Visit www.boighill.com to request a quote.

FLOWSERVE

Worcester Controls

WCAIM2030
(Part 16474)

Miser Ball Valves

Installation, Operation and Maintenance Instructions

¼" - 2" 4, 44 — Includes CL, H, MP, PT, S, W, W2 and WK44 Series
½" - 2" D, T and FZ series
¼" - ⅜" AF Series
¼" - 1½" 59 — Includes PT, W and W2 Series

CAUTION: Flowserve recommends that all product which must be stored prior to installation be stored indoors, in an environment suitable for human occupancy. Do not store product in areas where exposure to relative humidity above 85%, acid or alkali fumes, radiation above normal background, ultraviolet light, or temperatures above 120°F or below 40°F may occur. Do not store within 50 feet of any source of ozone.

A. INSTALLATION

1. Miser valves may be installed for flow or vacuum in either direction. Use care to exclude pipe sealants from the valve cavity. Valves with upstream relief hole in ball (V3 option) are one-way valves.

   Miser Diverter Valves (D) may be installed using the bottom port as the inlet port. The flow can then be diverted to either one of the two side outlet ports.

   Miser Three-Way Valves (T) may be installed using any of the ports as inlet or outlet ports. The source can be selected from either of two sources to be directed toward one outlet. It can also be selected from one source to one outlet and then, by rotating the valve, use that outlet as an inlet and use the third port as the new outlet. The three-way valve does not have separate body seals. This function is incorporated into the three-way seat. Therefore, more care than normal must be taken to not damage the back face of this seat upon disassembly and reassembly.

   Note that for CL44 valves, the maximum pressure rating is 300 psi per Chlorine Institute. The Chorine Institute recommends that the relief hole in the ball be upstream, toward the pressure source. An arrow stamped on the body or on a metal tag welded to the body indicates flow path.

2. Weld End Valves (TE, SW, BW, SWO, XBO):

   ***NOTE**: Prior to welding or brazing, THOROUGHLY CLEAN ALL JOINT SURFACES to prevent contamination. Worcester brass valves are of leaded forging brass. Brazing can not be successfully accomplished unless a white flux is used.*

   Valves with “PG”, “RG”, “XG”, “AG”, and “GG” seat and body seal combinations and V67 option code are compatible with welding temperatures. Therefore, these valves are weld-as-is and do not have to be disassembled to be welded in the line. These valves will have a red welding tag attached. If these valves are disassembled, the graphite-coated stainless steel gasket body seals and the seat back seals (used with “A” or “G” seats only) must be replaced. When welding these valves, the ball must be open to prevent adhesion of weld spatter to the ball. Use STICK or MIG welding, and allow valve and joint to cool to the touch between passes.

   Valves with XBO pipe ends can be welded in line as assembled.

For all other weld, braze or solder valves:

a. Tack weld valve in place.

b. With valve open, remove three body bolts, loosen fourth and swing out body.

   ***NOTE:** AF44 and FZ44 fire valves can not be swung out. Remove fourth bolt and spread pipe ends to clear centering ring, if any (rings are no longer used with revision R4 and later fire valves are fire valves with “G” seats.).*

   Close valve, remove ball, seats, body seals or one-piece (three-way) seat/body seals.

   Return body to its original position and temporarily secure it with two body bolts diagonally opposite each other.

Visit www.boighill.com to request a quote.

Visit www.boighill.com to request a quote.

c. Weld valve in line (when gas welding or brazing do not play flame on valve body.)

d. Allow valve to cool, reassemble valve. Install new body seals, if they were shipped separately from the valve. Temporary Buna body seals, if found in the valve as received, are not to be reused. If coated stainless steel "S" gasket body seals are used (Code M or G), the wide flange of the "S" gasket must face the valve body. See View A-A detail on page 5.

e. Tighten and torque body bolts evenly and diagonally opposite each other, alternating in a criss-cross pattern. Use torque figures below:

Carbon Steel Bolts			Stainless Steel and Alloy 20 Bolts		
Bolt Dia.	**In-Lbs**	**Ft-Lbs**	**Bolt Dia.**	**In-Lbs**	**Ft-Lbs**
¼"	96-120	8-10	¼"	72-94	6-8
5⁄16"	156-204	13-17	5⁄16"	120-144	10-12
⅜"	216-264	18-22	⅜"	192-216	16-18
7⁄16"	480-540	40-45	7⁄16"	336-384	28-32
½"	720-780	60-65	½"	504-552	42-46

***Note**: Stainless steel bolts and nuts are generally used in all three-piece valves with stainless steel bodies, FZ valves and valves with "G" seats.*

CAUTION: The fluoropolymer and UHMWPE body seals (codes T and U), and the coated stainless steel gaskets (codes M and G) make excellent seals. However, some points of caution in their use need emphasizing.

