



VALVES & MEASUREMENT

TBV™

OPERATION AND MAINTENANCE MANUAL
SERIES 21/20: CRYOGENIC FLANGED BALL VALVE

For technical questions, please contact the following:

*Engineering Department
1537 Grafton Road
Millbury, MA 01527
Phone: (508) 887-9400
Fax: (508) 887-8612*

TBV cryogenic ball valves are designed and engineered to provide long lasting, trouble-free service when used in accordance with these instructions and specifications. All TBV cryogenic ball valves have been cleaned and prepared for Oxygen service.

INSTALLATION

- 1. Valve must be installed with extended bonnet within 30° of true vertical.*
- 2. TBV cryogenic ball valves are unidirectional and must be installed for flow in one direction as indicated by the flow arrow marked on the body and bonnet pad.*
- 3. During installation, it is recommended that the valve ball be left in the open position to prevent possible damage to the ball.*
- 4. When installed with the flow arrow pointing downstream (in the direction of flow, or opposite the pressure source), the valve cavity will self-relieve into the upstream piping.*
- 5. Flanged valves should be installed using flange gaskets appropriate for the intended service. Fire safe valves require high temperature gaskets. Tighten flange bolts evenly to torque values appropriate for the gasket and bolt materials.*
- 6. After installation, cycle the valve several times to assure smooth operation.*

OPERATION

- 1. A quarter turn of the handle clockwise closes the valve and a quarter turn counterclockwise opens the valve. Visual indication of the ball position is determined by the handle position: when the handle is inline with the piping the valve is open; across the line, the valve is closed.*
- 2. Cryogenic ball valves perform best with the ball either fully open or fully closed. Leaving a soft-seated ball valve in a partially open position for an extended period of time may result in leakage due to seat deformation. Consult the factory for recommendations relative to modulating applications, and for valve purging procedures.*
- 3. Any media that might solidify, crystallize or polymerize should not be allowed to stand in the ball valve cavities. In particular, any water present in the pipeline will freeze and render the valve inoperable. In the event that this should happen, DO NOT force the valve in either direction; disassemble and clean before resuming service.*
- 4. Breakaway torque (i.e. force which must be exerted to start moving the valve ball) will vary depending on the media, pressure and length of time between cycles, as well as valve seat and packing materials. Consult the factory for specific values.*

MAINTENANCE

A repair kit containing the appropriate number of components is available for rebuilding each size and configuration of valve. Be sure to specify the complete valve model number, and the TBV Inc. sales order number that is stamped on the valve body, when ordering. Additional components, such as balls, stems, etc. are also available for repair purposes. Refer to illustration for part identification.

AT ALL STAGES OF THE FOLLOWING DIS-ASSEMBLY AND RE-ASSEMBLY PROCEDURES, CARE MUST BE TAKEN TO AVOID DAMAGE TO ALL SEALING SURFACES.

1. *Before removing valve from line, make absolutely certain that line pressure is shut down, and that the line is vented, to remove all pressure from the valve. Operate the valve to assure that there is no pressure or media trapped within the valve body cavity. Flush the line as appropriate to remove harmful chemicals that may be present.*
2. *Remove the valve from the line. Be certain to fully decontaminate the valve, if it has been used in services that have any degree of toxicity. Wear protective gloves and clothing as appropriate to avoid contact with potentially harmful chemicals.*
3. *Unscrew the end plug, using hex stock of the appropriate size. Prior to removal, it is useful to place a witness mark to note where the end plug is located relative to the body.*
4. *Rotate valve ball to closed position and remove seats and ball.*
5. *If it is necessary to replace the stem seal, remove the handle nut, lockwasher, handle, packing nut, stop and follower in that order. Lower stem into body cavity. Unscrew set screw and collar and remove. The thrust bearing may be removed from either the stem assembly or the counter bore in the valve body. Remove the stem by lifting through the bonnet extension. Remove the stem seal assembly, taking care not to scratch the stem seal counter bore.*
6. *Clean and inspect all components to be sure that they are free from foreign matter, pit marks, or scratches, paying particular attention to the areas that must maintain a seal (e.g. finished diameter on stem, seat pockets, ball, body seal grooves, and packing bores). These areas should be free from pitting, and scratches.*
7. *Once all components have been cleaned, inspected, and replaced as necessary, the valve can be rebuilt using the factory repair kit recommended.*
8. *Install new stem seal assembly in reverse order of description in step 5. Loosely adjust stem nut. Do not fully tighten at this time.*
9. *Lightly lubricate the ball and seats with a lubricant compatible with the intended service. Install one seat into the seat pocket in the bottom of the body bore. With the stem in the open position, carefully slide the ball in place.*
10. *Install the two body seals into their respective grooves in the end of the body.*
11. *Install the second seat in the seat pocket of the end plug.*
12. *Install the end plug into the body, taking care to keep the seat in the end plug seat pocket. Be extremely careful not to cross-thread the end plug. Light lubrication on the threads is recommended to prevent the threads from galling. Tighten sufficiently to ensure metal to metal contact of the end plug to the body. In this condition, the end plug should project above the surrounding flange surface by approximately .060". It is useful to have the witness mark mentioned in step 2 as a reference for re-assembly.*
13. *Adjust stem packing as follows:*

14. Tighten packing nut firmly. The following approximate torque values are given as a guide. It is recommended that the packing be compressed, relaxed, and then re-compressed to these same values. This has been found to provide optimum life for the stem packing.

