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FLOWSERVE

Worcester Controls

12230-N

3" - 10" 51/52, 3" - 6" 4, 151/301 Flanged and Wafer One-Piece Ball Valves (Including D, PT, CL, AF and FZ Series Valves)

Installation, Operation and Maintenance Instructions

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

   Diverter valves (D51) 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.

   For chlorine valves, the maximum pressure rating is 300 psi. The Chlorine Institute Pamphlet #6 recommends that the relief hole in the ball be upstream when valve is closed, toward the pressure source.

2. When installing, use standard gaskets suitable for the specific service. Tighten flange bolts or studs evenly.

3. On 151 and 301 wafer valves, it is recommended to leave the ball in the open position while installing, to eliminate possibility of damaging ball finish.

B. OPERATION

1. The operation consists of turning the handle and/or stem ¼ turn clockwise to close, and ¼ turn counterclockwise to open. When stop plate pointer and/or stem groove is in line with the pipeline, the valve is open. These valves may also be automated.

2. These valves will provide bubble-tight shutoff 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 output port when used as described with the bottom port as the inlet.

   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) 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 partially open (throttling operation) without knowledge of the pressure drop and flow at that position. These conditions should be checked with Flowserve.

5. As shipped from the factory, all valves (except chlorine, oxygen prepared (V20, V33 or prefix code "X") and valves with V38 or V46 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.

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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.

NOTE: *Media which contain fine powders (25 microns or less) will significantly raise ball valve torque requirements.*

CAUTION

8. The fluoropolymer (T) and UHMWPE (U) body seals, the graphite body seals (Z) and the seat back seals (used with "A" or "G" seated (filled metal) valves) make excellent seals. However, some points of caution in their use need emphasizing.

a. No seat back seal, graphite body seal, fluoropolymer or UHMWPE part (except a seat) is reusable. Upon disassembly of the valve, they should be discarded and replaced with new parts.

b. Care must be taken to avoid scratching the fluoropolymer or UHMWPE seal during installation. Light lubrication of these seals can help to prevent damage. Care must also be taken when handling a graphite thrust bearing, stem seal, body seal or seat back seal. These parts are easily damaged and should be handled on the flat surface rather than the O.D.

c. The ball used in "A" or "G" (filled metal) seated valves has a special anti-galling coating. DO NOT use an uncoated ball with filled metal seats. To ensure proper contact with the seat, do not drop, dent or scratch the ball during handling.

C. MAINTENANCE

If seepage is noted at stem, tighten retaining nut ⅛ turn at a time until seepage stops.

CAUTIONS: Excessive tightening causes higher torque and shorter stem seal life.

For chlorine valves only, immediately after the first frost is detected around the stem, tighten the retaining nut to adjust the compression of the stem seals.

D. REBUILDING

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

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 body.
- All persons involved in the removal and disassembly of the valve should wear the proper protective clothing such as face shield, gloves, apron, etc.
- For chlorine valves, refer to Chlorine Institute Pamphlet #6 for flushing and drying procedure, and for additional information or precautions and cleaning.

1. A standard repair kit may be ordered for the valve. Specify the size, series, material of seats and body seal and R# (revision number) of valve or for non-standard valve, the "P" number, "T" number, "C" Number, or similar number, as found on nameplate. Some series, such as CL, PT, FZ, AF, and V51 option have their own repair kits, which are ordered by the prefix or adding V51 suffix. If valve body is stainless steel, place a "6" after the valve size in repair kit ordering code.

Examples:

Valve Size	Prefix (if required)	RK	Series	Material	Rev. #	P, T, C or similar #
3"	AF	RK	51	PT	R3	—
3"		RK	51	RT	R5 V51	—
4"		RK	51	T	—	T0914

NOTES: *For Series 4 (151/301) and 52 valves, repair kits can be ordered as RK51. V51 high-cycle stem packing option cannot be used with CL, FZ, AF series, or oxygen service valves or valves with "G" seats.*

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

2. This covers rebuilding of both flanged and wafer valves.

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

NOTE: *Series 51 and 52 Revision OF valves do not have retaining screws. Consult your distributor or Flowserve for end plug removal tools to facilitate removal of screwed ring insert retainer.*

a. Disassembly of Valve:

1) Place valve in open position. Unscrew all flange bolts or studs and nuts and remove valve from line.