3. a. No fluoropolymer or UHMWPE part (except a seat) or seat back seal is reusable. Coated stainless steel gaskets are also not reusable and cannot be used in stainless bodies with cast surfaces or serrations in body seal area. These include R12, R14, R15, R17, R20, R22 or current R1 and R3 Revision level 44 and 59 valves. Upon disassembly of the valve, these seals or gaskets should be discarded and replaced with new parts.

b. Care must be taken to avoid scratching the fluoropolymer or UHMWPE seals, or the coating of the stainless steel gaskets during installation. Light lubrication of these seals can help to prevent damage.

c. Care must also be taken when handling a graphite thrust bearing, stem seal, or seat back seal. These parts can be easily damaged by squeezing the O.D. of the seal. Parts are to be handled on the flat surfaces rather than the O.D.

d. The ball used in valves with "A" and "G" (filled metal) seats is round to special tolerances. To ensure proper contact with the seat, do not drop, dent or scratch the ball during handling. These balls also have an anti-galling coating. DO NOT use uncoated balls with filled metal seats.

e. Standard WK44 and CL44 valves are furnished with one-piece seat/body seals. More care than normal must be taken to not damage the back face of these seats during disassembly and reassembly.

f. WK44 valves and repair kits have been assembled, cleaned, and packaged for ultra high purity systems, and caution should be used to maintain the integrity of the valve parts.

g. WK44 valves are assembled with no lubrication.

B. OPERATION

1. The operation consists of turning the handle and/or stem ¼ turn clockwise to close and ¼ turn counter-clockwise to open. When the handle and/or stem flats are in line with the pipeline, the valve is open. These valves may also be automated.

2. These valves will provide bubble-tight shut-off when used in accordance with Worcester's published pressure/temperature chart. Valves with "G" seats meet the leakage rates of ANSI B16.104 Class VI.

3. The diverter valve will allow no leakage through the closed outlet port when used as described with the bottom port as the inlet. If other inlet ports are needed, the three-way valve is to be used which also does not allow leakage through the closed port.

   The porting one (V1) style valve is operated by turning the handle one quarter-turn to change selection of sources. With this style of valve the flow is never shut-off and some mixing of the media is possible. This valve is easily automated with a pneumatic or electric actuator.

   The porting two (V2) style valve is operated by turning the handle one-half turn to direct the flow from one side to the other. With this style valve, the flow is shut-off in the 90° position. (There is no stop in this position.) This valve may be automated with an electric actuator only.

4. It is not good practice to leave a ball valve partly open (throttling operation) without knowledge of the pressure drop and flow at that position.

5. As shipped from the factory, all valves (except CL44, WK44, oxygen prepared (V20, V33 or prefix code "X"), and valves with V38 or V6 options) contain a silicone-based lubricant. This is for break-in purposes, and may be removed if it is objectionable for a particular application by disassembling and solvent washing. Lacquer thinner will remove the lubricant. "A" or "G" (filled metal) seated valves should not be operated without a break-in lubricant.

6. Media which can solidify, crystallize or polymerize should not be allowed to stand in ball valve cavities.

7. Torque Requirements – Operating torque requirements will vary depending on the length of time between cycles, line pressure, type of valve seats, and the media in the system. For a detailed analysis of valve torque requirements, see Worcester's Actuator Sizing Manual.

Visit www.boighill.com to request a quote.

Visit www.boighill.com to request a quote.

C. MAINTENANCE

Tighten retaining nut if seepage is noted at stem.

CAUTION: For maximum stem seal life, proper stem adjustment procedure must be followed.

Excessive tightening causes higher torque and shorter stem seal life.

For CL44 valves only, immediately after the first frost is detected around the stem, tighten the retaining or self-locking nut, as stated below, to adjust the compression of the stem seals.

For Valves with two stem nuts and a lockwasher (with or without handle):

1. Tighten retaining nut (lower nut) until Belleville washers are flat, the nut will "bottom".
2. Back off retaining nut ⅛ turn.
3. Tighten handle nut securely to lock retaining nut in place. (On some automated valves, two retaining nuts are used with a lockwasher in between. Hold the bottom nut securely with a wrench while tightening the top nut to lock the 2 nuts in place.)

For Valves with self-locking stem nut (and four Belleville washers):

1. Tighten self-locking stem nut until Belleville washers are flat, the nut will "bottom".
2. Back off nut ⅓ turn.

CAUTION: The self-locking stem nut is difficult to tighten, and must fully flatten Belleville washers before backing off.

D. REBUILDING

⚠ WARNING: BALL VALVES CAN TRAP PRESSURIZED FLUIDS IN BALL CAVITY WHEN CLOSED

Special handling and cleaning procedures are necessary for oxygen and vacuum service valves. Refer to industry practices when overhauling these units.

