3/8", 1/2", 3/4" and 1" (8, 10, 15, 20 and 25 mm) sizes in butt weld, socket weld, MNPT x FNPT and flanged
- ASME Classes 150, 300, 600 and 900
- 2000 psi WOG rating



Dimensional drawing shown: 1/2" FNPT x 1/2" MNPT valve. Consult Cameron for other configurations.

## SERIES 6100 – BAR STOCK BODY AND ENDPLATE

### Welded Instrumentation Valve with Multiple Ports

1/2" to 1" (15 to 25 mm) standard endplates are available. Other sizes are available upon request. The TBV Series 6100 valve is a specially designed instrumentation valve used in the chemical and petrochemical industries as a gauge or isolation valve with tapped NPT side ports for flush and drain applications.

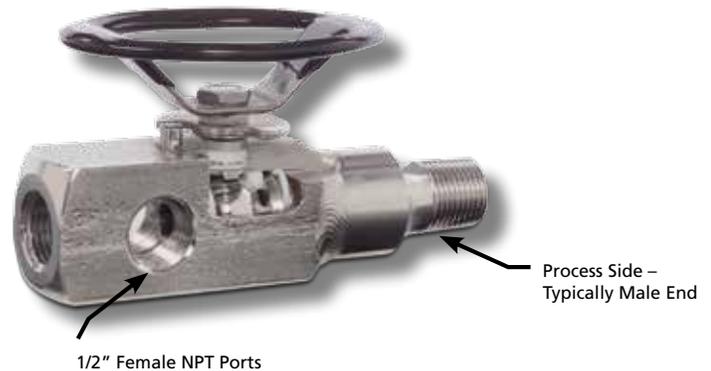
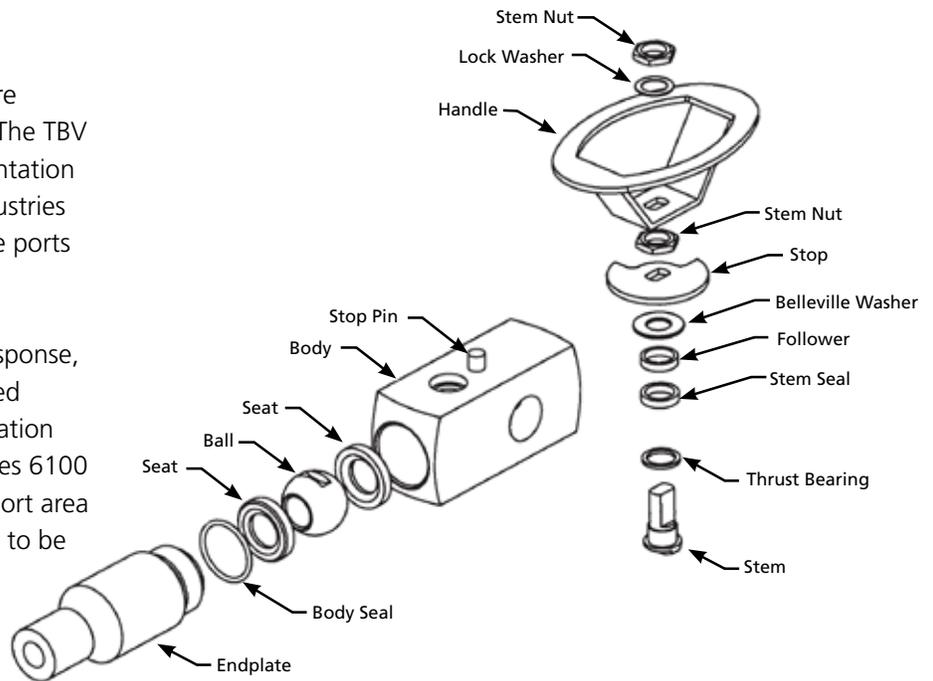
Safety is a major concern in most industries. In response, Cameron's TBV valve offers a tamper-proof, welded design, an oval handle to prevent accidental operation and a blowout-proof bottom entry stem. The Series 6100 valve also incorporates a large, straight-through port area for easy rod-out capability. Only the handle needs to be removed when installing on 2-1/8" (54 mm) center-to-center applications.

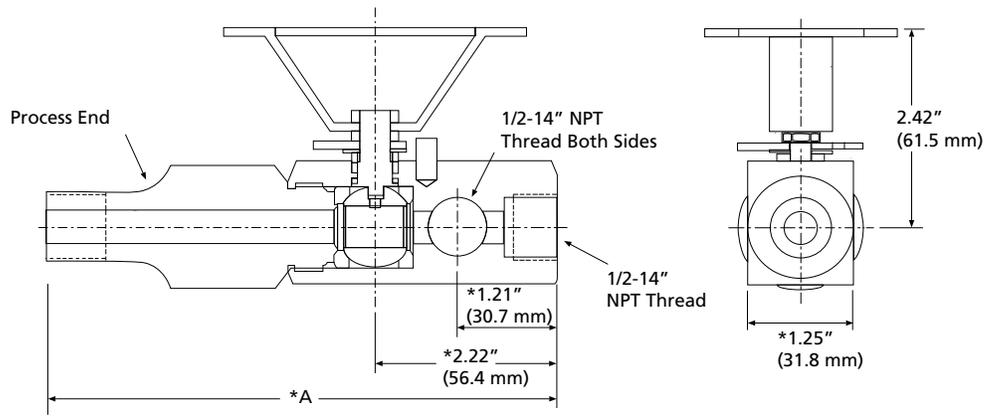
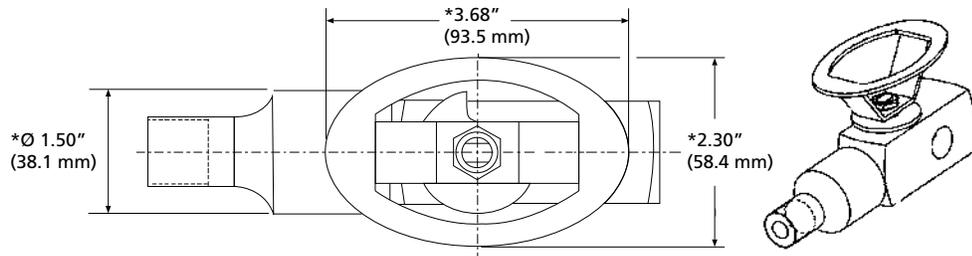
#### APPLICATIONS:

- Root valve
- Gauge valve for multiple portings
- Isolation valve
- Drain valve
- Orifice valve

#### End Connections Available

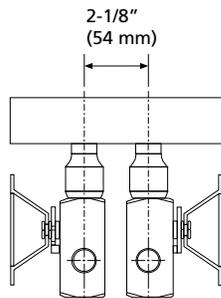
- 1/2", 3/4" and 1" (15, 20 and 25 mm) sizes in butt weld, socket weld, FNPT or flanged
- ASME Classes 150, 300, 600 and 900
- 2000 psi WOG rating





Dimensional drawing shown: 1/2" FNPT x 1/2" MNPT valve. Consult Cameron for other configurations.

