

TBV™ Series 21/20 Cryogenic Flanged Ball Valve



TBV™

SERIES 21/20



The **TBV 21/20 Series Flanged Cryogenic Ball Valve** is the result of more than 20 years of experience providing valves for cryogenic service.

The combination of its investment cast, unibody, standard port design, extended bonnet and blow-out proof stem offers unrivaled safety and reliability in both on-off and modulating applications.

As a result of our exclusive Cryofil seat material, adjustable V-ring stem packing and dual, fully-encapsulated body seals, the **21/20** offers low torque operation and tight shutoff at temperatures down to -452°F (-269°C).

Actuator mounting is facilitated by a rugged, four-bolt mounting pad as standard. In the manually operated version this mounting pad provides a standard locking device.

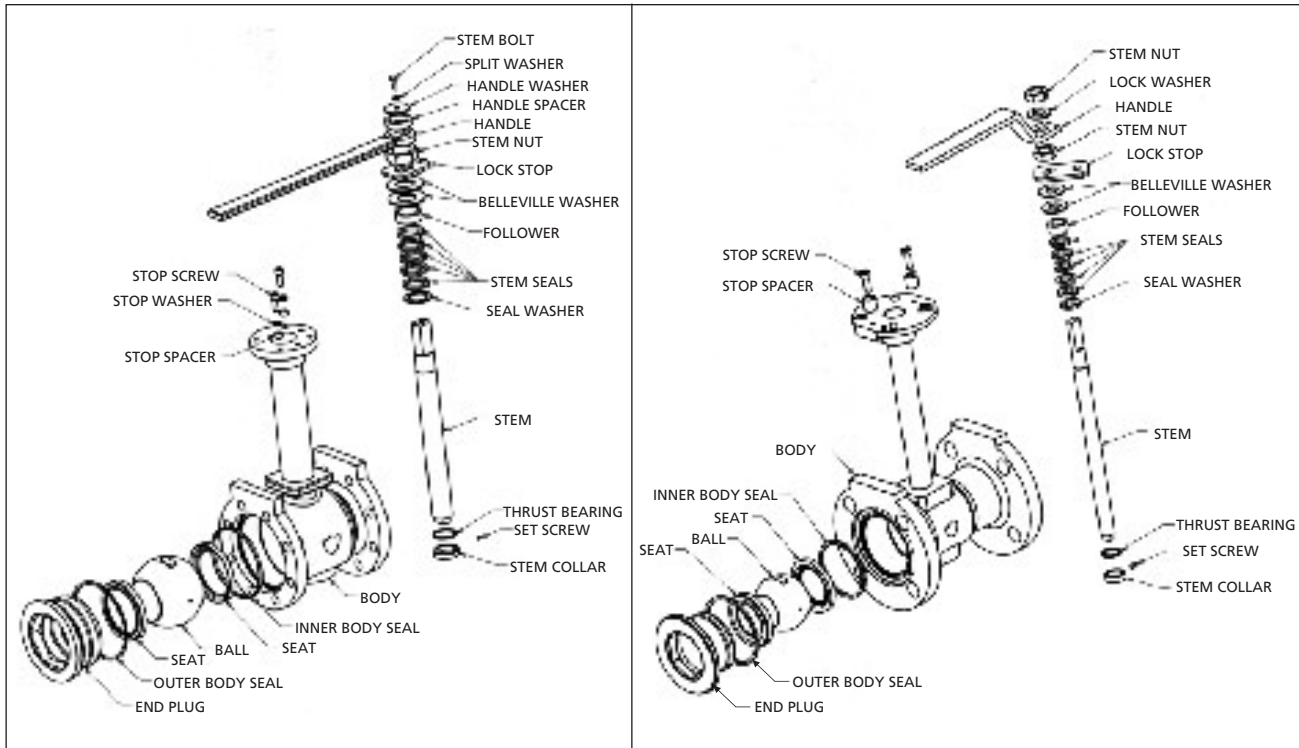
Cleaning procedures for TBV Cryogenic Valves are based on Praxair Specification GS-38.