If the valve has been used to control hazardous media, it must be decontaminated before disassembly. It is recommended that the following steps are taken for safe removal and disassembly:

- Relieve the line pressure. Operate the valve prior to attempting removal from line.
- Place valve in half-open position and flush the line to remove any hazardous material from valve.
- For CL44 valves, refer to Chlorine Institute Pamphlet 6 procedure for flushing and drying, and for additional information on precautions and cleaning.
- All persons involved in the removal and disassembly of the valve should wear the proper protective clothing such as face shield, gloves, apron, etc.

1. A standard repair kit may be ordered for these valves, consisting of seats and body seals or one-piece (three-way) seat/body seals, two or four Belleville washers, seat back seals (used with "A" or "G" seat only), stem seal(s), and thrust bearing(s). specify the material of seats and body seals, size, series and R number (revision number) of valve or for non-standard valve, the "P", "T", "C", or similar number, as found on the valve body, stop plate, handle, valve nameplate or on the actuator bracket nameplate. If valve body is stainless steel or Alloy 20, place a "6" after valve size in repair kit ordering code.

   To Order: Valve Size/Series/RK 44 or 59/Material/Revision No., or P, T, C, etc., Number

   Examples:

   1" 6 FZ RK 44 PM RO

   1" RK 59 PM R16

   ½" RK 44 RT TO914

   CAUTION: If the seats and seals installed differ from those removed, the valve nameplate or stop must be replaced or remarked to indicate the altered materials and ratings, or valve tagged to so indicate.

2. To replace seats and seals:

   a. Place valve in open position, remove three body nuts and bolts, loosen fourth, swing out center section from between pipe ends with valve open. Some AF44 and FZ44 fire valves require the removal of all four bolts and spreading the pipe ends to clear the pipe end centering rings, if any (valves with "G" seats or revision R4 and later fire valves do not use centering rings).

   b. With valve in closed position, remove old seats, body seals or one-piece (three-way) seat/body seals, seat back seals (if any), and ball.

   c. Remove handle nut, lockwasher, separate handle and stop or one-piece handle and stop (if manual valve). (This step is not applicable to valves with self-locking stem nut.)

   d. Using handle or a wrench to prevent stem from turning, remove retaining or self-locking stem nut, Belleville washers, and follower from stem. Remove the stem through body cavity.

   e. Remove thrust bearing(s) from body or stem; stem seal(s), and stem seal protector (if any), from recess in top of body.

   f. Clean all sealing surfaces of valve including the ball.

Visit www.boighill.com to request a quote.

Visit www.boighill.com to request a quote.

***NOTE**: The ball and the surfaces against which the seats and seals are installed should be undamaged, clean and free of pit marks and scratches. Light marring from the action of the ball against the seats is normal and will not affect the operation of the valve. Flaws which can be seen but barely detected with fingertips are acceptable. The stem and body surfaces that the thrust bearing(s) and stem seal(s) contact must be undamaged, clean, and free of pit marks and scratches.*

g. Lightly lubricate the ball, seats, body seals, stem seal(s), stem seal protector and seat back seals (if any), and thrust bearing(s) with a lubricant compatible with the media being handled, except for valves with V20, V33 or V38 options, which are assembled dry. White petroleum jelly is a good general-purpose lubricant.

For valve repair kits with "A" or "G" seats, the filled metal seats will be lubricated at the factory. If they are not, they should be lubricated as noted in Paragraph B.5. and also as stated above. Do not operate a newly rebuilt valve using filled metal seats without lubricants. The seat back seals will be pre-assembled to the seat backs.

For CL44, and oxygen prepared (prefix code "X") valves only, lightly lubricate the ball, seats/body seals, stem seal and thrust bearing with a PTFE-based lubricant as Fluorolube S-30 or equivalent.

h. For stem area rebuilding, refer to exploded view, stem build illustrations and stem component color chart on the following pages that pertain to the type valve being rebuilt.

Order of Assembly:

Place new thrust bearing(s) on stem and insert assembly through body cavity. Place new stem seal(s), stem seal protector (if any), and the follower in position. PEEK thrust bearing and stem seal protectors are placed outside of seals and bearings. The seals/bearings must contact the body.

***NOTE**: For valves having graphite stem seal(s), care must be taken when installing the graphite parts because they are easily damaged by squeezing the O.D. of the seals. Handle gently by holding seal(s) on flat surfaces rather than on the O.D. If resistance is encountered when installing seal(s) over the stem, use follower to gently push the stem seal(s) down.*

Stem seals, stem seal protectors and thrust bearings that are the same size and color are interchangeable.

i Place two new Belleville washers in position with the larger diameter sides touching each other.