NOTE: Periodic stem packing adjustment may be required depending on pressure and temperature and number of cycles. Refer to the recommended stem nut torque chart located below

VALVE SIZE	STEM NUT TORQUE
1/2" – 3/4"	80-100 inch-pounds
1"	140-180 inch-pounds
1 1/2" – 2"	250-300 inch-pounds
3" – 4"	75-95 foot-pounds
6" – 8"	90-110 foot-pounds

15. Cycle valve several times to assure smooth operation.

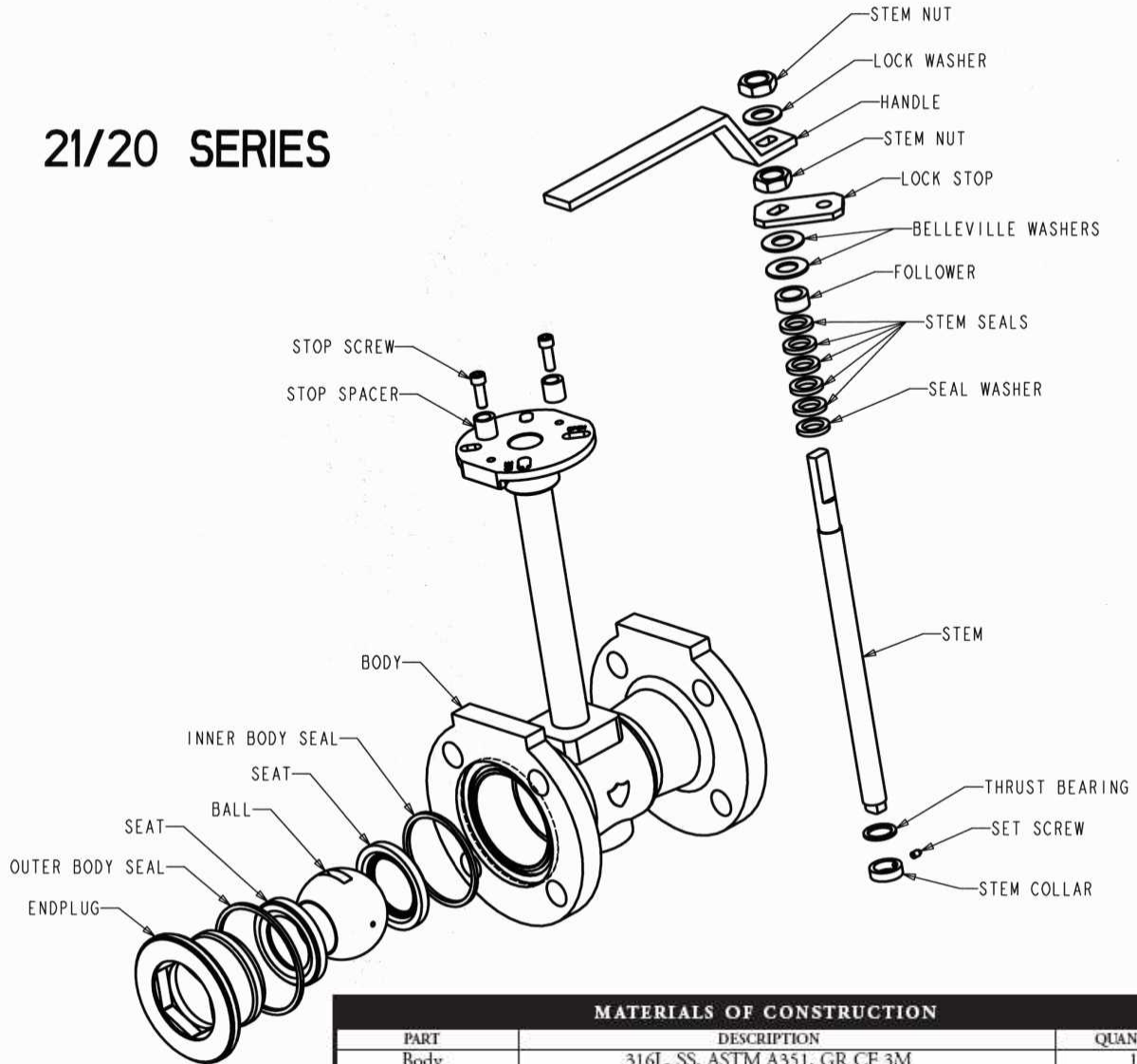
16. It is recommended that the rebuilt valve be pressure tested prior to re-installation. Perform seat and shell tests using media compatible with the service, checking for any evidence of leakage. If necessary, adjust packing nut in 1/6-turn increments as necessary to stop leakage. Do not over-tighten, as this will shorten the life of the packing. If there is leakage at the flange joint due to body seal leakage, re-check alignment of the end plug. If leakage persists, check for proper installation of the body seals.

17. Install valve in line following procedures described above.

18. The valve is now ready for service.

Periodic stem **packing** adjustment may be required depending on pressure and temperature and number of cycles. Refer to the recommended stem **nut** torque chart located below

21/20 SERIES



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