- **1/2" THROUGH 6" SIZES**
- **LOW OPERATING TORQUE TO -452°F**
- **INVESTMENT CAST UNIBODY CONSTRUCTION**
- **EXCLUSIVE CRYOFIL SEATS**
- **ACTUATOR MOUNTING CAPABILITY STANDARD**
- **PADLOCKING DEVICE STANDARD**
- **OXYGEN CLEANING STANDARD**
- **BRITISH STANDARD (BS) 6364 COMPLIANT**

SERIES 21/20

3" - 6"

1/2" - 2"



MATERIALS LIST

PART	QUANTITY	DESCRIPTION
Body	1	316L, Stainless Steel, ASTM A351, Gr. CF 3M
End Plug	1	316L, Stainless Steel, ASTM A351, Gr. CF 3M
Ball	1	316 Stainless Steel, ASTM A479 or Monel, ASTM B164, Gr. 400
Stem	1	316 Stainless Steel, ASTM A479 or Monel, ASTM B164, Gr. 500
Follower	1	300 Series Stainless Steel
Seat	2	Cryofil, CTFE, Kel-F or Ultrafil
Stem Seal	5	PTFE, Grafoil®
Body Seal - Inner	1	PTFE, Grafoil®
Body Seal - Outer	1	PTFE, Grafoil®
Stop		300 Series Stainless Steel
Handle	1	300 Series Stainless Steel or Carbon Steel Plated
Thrust Bearing	1	Filled PTFE
Stem Nut	2	300 Series Stainless Steel
Stop Pin Screw	2	300 Series Stainless Steel
Lock Washer	1	300 Series Stainless Steel
Belleville Washer	2	300 Series Stainless Steel
Seal Washer	1	316 SS, ASTM 479 or Monel, ASTM B164, Gr. 400
Stop Pin	2	300 Series Stainless Steel
Set Screw	1	300 Series Stainless Steel
Stem Collar	1	300 Series Stainless Steel
Spacer	1	300 Series Stainless Steel
Flat Washer	1	300 Series Stainless Steel
Handle Screw	1	300 Series Stainless Steel
Lock Washer	2	300 Series Stainless Steel

®Union Carbide.

Repair Kit Items: seats, stem seal, body seals and thrust bearing.

When ordering a repair kit, customer must provide valve code and sales order number stamped on body of valve:

Example: Repair kit for 10S 2B 150 6L6L CT 0 (Part Number); S16754-3 (Sales Order Number).