For those valves with single self-locking stem nut, place four new Belleville washers in position (two pairs of washers with larger diameter sides touching each other).

j. Place retaining or self-locking stem nut on stem and using handle or a wrench to prevent rotation, tighten nut to make snug and firm. Follow Section C, Maintenance, for proper stem adjustment.

k. Replace separate stop and handle or one-piece handle and stop (if manual valve), lockwasher and handle nut on stem. (This step is not applicable to valves with self-locking stem nut.)

l. With valve in closed position (stem flats going across pipeline), replace ball (see note below), one-piece (three-way) seat/body seal (if used), or seats and seat back seals (if any). With valve in open position, carefully insert new body seals and place center section between pipe ends. For AF44 and FZ44 fire valves, insert centering rings, if any, into pipe ends before installing center section of valve. For valves with coated stainless steel "S"gaskets, install with wide flange facing body (see view A-A on page 5). For valves with "A" or "G" seats, before putting the center section back between the pipe ends make sure that the seat back seal is located on the seat correctly. If it is not, it could be damaged or cause the valve to leak.

***NOTE**: For diverter and three-way valves, install ball as follows:*

V1(90° valves)– with handle and/or stem flats in line with body main axis, viewed from bolt head side (normally upstream) one ball port is to the right, one is down, and one is on opposite end of valve.

V2(180° valves)- Using some convention as V1, one ball port is down and the other is on opposite end of valve.

Valves with a pressure relief hole in the ball (V3 option and chlorine valves) must be assembled and installed with the hole upstream when the valve is closed, to insure that cavity relief is upstream. Any valve with a relief hole will have an arrow on the body pointing downstream. This arrow is tamped on the body or on a metal tag welded to the body.

Replace and tighten body bolts and nuts per torque figures and method found in Section A.2.e.

CAUTION: Do not scratch body seals when replacing valve body.

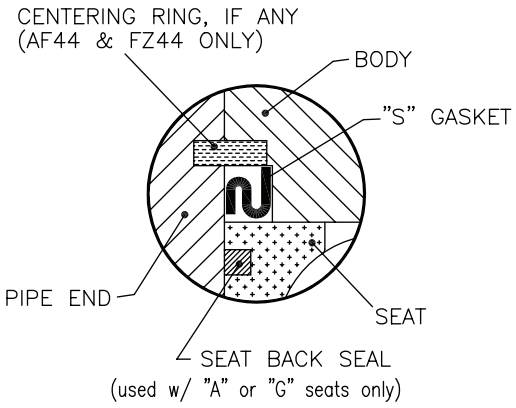
When ordering parts, please provide the part name and the following information as found on the valve body, stop plate, handle, valve nameplate, or mounting bracket nameplate:

1. Valve Size, Style and Revision Number – Example: ½" 4466T SE RO STEM
2. Valve Size, Style and Five-Character Code, known as a "P", "T", "C", or similar number, the designation for a non-standard product. – Example: ¾" 4446RT SW T0726 BALL
3. Porting (if a diverter or three-way valve) must also be specified when ordering these parts. Example: 1" D4466 T SE V1 R8 BALL

The terminology shown in the exploded view Parts Listing on next page is standard.