Endplate Options for Process End		
Flanged End (ASME Classes 150 or 300)	Butt-Weld End	Socket-Weld End



### Major Dimensions

- 1/2", 1/2" x 3/4" (15 mm, 15 mm x 20 mm)

Ends*	EE**
*A 6.19 (157)	7.27 (185)

\* Dimensions for screw end, socket-weld ends and butt-weld ends are equal. Dimensions for ASME Classes 150 and 300 flanges are equal.

\*\* Extended end is designated as an EE in the ordering code.

Valves can be mounted on 2-1/8" (54 mm) centers by removing the mating valve handle. In common competitive globe body configuration, it is necessary to disassemble the bonnet from the body in order to screw the valve into the orifice flange next to another valve. TBV valves do not require disassembly, therefore factory integrity is not disturbed.

## SERIES 6600 – CAST BODY WITH BAR STOCK ENDS

### Welded Instrumentation Valve with Double Male Ends

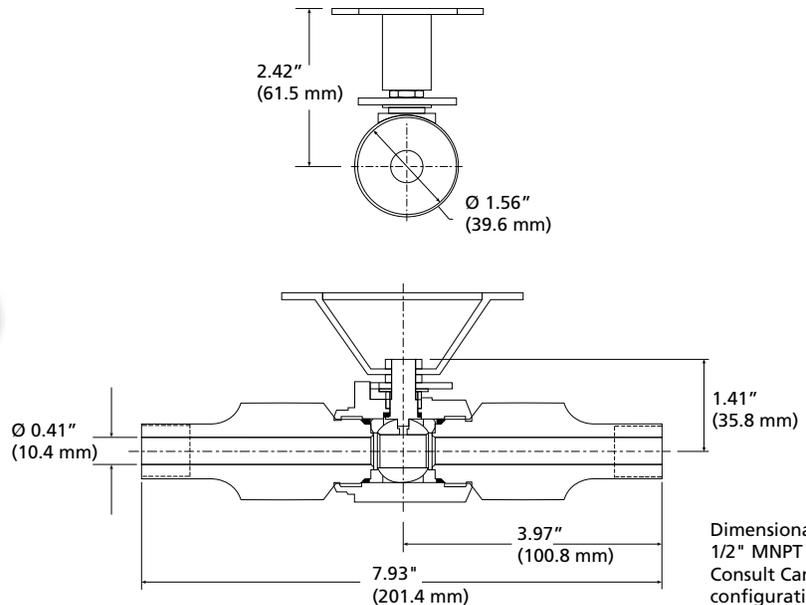
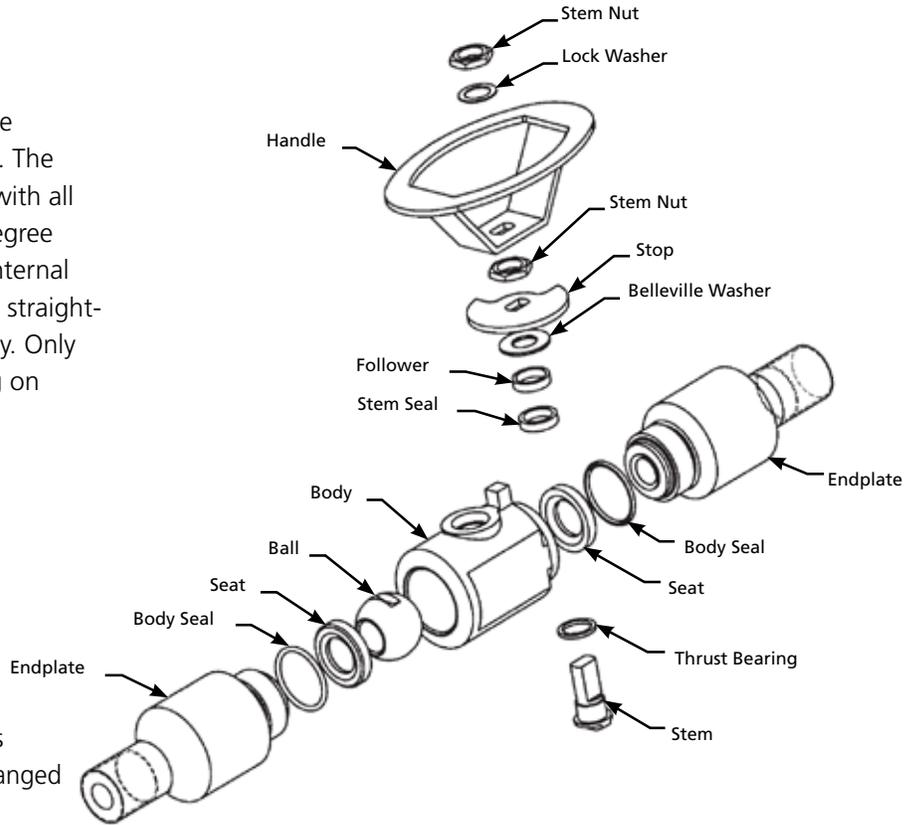
1/2" to 1" (15 to 25 mm) standard endplates are available. Other sizes are available upon request. The TBV Series 61/41/61 valve is uniquely designed with all inherent TBV ball valve features, including 90-degree operation, tamper-proof welded construction, internal entry stem and an oval safety handle. The large, straight-through port area permits easy rod-out capability. Only the handle needs to be removed when installing on 2-1/8" (54 mm) center-to-center applications.

#### APPLICATIONS:

- Root valve
- Gauge valve
- Isolation valve
- Orifice valve

#### End Connections Available

- 1/2", 3/4" and 1" (15, 20 and 25 mm) sizes in butt weld, male socket weld, MNPT and flanged
- ASME Classes 150, 300, 600 and 900
- 2000 psi WOG rating



Dimensional drawing shown: 1/2" MNPT x 1/2" MNPT valve. Consult Cameron for other configurations.