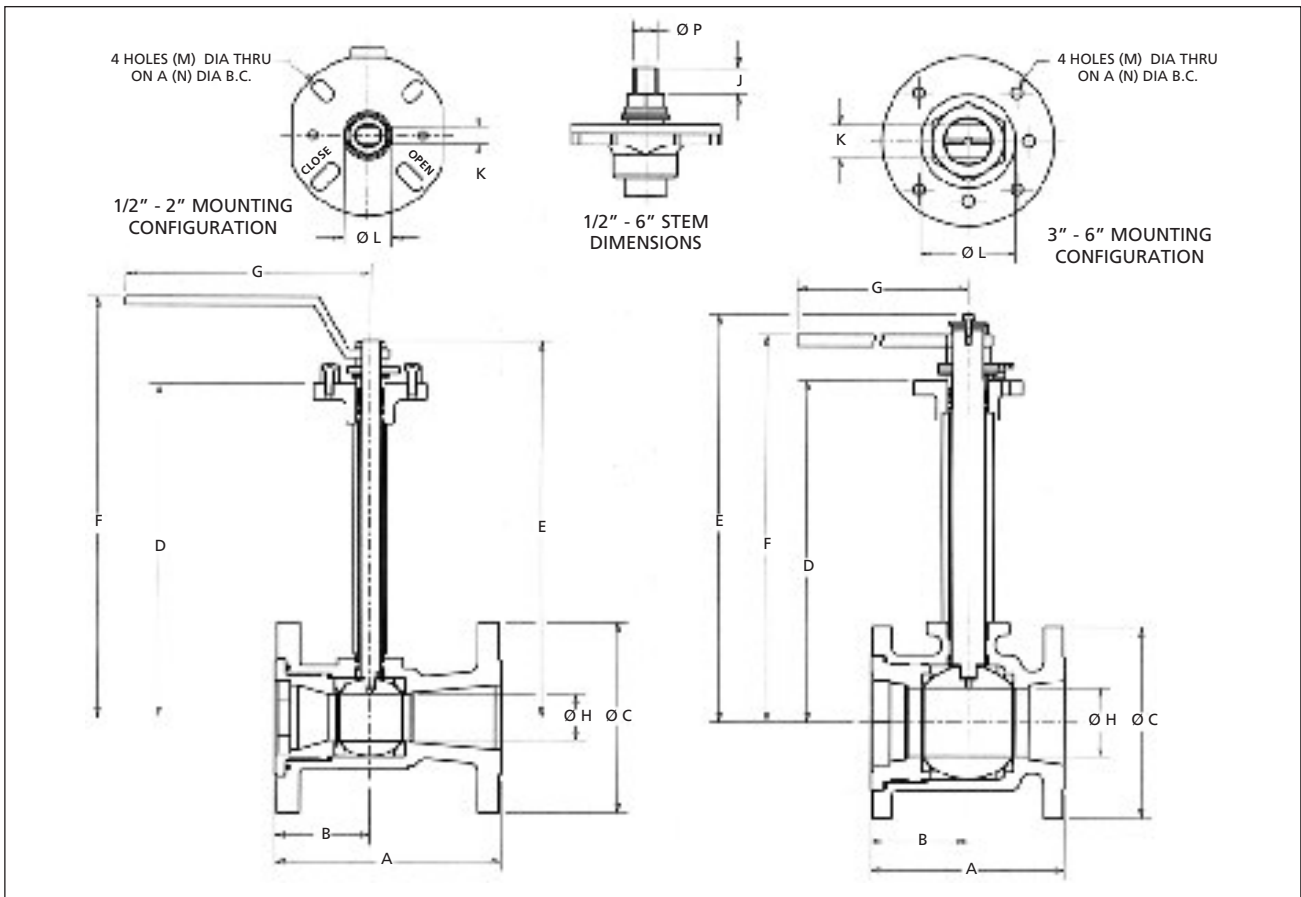
SERIES 21/20 ENGINEERING DATA

MAJOR DIMENSIONS ASME/ANSI CLASS 150

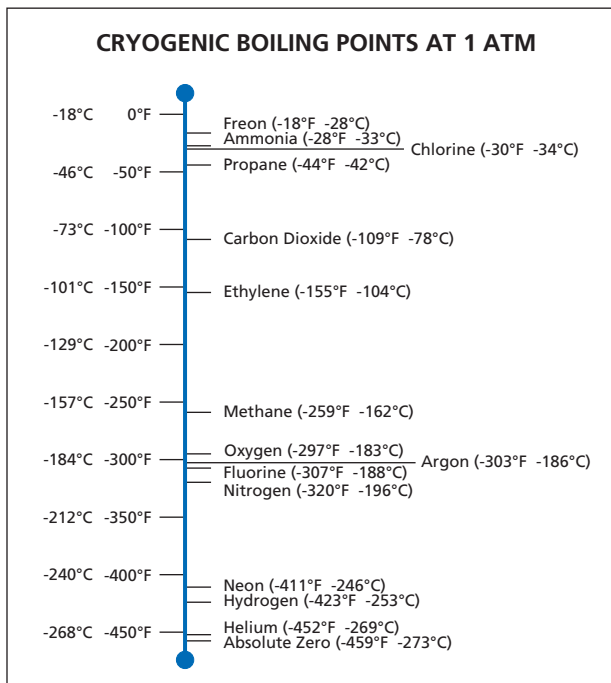
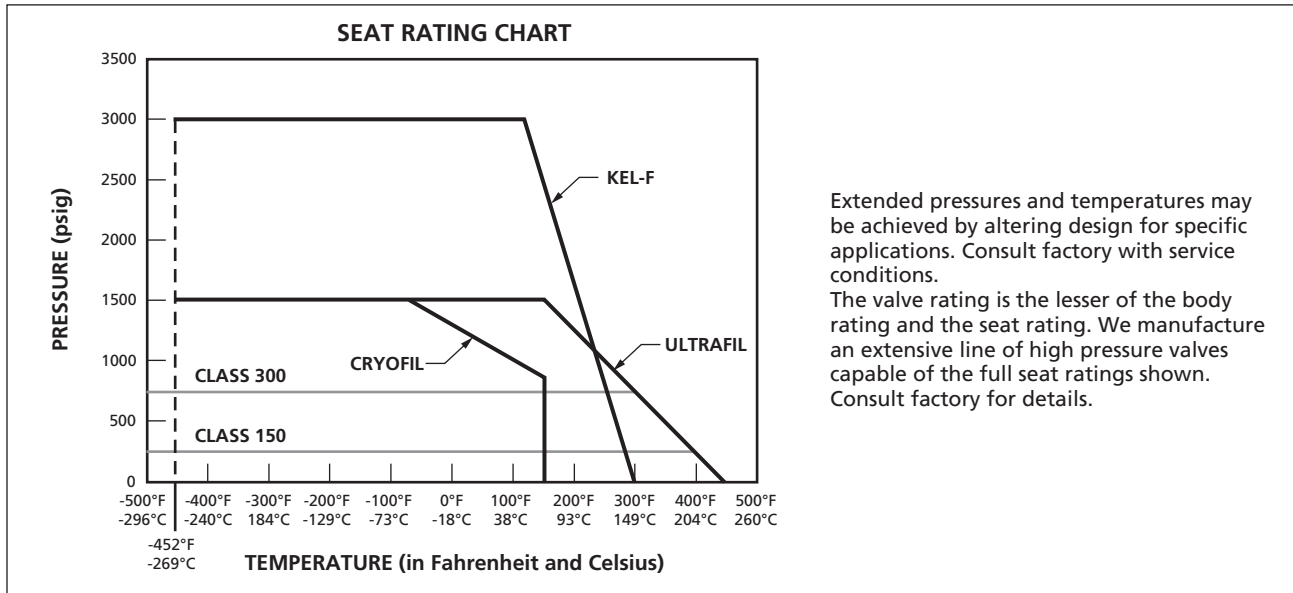
Valve	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Weight lb.
1/2"	4.25	2.12	3.50	7.88	8.83	8.64	5.50	0.38	0.38	0.230	0.75	0.34	3.18	3/8-24	5.5
3/4"	4.62	2.31	3.88	7.97	8.92	8.73	5.50	0.41	0.38	0.230	0.75	0.34	3.18	3/8-24	7.5
1"	5.00	2.25	4.25	8.19	9.35	9.08	5.50	0.75	0.50	0.296	0.88	0.34	3.18	7/16-20	9
1 1/2"	6.50	2.50	5.00	10.28	11.60	11.22	7.55	1.18	0.63	0.340	1.13	0.34	3.18	9/16-18	17
2"	7.00	2.92	6.00	10.47	11.79	11.41	7.55	1.44	0.63	0.340	1.13	0.34	3.18	9/16-18	24
3"	8.00	4.06	7.50	15.50	17.91	17.41	17.88	2.50	0.75	0.995	2.75	3/8-16	4.02	1 3/8-12	42
4"	9.00	4.51	9.00	16.10	18.51	18.01	17.88	3.25	0.75	0.995	2.75	3/8-16	4.02	1 3/8-12	54
6"	10.50	5.25	11.00	18.70	21.95	21.45	21.50	4.38	1.40	1.246	3.25	7/16-14	4.92	1 3/4-12	155