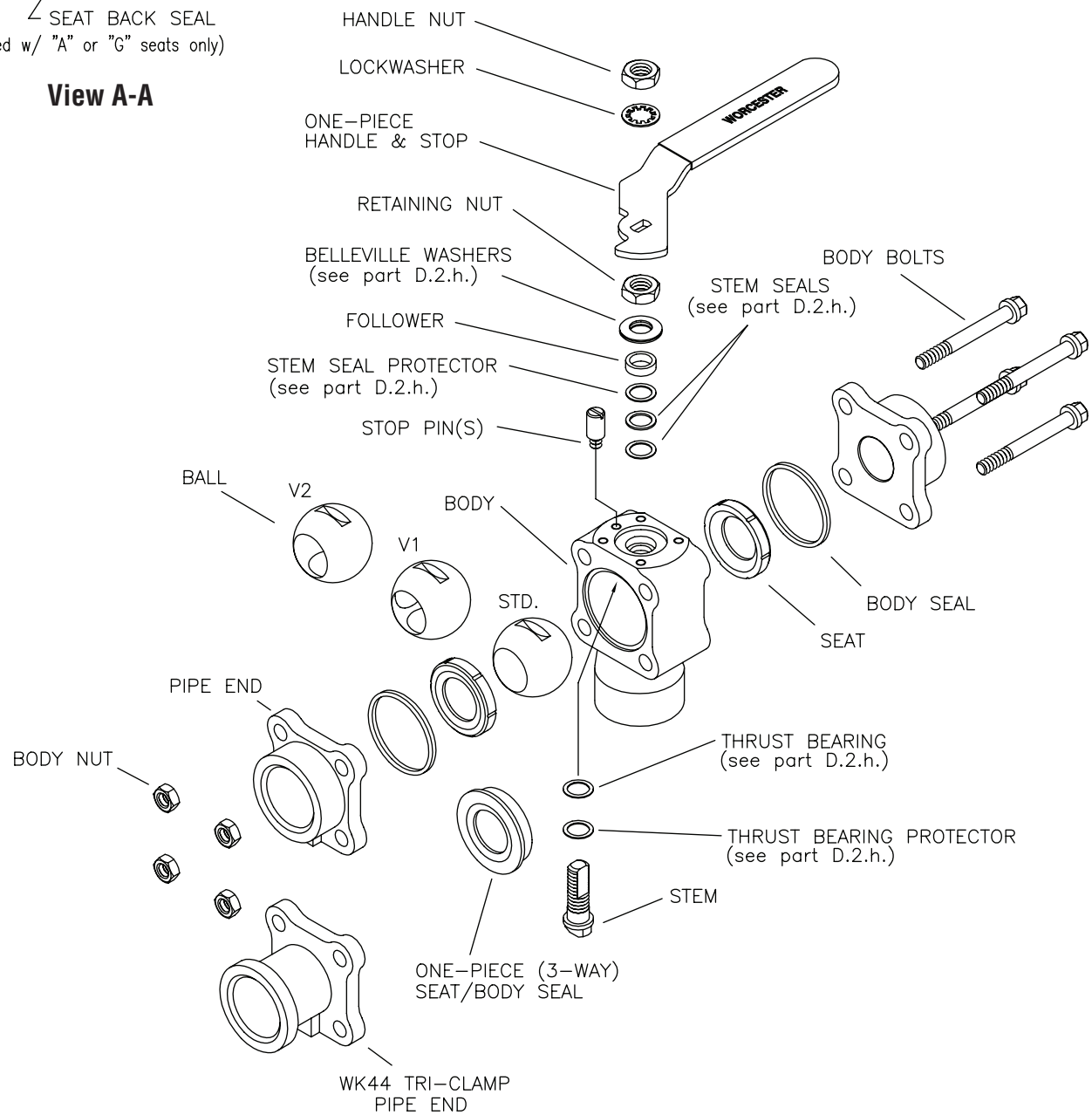
Visit www.boighill.com to request a quote.

Visit www.boighill.com to request a quote.



View A-A

1¼" – 2" Size Top-Mount Valves Shown

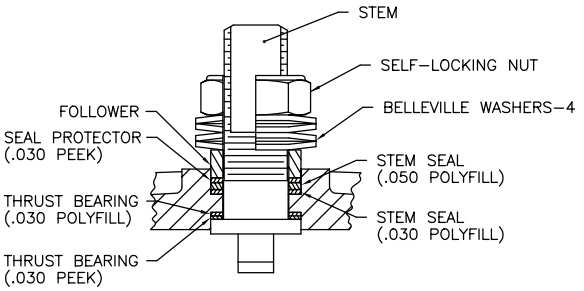


Visit www.boighill.com to request a quote.

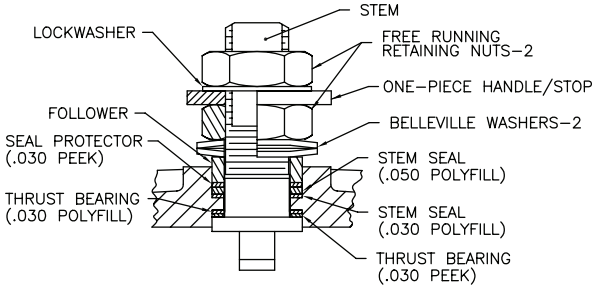
Visit www.boighill.com to request a quote.