## SERIES 6400 – FORGED BODY WITH BAR STOCK ENDS

### Welded Instrumentation Valve

1/2" to 1" (15 to 25 mm) Standard endplates are available. Other sizes available upon request. Cameron's TBV Series 6400 forged body with bar stock ends, carbon or stainless steel process, gauge ball\* valve replaces leaky gate valves. TBV ball valve features a fire-safe design that meet stringent refinery and chemical plant requirements.

The Series 6400 valve also features a high-strength forged body, welded tamper-proof construction, internal entry blowout-proof stem, an oval safety handle and an integral lock-out device to prevent accidental operation. The unique, fire-safe design of this product incorporates backup metal fire lips to provide sealing if the soft seats sublimate in the event of a fire, and optional grafoil stem seal to ensure fire-safe integrity. This fire-safe design meets the stringent requirements of API 607. The Series 6400 valve is available with options, including lock-out devices and spring return handles.

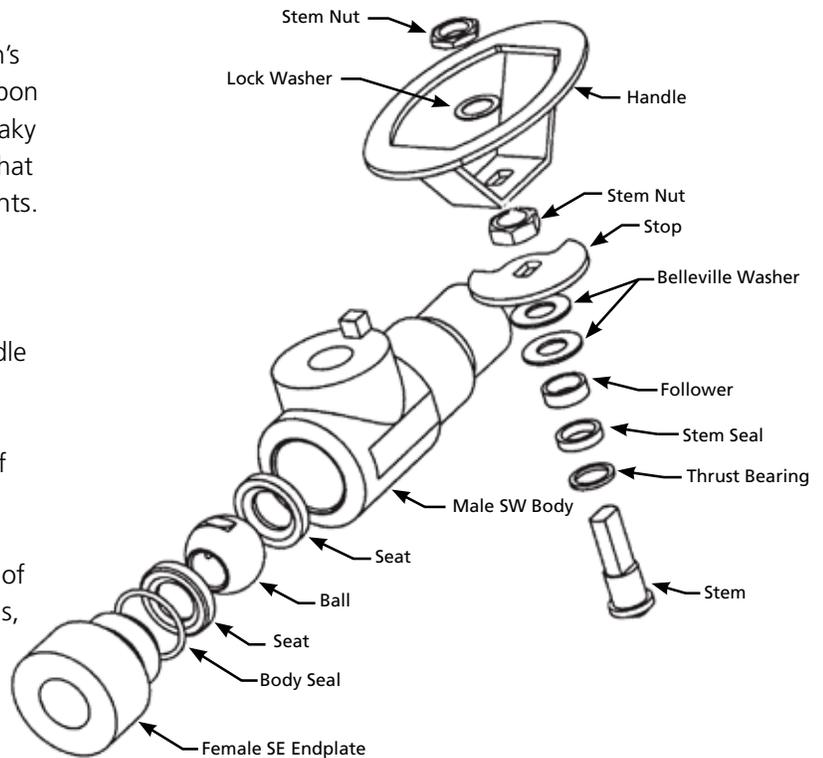
\*Consult Cameron for other materials of construction.

### APPLICATIONS:

- Differential pressure transmitters
- Pressure transmitters
- Head level transmitters
- Sample point applications
- Drain valves and blowdown service

### End Connections Available

- 1/2", 3/4" and 1" (15, 20 and 25 mm) sizes in butt weld, socket weld, FNPT and flanged
- ASME Classes 150, 300, 600 and 900
- 2000 psi WOG rating



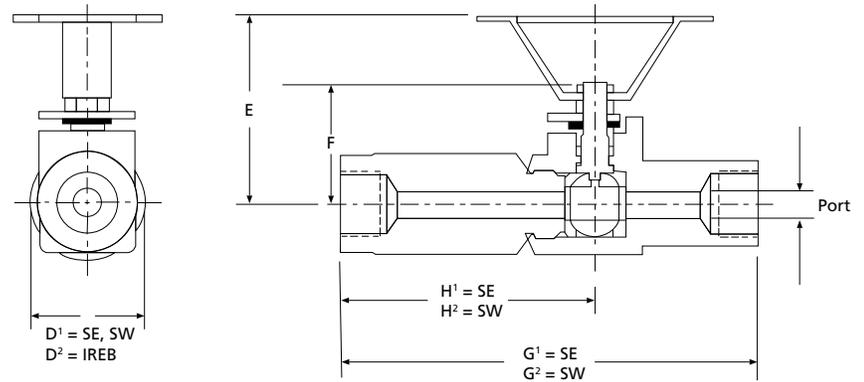
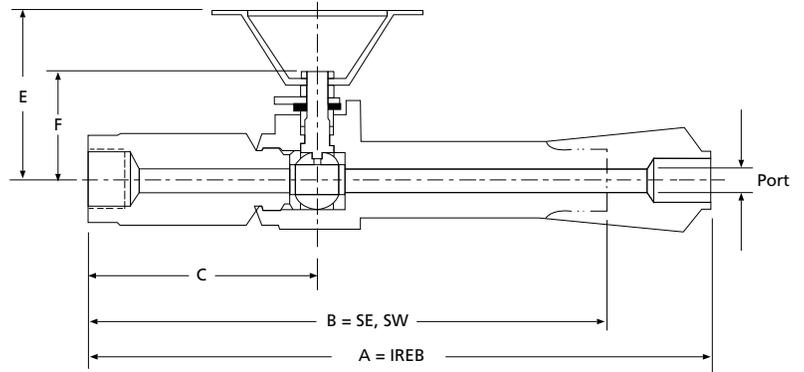
## SERIES 6400 WITH EXTENDED BODY

### Steam Manifold Application Notes

- Tapping of pressure vessels and header lines
- Eliminates the need for gussets
- IREB (Integrally Reinforced Extended Body) with Schedule 160 end connection
- Saves installation time and labor

### APPLICATIONS:

- Vents
- Drains
- Instrumentation



### Major Dimensions

Valve Size in.			
DN Size (mm)	1/2" (15)	3/4" (20)	1" (25)
A	10.78 (273.8)	10.78 (273.8)	11.73 (297.9)
B	8.97 (227.8)	8.97 (227.8)	10.36 (263.1)
C	3.97 (100.8)	3.97 (100.8)	4.11 (104.4)
D <sup>1</sup>	1.56 (39.6)	1.56 (39.6)	2.06 (52.3)
D <sup>2</sup>	1.78 (45.2)	1.78 (45.2)	2.06 (52.3)
E	2.83 (71.8)	2.83 (71.8)	4.00 (101.6)
F	1.81 (46.0)	1.81 (46.0)	2.29 (58.2)
G <sup>1</sup>	6.53 (165.9)	6.53 (165.9)	6.86 (174.2)
G <sup>2</sup>	6.75 (171.5)	6.75 (171.5)	8.86 (225.0)
H <sup>1</sup>	3.97 (100.8)	3.97 (100.8)	4.11 (104.4)
H <sup>2</sup>	3.97 (100.8)	3.97 (100.8)	4.11 (104.4)
Port	0.41 (10.4)	0.41 (10.4)	0.75 (19.1)

Note: The extension for female socket-weld end connections are provided in order to avoid overheating the seats and body seals when welding.