MAJOR DIMENSIONS ASME/ANSI CLASS 300

Valve	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Weight lb.
1/2"	5.50	2.12	3.75	7.88	8.83	8.64	5.50	0.38	0.38	0.230	0.75	0.34	3.18	3/8-24	8.5
3/4"	6.00	2.31	4.62	7.97	8.92	8.73	5.50	0.41	0.38	0.230	0.75	0.34	3.18	3/8-24	10.5
1"	6.50	2.25	4.88	8.19	9.35	9.08	5.50	0.75	0.50	0.296	0.88	0.34	3.18	7/16-20	12
1 1/2"	7.50	2.50	6.12	10.28	11.60	11.22	7.55	1.18	0.63	0.340	1.13	0.34	3.18	9/16-18	24
2"	8.50	2.92	6.50	10.47	11.79	11.41	7.55	1.44	0.63	0.340	1.13	0.34	3.18	9/16-18	30
3"	11.12	4.06	8.25	15.50	17.91	17.41	17.88	2.50	0.75	0.995	2.75	3/8-16	4.02	1 3/8-12	56
4"	12.00	4.51	10.00	16.10	18.51	18.01	17.88	3.25	0.75	0.995	2.75	3/8-16	4.02	1 3/8-12	80
6"	15.88	5.25	12.50	18.70	21.95	21.45	21.50	4.38	1.40	1.246	3.25	7/16-14	4.92	1 3/4-12	175



SERIES 21/20 ENGINEERING DATA



DESIGN SPECIFICATIONS

ASME B16.5	Pipe flanges and flanged fitting
ASME B16.10	Face-to-face dimensions of ferrous valves
ASME B16.34	Steel valves (performance & design)
ASME B31.3	Process Piping (application)
MSS SP25	Valve marking
MSS SP61	Pressure testing
API 607 4th Edition	Fire test for soft seated valves

SEAT MATERIAL IDENTIFICATION CODE

C - Cryofil	white
K - CTFE	translucent
U - Ultrafil	black

C_v VALUES AND MAXIMUM TORQUE (in. - lbs.)

SIZE	C _v	SEAT C	SEAT K	SEAT U
1/2"	8	100	120	50
3/4"	12	125	150	70
1"	33	250	300	120
1 1/2"	85	375	450	350
2"	133	610	732	600
3"	370	1350	1620	1900
4"	720	2500	3000	2800
6"	1050	5800	6960	5500

C_v values are based on the flow of water at 60°F and 14.7 psig through the valve in US gallons per minute at a pressure drop of 1 psi.

- NOTES FOR TORQUE INFORMATION AND C_v**
- All torque values are based on maximum rated pressure, clean service, and frequent operation (more than once per month).
 - The recommended safety margin for sizing purposes is a minimum of 25%
 - For valves with torques above 1440 inch lbs., gear operator or actuation should be considered.
 - Lower working pressures will reduce stem operating torque. Consult factory for further assistance.

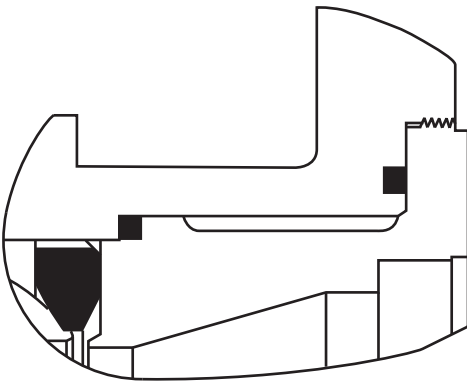
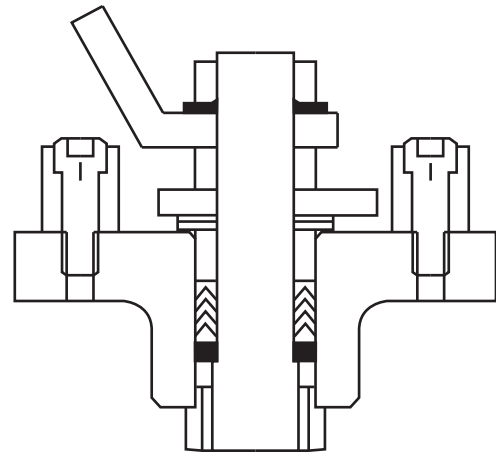
SERIES 21/20 ENGINEERING DATA

The TBV Series 21/20 Flanged Cryogenic Ball Valve provides the features and versatility to meet the requirements of virtually all cryogenic applications.