Top-Mount Valve Stem Builds

AUTOMATED VALVE SHOWN

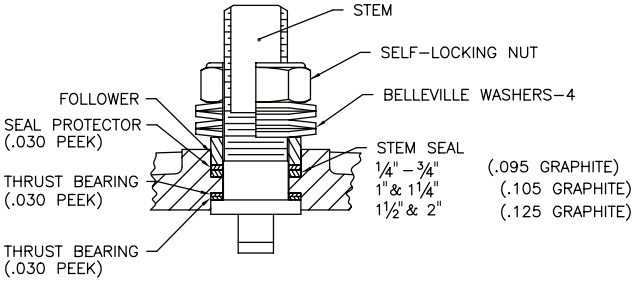


MANUAL VALVE SHOWN

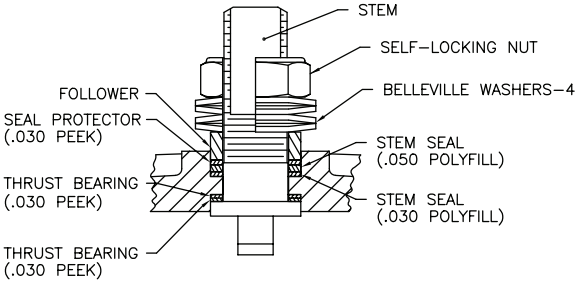


THE ABOVE STEM BUILDS ARE FOR ALL 44 AND 59 SERIES TOP–MOUNT VALVES – EXCEPT FOR THOSE SHOWN BELOW

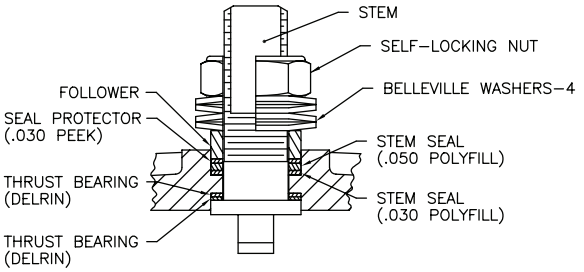
PT SERIES VALVES WITH HIGH–PER FILL "X" SEATS
AUTOMATED VALVE SHOWN



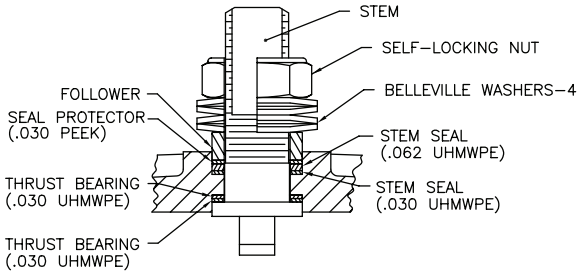
ALL OTHER VALVES WITH HIGH–PER FILL "X" SEATS
AUTOMATED VALVE SHOWN



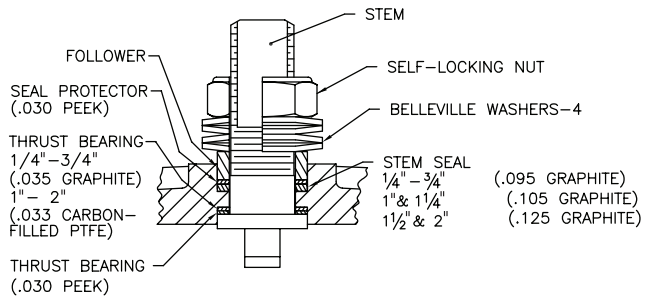
VALVES WITH LUBETAL "Y" SEATS
AUTOMATED VALVE SHOWN



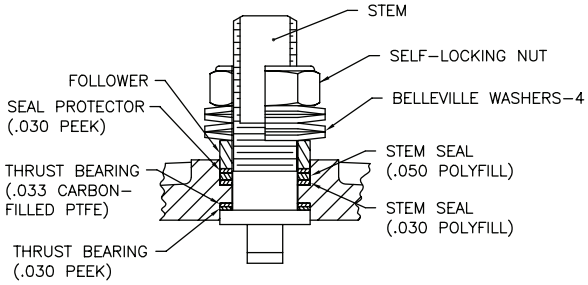
VALVES WITH UHMWPE "U" SEATS
AUTOMATED VALVE SHOWN



FIRE VALVE – AUTOMATED VALVE SHOWN



V17 OPTION – AUTOMATED VALVE SHOWN



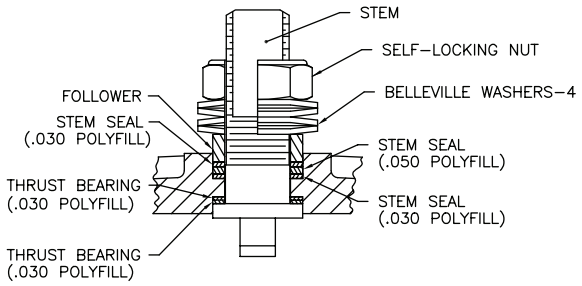
NOTE: *Manual valve stem build compoents such as stem seal(s), thrust bearings, and seal protector are the same as automated valves. For colors of various stem components, see color chart on page 8. For fire valves and valves with V17 option used in oxygen service, use polyfill stem seal and thrst bearing protectors in place of PEEK material.*

Visit www.boighill.com to request a quote.