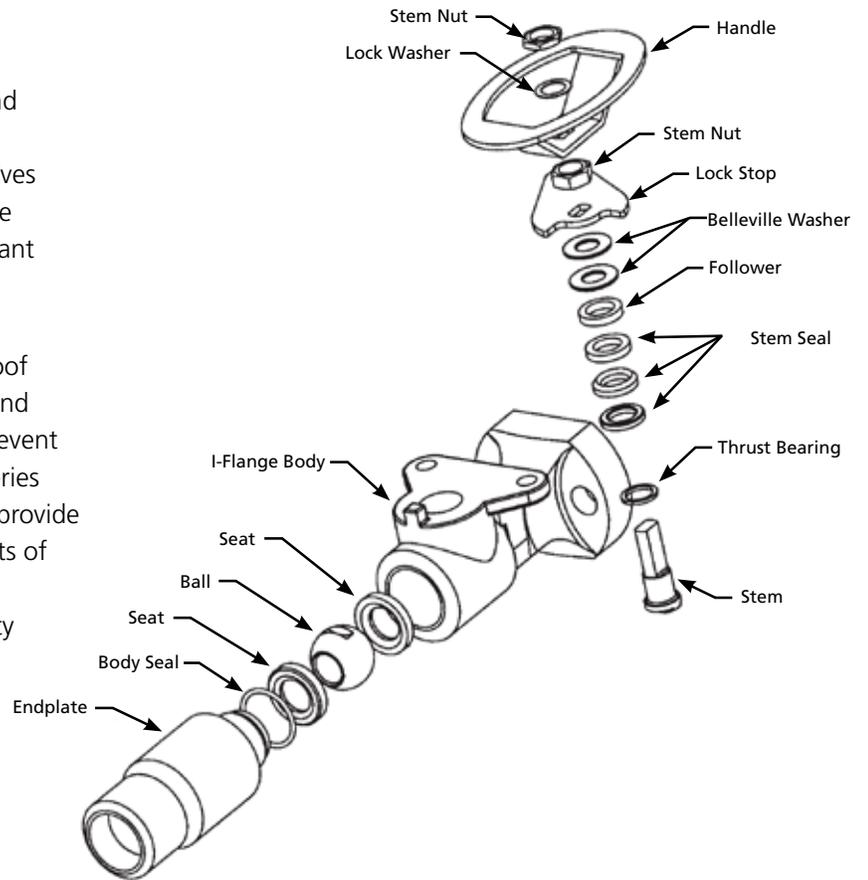


## SERIES 6500 WELDED INSTRUMENTATION VALVE WITH I-FLANGE CONNECTION

### Welded Instrumentation Valve with I-Flange Connection

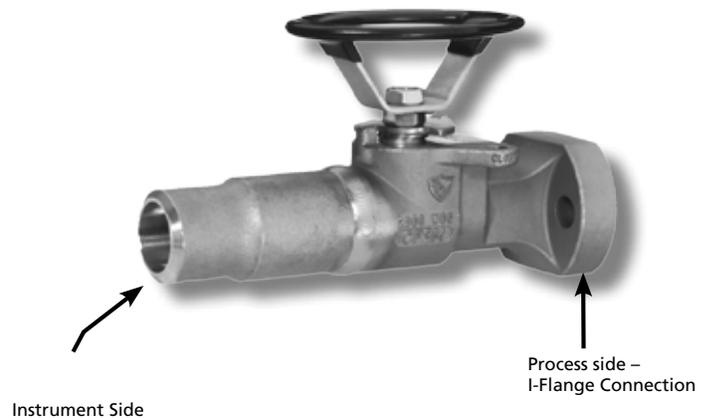
3/4" x 1" or 1/2" (20 mm x 25 mm or 15 mm) end connections are available. The TBV Series 6500 cast body transmitter valve replaces leaky gate valves with advanced TBV ball valve features in a fire-safe design meeting stringent refinery and chemical plant requirements.

The Series 6500 valve features welded tamper-proof construction, internal entry blowout-proof stem and an oval safety handle with a lock-out device to prevent accidental operation. The unique design of the Series 6500 valve incorporates backup metal fire lips to provide sealing if the soft seats meet the stringent requirements of API 607. The Series 6500 valve offers reliability, safety, visibility, unique mounting capability, quality and unsurpassed leakage protection.