Available in 1/2" through 6" sizes and ASME/ANSI Class 150 and 300 flanged configurations, the Series 21/20 provides unsurpassed quality, reliability and safety in both on-off and modulating applications.

STEM SEAL

Leak-free stem sealing of the Series 21/20 is provided by a unified stem sealing system. The 5 rings of PTFE V-ring packing sits on a shoulder machined on the blowout-proof stem, allowing the packing and stem to move as a unit during thermal cycles. In addition, the packing is live-loaded, retained by self-compensating belleville spring washers and a packing adjustment nut that is captured between two stem-keyed components, virtually guaranteeing that the packing nut cannot loosen. These features coupled with close tolerance machining and finish of the packing bore, provide maximum stem seal life with the minimum maintenance.



BODY SEAL

The leak tight integrity of the Series 21/20 is further enhanced through the use of dual, fully-encapsulated body seals. These dual body seals are contained on all four sides by the valve end plug, thus preventing cold-flow of the PTFE.

A positive, internal, metal-to-metal stop assures that the seals are effectively loaded during assembly. There is no guesswork and no torque wrench required. Maintenance is further simplified by the standard hex drive in the end plug which allows the use of conventional tools.

The raised face surface finish meets the latest ASME B16.5 requirements and is uninterrupted, facilitating leak tight installation.

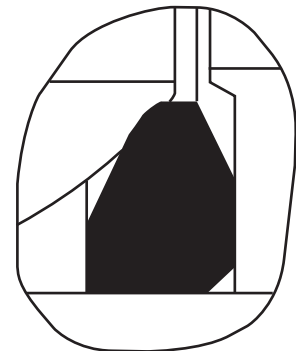
The Series 21/20 may be ordered as fire safe to API 607 4th Edition with the addition of graphite packing and graphite body seals.

SEATS

TBV's exclusive Cryofil seat material was developed in conjunction with a major elastomer producer. It is essentially a refined grade of Virgin PTFE with no fillers and therefore, does not represent a potential source of contamination. It is extremely stable at cryogenic temperatures.

The Cryofil seat utilizes a flexible lip design which allows the seat to follow the floating ball as the valve goes through pressure fluctuations, maintaining tight shutoff while minimizing operating torque through the full range of pressure and temperatures.

TBV's Series 21/20 is normally a unidirectional valve since a vent hole in the upstream side of the ball is utilized to prevent trapped media from building up pressure in the body cavity. If bidirectional shutoff is required, the vent hole may be eliminated through the use of our optional self-relieving seat.



ACTUATION

The Series 21/20 includes a rugged actuator mounting pad as standard, allowing pneumatic or electric actuators to be easily and securely installed utilizing a four-bolt mounting pattern. TBV's exclusive Cryofil seats provide low torque operation, minimizing the size of the actuator required. The Series 21/20 also provides a compact, lightweight, quarter-turn control valve package when utilized with a pneumatic or electric actuator/positioner.

SERIES 21/20
OTHER TBV CRYOGENIC VALVES

Quality, reliability and safety make the Series 21/20 Flanged Cryogenic Ball Valve and the following products the ultimate choice for cryogenic applications.



Series 2100 Three Piece Cryogenic Valve:
 1/4" through 3"; 316 stainless steel or bronze;
 threaded, socket weld or butt weld end connections.



Series 21/51 Three Piece Cryogenic Diverter Valve:
 1/4" through 6"; 90 or 180 degree operation;
 side or bottom ported; 316L stainless steel or bronze;
 threaded, socket weld, butt weld or flanged end connections.