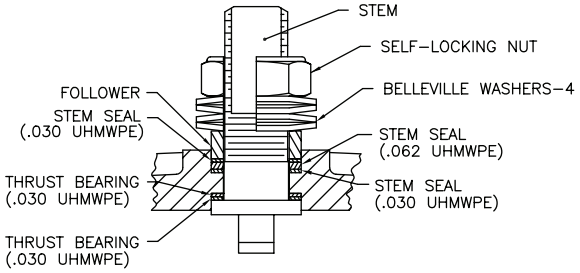
Visit www.boighill.com to request a quote.

Top-Mount Valve Stem Builds, continued

CL SERIES AND OXYGEN SERVICE VALVES
AUTOMATED VALVE SHOWN

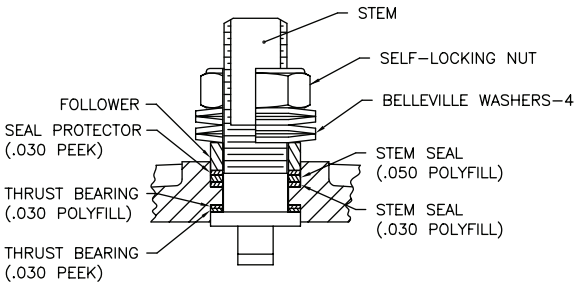


OXYGEN SERVICE VALVES WITH UHMWPE "U" SEATS
AUTOMATED VALVE SHOWN

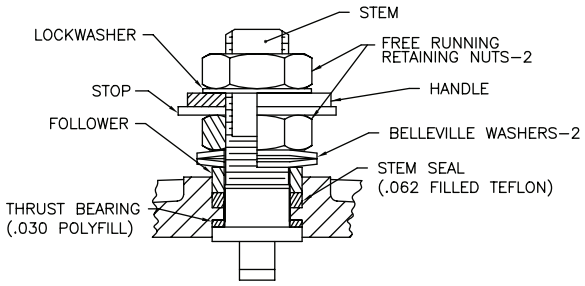


All Non-Top-Mount Valve Stem Builds

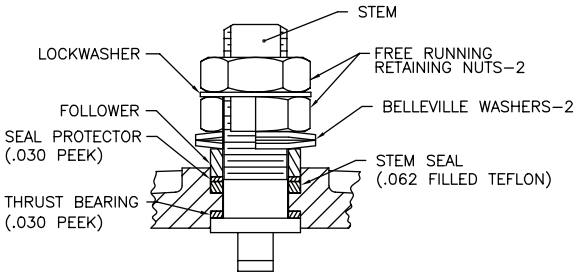
V51 HIGH CYCLE OPTION FOR AUTOMATED VALVES



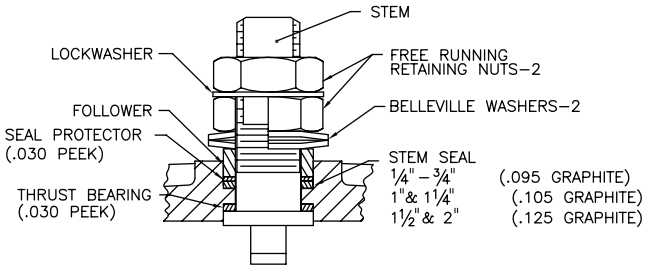
STANDARD 4, 44/59 MANUAL VALVE
INCLUDING PT44/59 WITH "A" OR "G" SEATS,
CL44, WK44, D/T4