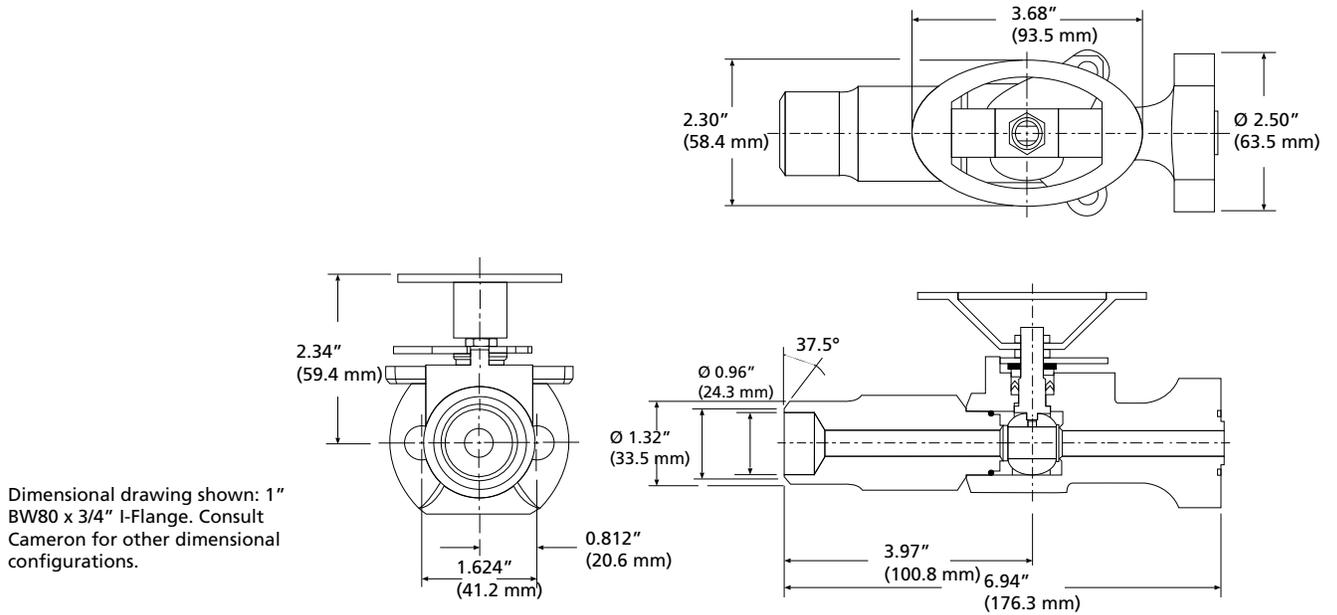


### End Connections Available

- 1/2", 3/4" and 1" (15, 20 and 25 mm) sizes in butt weld, socket weld, MNPT, FNPT and flanged
- ASME Classes 150, 300, 600 and 900
- 2000 psi WOG rating



## SERIES 6500 WELDED INSTRUMENTATION VALVE WITH I-FLANGE CONNECTION (CONT.)



Application Information		
Floe D/P Transmitters	Pressure Transmitters	Differential Pressure Transmitter
Orifice	Gauge Pressure	Head Level D/P
Flowtube	Absolute Pressure	Differential Pressure
Venturi	Draft Pressure	
Wedge		
Annubars		

Applications: Direct connection for transmitter to root/isolation valve.



## SERIES 6800 – CAST BODY WITH BAR STOCK END

### Welded Instrumentation Valve with Integral Locking Plate

3/4" (20 mm) body with 1/2", 3/4" or 1" (15, 20 or 25 mm) end connections are available. The TBV Series 6800 valve is an instrumentation valve with a cast carbon or stainless steel body\* that incorporates an integral lock-out pad and a high-performance stem packing. The valve comes equipped with a locking oval handle as a standard feature. It is seal-welded to prevent tampering or accidental unthreading when removing from the line. The Series 6800 valve is fire-safe when ordered with appropriate seals and is fully roddable. Because of the cast lock-out pad, it cannot be turned on 2-1/8" (54 mm) centers.

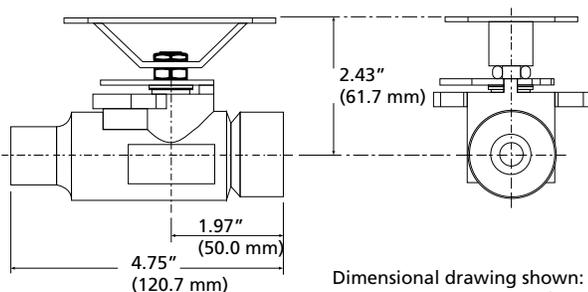
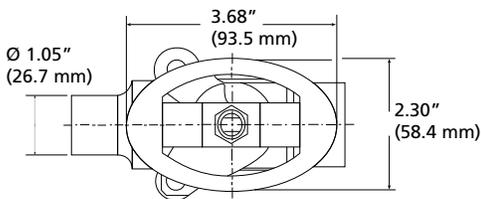
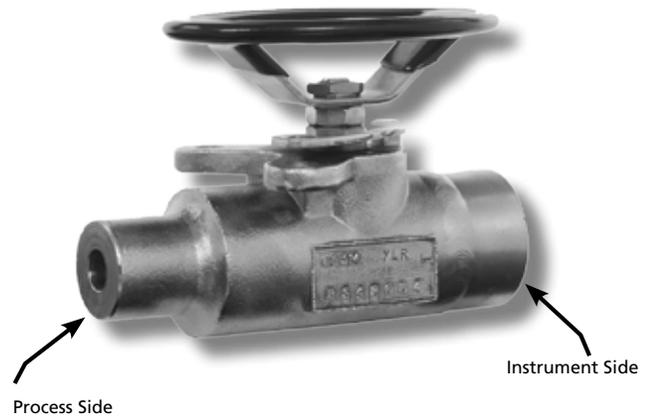
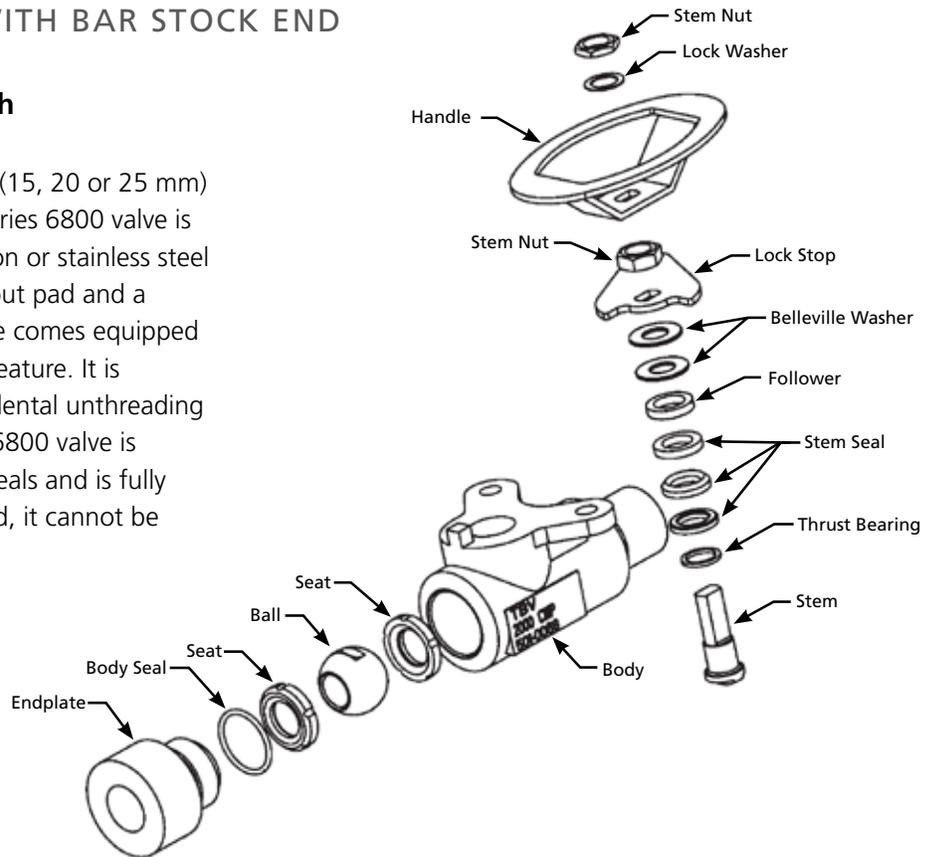
\*Consult Cameron for other materials of construction.