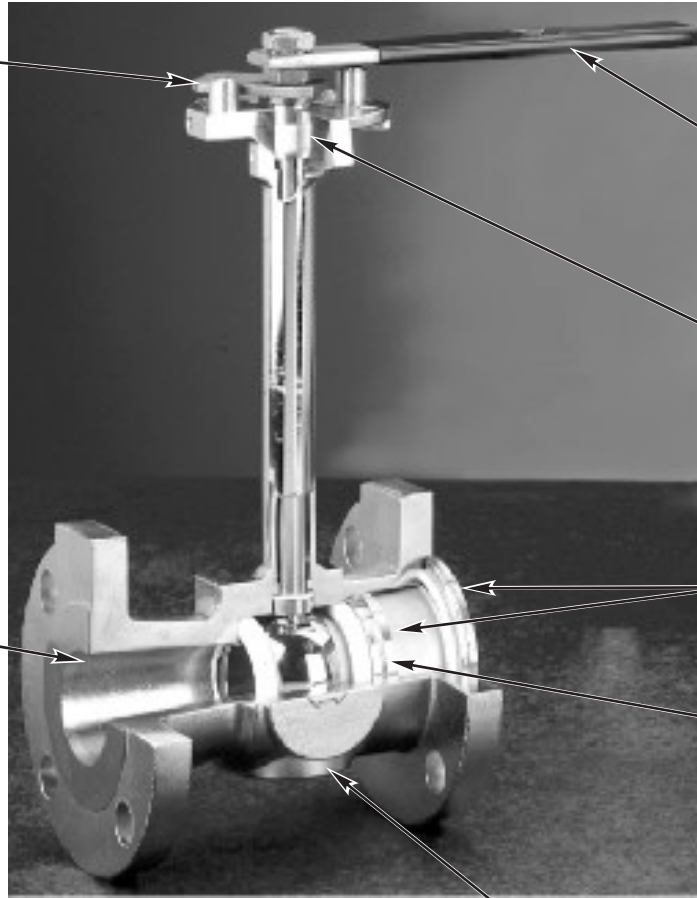
Series 21/51A Multi-Ported Diverter Valve:
 dual safety relief diverter valve assembly design to meet the
 flow requirements of stationary cryogenic containers and
 eliminate fabrication.



Series 21/20NE Non-Extended Bonnet:
 ASME/ANSI Class 150 and 300 flanged, cryogenic ball valve.
 For use in intermittent or semi-cryogenic service.
 Incorporates the same features as the Series 21/20.

SERIES 21/20 FEATURES AND BENEFITS

PADLOCKING DEVICE
AS STANDARD



LEVER OR OVAL HANDLE FOR
EASE OF OPERATION
(OVAL HANDLE ONLY FOR
1" AND SMALLER)

5 -RING, V-RING STEM PACKING

ASME/ANSI CLASS
150 OR 3000

PTFE BODY SEALS

EXCLUSIVE CRYOFIL SEAT

HIGH INTEGRITY UNIBODY CONSTRUCTION

FEATURES

- Variety of seating materials
- Flexible lip seat design
- Integral actuator mounting pad
- Live loaded stem

- Blow-out proof stem
- Heavy duty handle and stop
- Fully traceable materials

- 5 ring chevron packing
- Investment cast
- Unibody design with totally encapsulated, double end plug seals
- Cryofil seats
- Welded bonnet construction
- Stainless Steel externals
- No lubrication used