H4 VALVES WITH HIGH–PER FILL "X" SEATS
AUTOMATED VALVE SHOWN



PT44/59 VALVES WITH HIGH–PER FILL "X" SEATS
AUTOMATED VALVE SHOWN

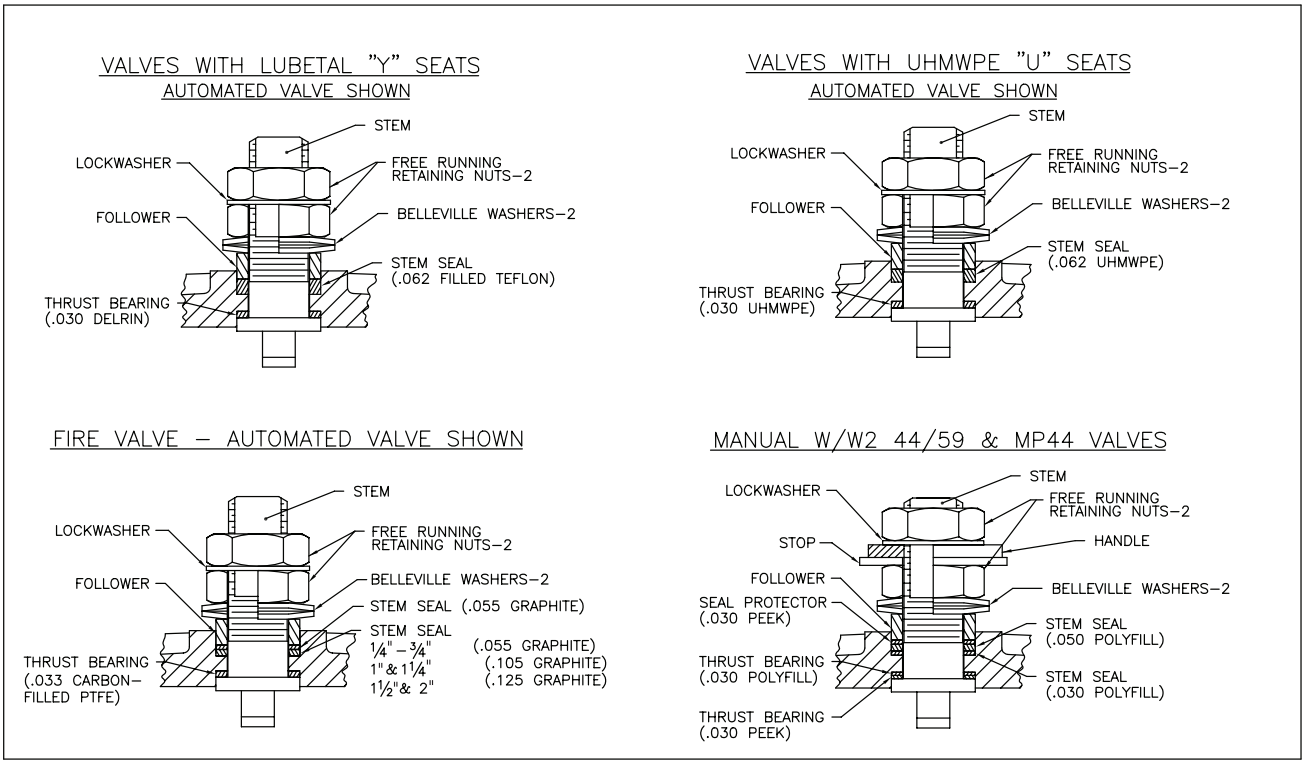


NOTE: *Stem build components such as stem seal(s), thrust bearings, and seal protector (if used) are the same for manual and automated valves. For colors of various stem components, see color chart on page 8.*

Visit www.boighill.com to request a quote.

Visit www.boighill.com to request a quote.

All Non-Top-Mount Valve Stem Builds, continued



NOTE: *Stem build components such as stem seal(s), thrust bearing(s), and seal protector (if used) are the same for manual and automated valves. For colors of various stem components, see color chart below.*

COLOR CHART FOR VARIOUS STEM COMPONENT MATERIALS	
MATERIAL	COLOR
POLYFILL	BLACK
PEEK	TAN
GRAPHITE	SILVER GRAY
CARBON FILLED PTFE	BLACK
UHMWPE	OPAQUE WHITE
DELRIN	BROWN
FILLED TFE	OFF-WHITE

Flowserve Corporation has established industry leadership in the design and manufacture of its products. When properly selected, this Flowserve product is designed to perform its intended function safely during its useful life. However, the purchaser or user of Flowserve products should be aware that Flowserve products might be used in numerous applications under a wide variety of industrial service conditions. Although Flowserve can (and often does) provide general guidelines, it cannot provide specific data and warnings for all possible applications. The purchaser/user must therefore assume the ultimate responsibility for the proper sizing and selection, installation, operation, and maintenance of Flowserve products. The purchaser/user should read and understand the Installation Operation Maintenance (IOM) instructions included with the product, and train its employees and contractors in the safe use of Flowserve products in connection with the specific application.

While the information and specifications contained in this literature are believed to be accurate, they are supplied for informative purposes only and should not be considered certified or as a guarantee of satisfactory results by reliance thereon. Nothing contained herein is to be construed as a warranty or guarantee, express or implied, regarding any matter with respect to this product. Because Flowserve is continually improving and upgrading its product design, the specifications, dimensions and information contained herein are subject to change without notice. Should any question arise concerning these provisions, the purchaser/user should contact Flowserve Corporation at any one of its worldwide operations or offices.

For more information about Flowserve Corporation, contact www.flowserve.com or call USA 1-800-225-6989.

FLOWSERVE CORPORATION
FLOW CONTROL DIVISION
1978 Foreman Drive
Cookeville, Tennessee 38501 USA
Phone: 931 432 4021
Facsimile: 931 432 3105
www.flowserve.com

© 2003 Flowserve Corporation, Irving, Texas, USA. Flowserve and Worcester Controls are registered trademarks of Flowserve Corporation.
WCAIM2030 10/03 Printed in USA

Visit www.boighill.com to request a quote.