#### APPLICATIONS:

- Root valve
- Gauge valve
- Isolation valve
- Drain valve

#### End Connections Available

- 1/2", 3/4" and 1" (15, 20 and 25 mm) sizes in butt weld, MNPT, FNPT and flanged
- ASME Classes 150, 300, 600 and 900
- 2000 psi WOG rating



Dimensional drawing shown:  
1/2" FNPT x 3/4" MSW valve.  
Consult Cameron for other configurations.

## SERIES 6900 – CAST BODY AND BAR STOCK ENDS

### Welded Instrumentation Valve with Multiple Gauge Ports and Integral Locking Plate

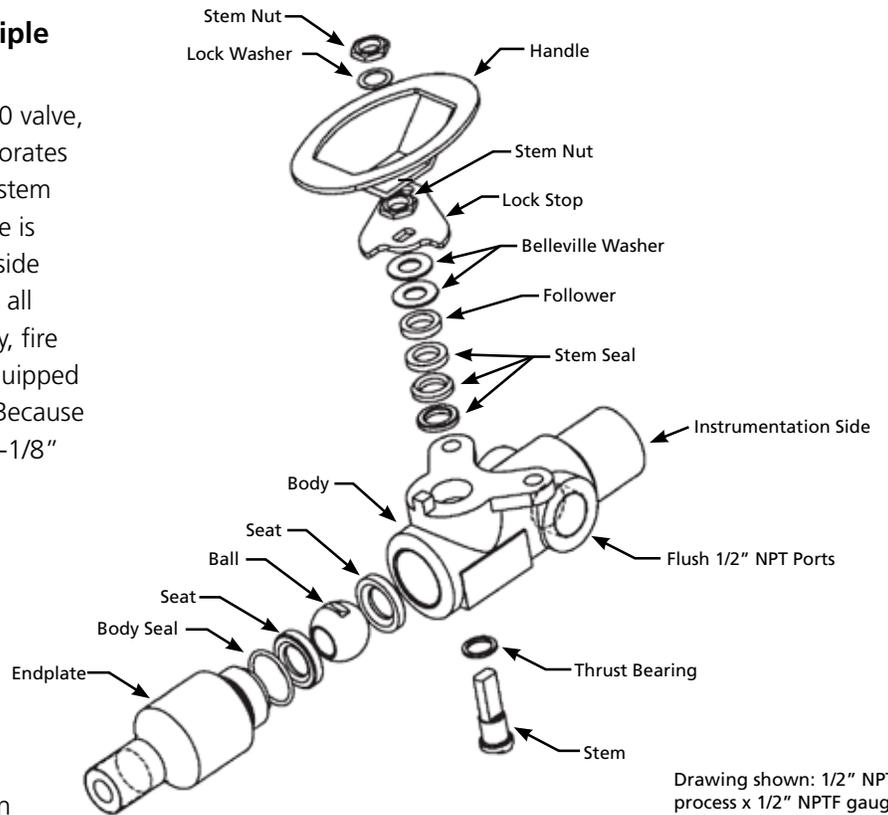
An instrumentation valve similar to the Series 6100 valve, the Series 6900 valve uses a cast body that incorporates an integral lock-out pad and a high-performance stem packing. Like the 6100 valve, the Series 6900 valve is used as a gauge isolation valve, with tapped NPT side ports for flush and drain functions. It incorporates all of the other features of the 6100 valve: roddability, fire safety and seal welding. The 6900 valve comes equipped with a locking oval handle as a standard feature. Because of the cast lock-out pad, it cannot be turned on 2-1/8" (54 mm) centers.

#### APPLICATIONS:

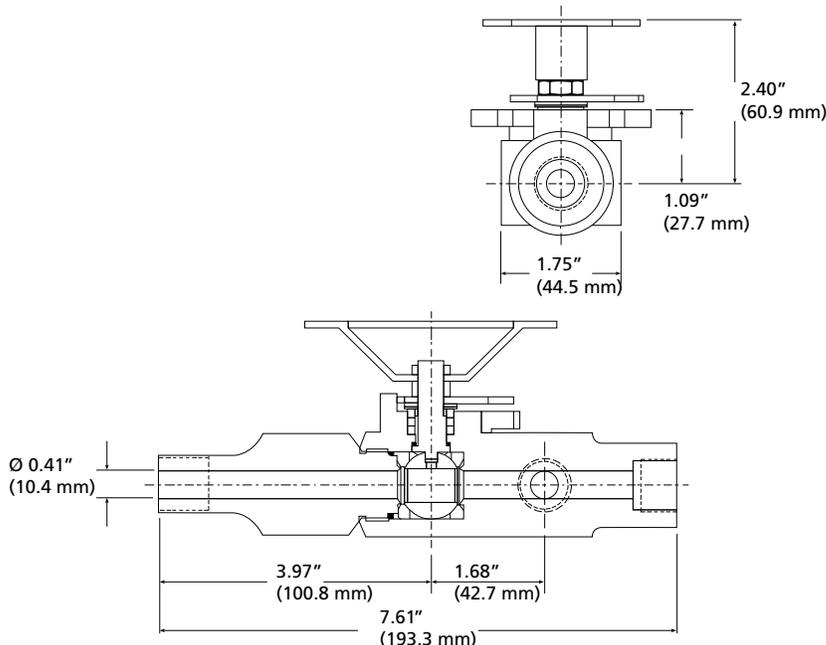
- Root valve
- Isolation valve
- Transmitter gauge block-and-bleed valve at -20° F to 500° F (-29° C to 296° C)

#### End Connections Available

- 1/2", 3/4" and 1" (15, 20 and 25 mm) sizes in butt weld, socket weld, MNPT, FNPT or flanged
- ASME Classes 150, 300, 600 and 900
- 2000 psi WOG rating



Drawing shown: 1/2" NPTM process x 1/2" NPTF gauge.