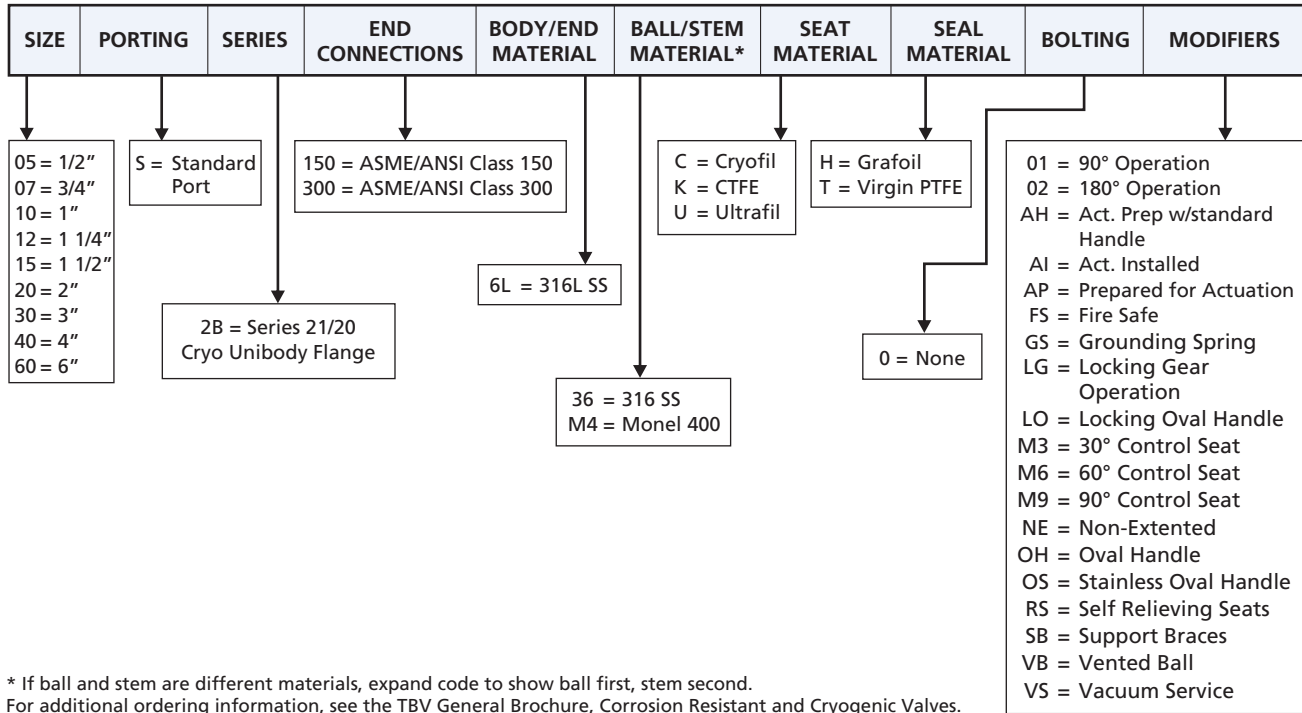
BENEFITS

- Wide range of process media and service conditions.
- Low operating torque.
- Ease of automation.
- Pressure and temperature recovery, stem seal integrity with a low operating torque.
- Operator safety.
- Ease of operation, long life.
- Certification of all pressure retaining parts available for stringent specification requirements.
- Stem seal integrity.
- High quality casting.

- Positive body sealing.
- Specially designed to provide leakproof operation to -452°F.
- No leak paths or exposed gaskets.
- Atmospheric corrosion resistance (optional).
- No possible contamination.

Note: Valve should not be installed more than 30 degrees from the vertical position.

SERIES 21/20 HOW TO ORDER



Example:

20S 2B 150 6L36 CT O = 2" Series 21/20, standard port, 150# flange, cryogenic ball valve with 316L stainless steel body and end plug; 316 stainless steel ball and stem, Cryofil seats, Virgin PTFE V-ring packing.



OTHER TBV CRYOGENIC VALVES

(from left to right):

- Series 21/20**
Cryogenic Flanged Ball Valves - Standard Port
- Series 2151A**
Multiport High Flow Cryogenic Diverter
- Series 2100**
Cryogenic Ball Valves 3-Piece
- Series 21/51**
Three Piece Cryogenic Diverter Valve
- Series 21/18**
Cryogenic Flanged Ball Valves - Full Port (not shown)

CERTIFICATIONS



TECHNOLOGY BASED VALUE IN VALVES AND INSTRUMENTATION PRODUCTS

Please contact Cameron, Valves & Measurement for Trademark information.

TRADEMARK INFORMATION

TBV™ is a registered trademark which is owned by Cameron.

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Trademark	Owner
HASTELLOY	Haynes International, Inc.
MONEL	INCO Alloys International, Inc.
PEEK	Vitrex PLC Corp United Kingdom
TEFLON	E.I. DuPont De Nemours & Company

To be checked for this BR

**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