Dimensional drawing shown: 1/2" FNPT x 1/2" MNPT valve. Consult Cameron for other configurations.



Transmitter Gauge Block-and-Bleed Valve

## ENGINEERING INFORMATION

Design Specifications Available	
ASME B16.5	Pipe Flanges and Flanged Fittings
ASME B16.10	Face-to-Face Dimensions of Ferrous Valves
ASME B16.104	Bubble-Tight Soft Seats; Metal Seats Classes IV and V
ASME B16.34	Steel Valves (Performance and Design)
ASME B13.1	Power Piping (Application)
ASME B31.3	Process Piping (Application)
Chlorine Institute Pamphlet 6	Piping System; Dry Chlorine
NACE MR0175/ISO 15156-1	Sour Gas Service (Application)
MSS-SP-99	Instrumentation Valves
API 607	Fire-Tested for Soft-Seated Valves

Features	Benefits
Variety of Seating Materials	Wide Range of Process Media and Service Conditions
Live-Loaded Stem	Pressure and Temperature Recovery; Stem Seal Integrity with a Low Operating Torque
Blowout-Proof Stem	Operator Safety
Heavy-Duty Handle	Ease of Operation and Long Life
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 1000° F (538° C); Consult Cameron for Recommendation
Large Port Area	Provides Capability to be Easily Rod-Out without Damage to Ball or Seats
Oval Safety Handle	Prevents Accidental Operation by Maintaining Easy Visual Indication of Open or Closed Position
Easy to Identify if Valve is Open or Closed	In Open Position, Handle is In-Line with Piping; in Closed Position, Handle is Cross-Lined with Piping
Welded Design	Tamper-Proof
Variety of End Connections	Threaded, Butt-Weld, Socket-Weld or Flanged Ends
Positive Mechanical Stop	Safe Operation
Available in All Alloys	Wide Range of Service Conditions
Optional Locking Handle	Additional Protection Against Accidental Operation
Fugitive Emissions are Optional	Reduces Release of Toxic Chemicals
Carbon Steel Body and Endplate are Black Oxide Coated	Corrosion-Resistant

### Notes for Torque Information

- All torque values are based on maximum rated pressure, clean service and frequent operation (more than once per month).
- All values represent torque required to both break the valve open and reclose the valve. For spring return actuators, this means that the end of spring torque must exceed the above values by the appropriate safety margin.
- The recommended safety margin for sizing purposes is a minimum of 25%.
- For full port valves, use torque values for the next-largest valve size.
- $C_v$  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.

## ENGINEERING INFORMATION (CONT.)

Instrumentation Valve Capabilities/Applications								
	4100	41/61	6100	61/41/61	6400	6500	6800	6900
Root	•	•	•	•	•	•	•	•
Gauge	•	•	•	•	•		•	•
Isolation	•	•	•	•	•	•	•	•
Drain		•			•		•	
Orifice		•				•		
Fire-Safe	•	•	•	•	•	•	•	•
Welded	•	•	•	•	•	•	•	•
Rod-Out Capability	•	•	•	•	•	•	•	•
Turn on 2-1/8" (54 mm) Centers	•	•	•	•	•	Δ	Δ	Δ

Δ Weld-in on 2-1/8" (54 mm) centers.

C <sub>v</sub> and Maximum Torque (in-lb) Data									
Size in.	C <sub>v</sub>	Seat T	Seat G	Seat C	Seat U	Seat P	Seat D	Seat K	Seat M
1/2	8	30	55	100	50	60	70	120	90
3/4	8	45	75	125	70	84	98	150	126
1	33	80	130	250	120	144	168	300	216

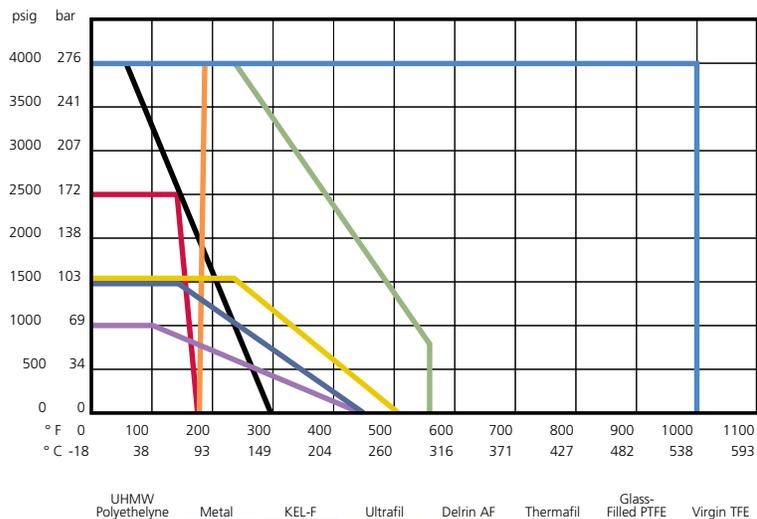
Seat Material Identification Code	
T – Virgin PTFE	White
G – Reinforced PTFE	White with Red Speckles
C – Cryofil	White
U – Ultrafil	Black
P – UHMWPP	Translucent White
D – Delrin	Dark Brown
K – CTFE	Translucent
M – Metal	Silver

In addition to the options and features shown, Cameron specializes in designing and manufacturing ball valves for a wide variety of special applications. Cameron is known for its ability to solve difficult applications with severe service valves that perform where others have failed.

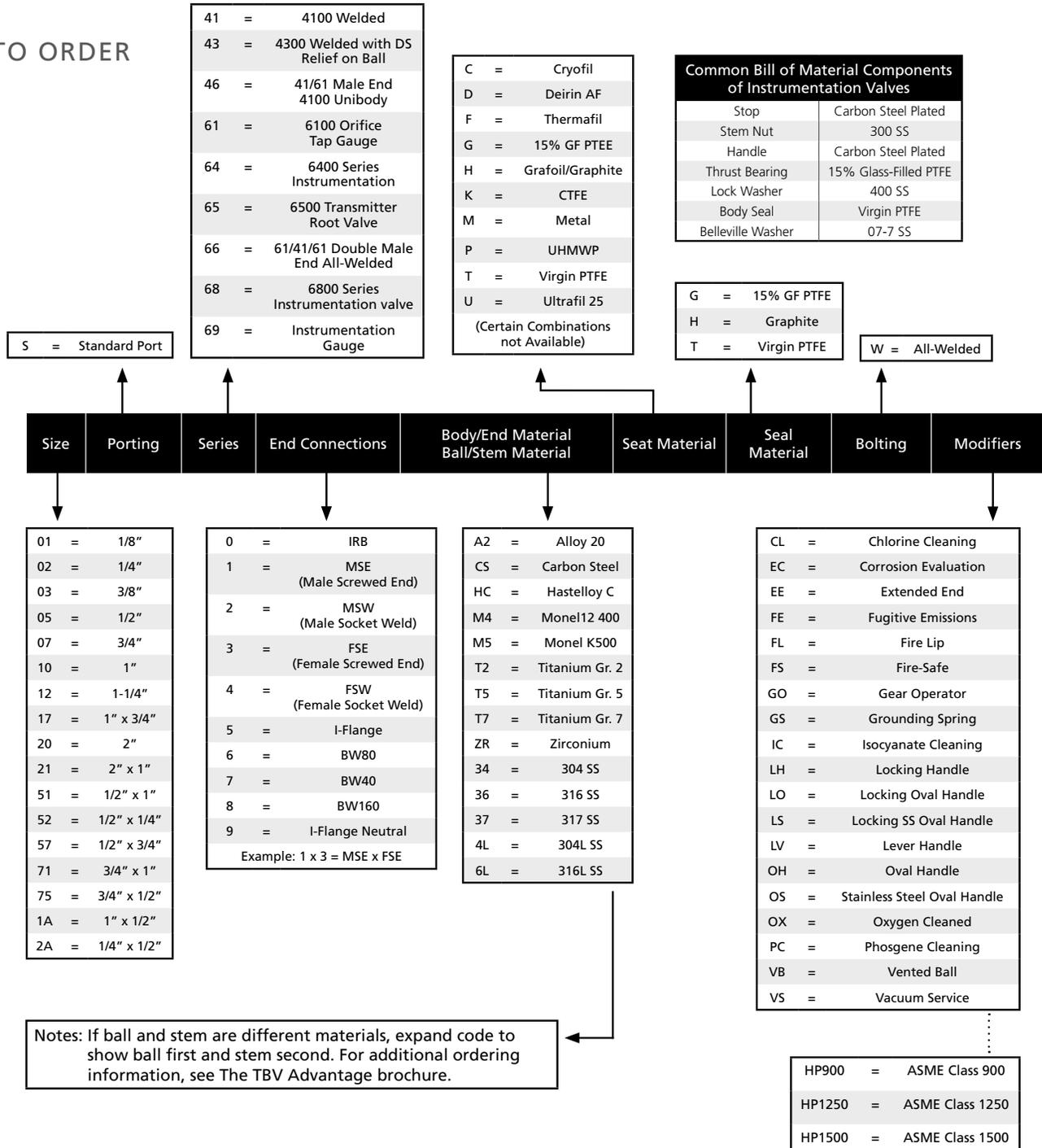
Extended bonnets are available to meet stringent fugitive emissions requirements. Our patented bellow-sealed ball valve ensures zero leakage when absolutely no external leakage is tolerable.

A variety of special materials also are available for severe or exotic services. Special material testing, such as corrosion evaluation, is available. Complete material certification packages can be provided to meet extensive specification requirements. A variety of other product configurations and sizes, up to 10" (254 mm) line size, are available on application. Consult Cameron's extensive TBV library of designs that have been proven to give outstanding performance in the most severe services.

Cryofil seats rated at 1500 psi from -425° F to 150° F (-254° C to 66° C). Extended pressures and temperatures may 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 manufactures an extensive line of high-pressure valves capable of the full seat rating shown. Consult Cameron for details.



# HOW TO ORDER



## Typical Valve Model Numbers/Descriptions:

**4100 – 075 41 FSE M4M4 TT WCLVB** = 3/4" (20 mm) 4100 welded valve with FSE ends, Monel 400 body, ball and stem, PTFE seats and seals, cleaned for chlorine service, with vented ball

**41/61 – 075 46 1X3 CS36 UT W** = 3/4" (20 mm) 41/61 welded valve with MSE by FSE ends, carbon steel body, 316 stainless ball and stem, ultrafil seats, and PTFE seals

**6100 – 755 61 2X3 A2A2 UT W** = 3/4" x 1/2" (20 x 15 mm) 6100 welded gauge valve with MSW by FSE ends, Alloy 20 body, ball and stem, ultrafil seats, and PTFE seals

**61/41/61 – 055 66 MSE 6L6L UT W** = 1/2" (15 mm) 61/41/61 welded single port gauge valve with MSE ends, 316 L stainless body, ball and stem, ultrafil seats, and PTFE seals

**6400 – 075 64 2X3 CS36 UH WFS** = 3/4" (20 mm) 6400 welded drain valve with MSW x FSE ends, carbon steel body, 316 stainless ball and stem, ultrafil seats, graphoil seals, fire-safe design

**6500 – 075 65 5X5 CSM4 TT W** = 3/4" (20 mm) 6500 welded instrumentation valve with I-Flange ends, carbon steel body, Monel ball and stem, and PTFE seats and seals

**6800 – 075 68 2X3 CS36 UH WFS** = 3/4" (20 mm) 6800 welded drain valve with MSW x FSE ends, carbon steel body, 316 stainless ball and stem, ultrafil seats, graphoil seals, and fire-safe design

**6900 – 755 69 1X3 6L36 UT WFLOS** = 3/4" x 1/2" (20 mm x 15 mm) 6900 welded gauge valve with MSE by FSE ends, 316L stainless body, 316 stainless ball and stem, ultrafil seats, PTFE seals with fire lip, and stainless steel oval handle

## Trademark Information

TBV is a trademark of Cameron.

This document contains references to registered trademarks or product designations, which are not owned by Cameron.

Trademark	Owner
Delrin	E.I DuPont De Nemours and Company
Hastelloy	Haynes International, Inc.
Monel	INCO Alloys International, Inc.

### Certifications





3250 Briarpark Drive, Suite 300  
Houston, TX 77042  
USA  
Tel 1 281 499 8511

For more information about TBV instrumentation ball valves:

[www.c-a-m.com/TBV](http://www.c-a-m.com/TBV)

[TBV@c-a-m.com](mailto:TBV@c-a-m.com)



#### **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.