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2) With valve in closed position, remove end plug retaining screws.

3) Remove end plug. If necessary, drive end plug from valve using wooden drift applied to ball.

4) Remove body seal, ball, seats and seat back seals (if any).

b. Removing Stem Assembly:

GENERAL NOTE: *Due to different valve series and body styles, one or two metal stem centering washers may be used and the stem seal may be one-piece or three-piece.*

1) Remove handle assembly (if any) by loosening handle screw.

2) Remove retaining nut. Prevent stem from rotating by holding stem with wrench.

3) Remove stop or valve stem spacer (actuated valves). Remove and discard Belleville washer(s) (if any). Remove and retain the follower.

4) Push stem into body cavity and remove. Remove stem seal(s), stem seal protector (if any) and thrust bearing. Remove and retain stem centering washer(s).

c. Visual Inspection:

1) 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 finger tips are acceptable.

2) The stem and body surfaces that the thrust bearing and stem seals contact, must be undamaged, clean and free of pit marks and scratches.

d. Reassembly:

NOTE: *Except for valves with graphite stem seals or V51 option, it is not necessary to replace Belleville washers.*

CAUTION: Care must be used when handling graphite stem seals, thrust bearing, body seals and seat back seals. 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. These parts will not work if they are cracked or broken. Light flaking of the material is acceptable. If resistance is encountered when installing stem seals over the stem, use follower to gently push the stem seal down.

1) Lightly lubricate the ball, seats, seat back seals (if used), body seal, stem seal(s), stem seal protector (if any) and thrust bearing with a lubricant compatible with 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 Para. B.5 and also as stated above. DO NOT operate a newly rebuilt valve using filled metal seats without break-in lubricant. The seat back seals will be pre-assembled to the seat backs.

For chlorine and oxygen prepared (prefix code “X”) valves only, lightly lubricate the ball, seats, body seal, stem seals, stem seal protector (if any), and thrust bearing with a PTFE (fluoropolymer) lubricant, such as Fluorlube S-30 or equivalent.

2) To reassemble stem, reinstall stem centering washer(s) into the recesses in the body. When only one washer is used, it goes inside recess on top of the body and under the stem seal(s). Place new thrust bearing onto stem and insert through body cavity. The thrust bearing can be distinguished from the stem seals by the darker color of the 25% filled fluoropolymer used in the thrust bearing. UHMWPE thrust bearings and stem seals are opaque white in color and the same size, and are interchangeable. Assemble new stem seal(s) over the top of the stem and down into the recess in the top of the body. The follower is installed on top of the stem seal(s). For valves with graphite stem seal(s), the stem seal is metallic silver gray and thicker than the thrust bearing. A Belleville washer is also added, concave side up over follower (3” - 8” sizes only). Place stop (or spacer) onto valve stem.

For valves with V51 high cycle stem packing option, the thrust bearing and stem seals are the same size and color, and they are interchangeable. A stem seal protector of PEEK material and tan in color is also used and installed over the stem seals.

NOTE: *FOR ACTUATED VALVES HAVING A GRAPHITE STEM SEAL OR V51 OPTION, TWO BELLEVILLE WASHERS ARE USED. THE BELLEVILLES SHOULD BE INSTALLED WITH THE LARGER DIAMETER SIDES TOUCHING EACH OTHER. THE STEM SPACER IS DELETED AND NOT USED.*

ON ANTI-STATIC FIRE-RATED VALVES (AF51, AF52, FZ51 & FZ52) A BLACK, CARBON-FILLED FLUOROPOLYMER THRUSTBEARING MUST BE USED FOR PROPER GROUNDING OF STEM TO BODY.

3) When stem assembly is complete, place retaining nut onto stem. Using handle or wrench to prevent rotation, tighten retaining nut to fully compress packing or fully flatten Belleville(s), if used, then backed off ⅛ turn. Excessive tightening causes higher torque and shorter stem seal life.

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4) Insert far seat and seat back seal (if any) in body. Make sure seat rests firmly on back surface of recess. For valves with “A” or “G” seats, the seat should appear to sit flat into the back of the cavity indicating that the seat back seal is properly located on the seat. If the seat back seal is not correctly positioned it could be damaged or cause the valve to leak.

5) With valve in closed position (stop plate pointer and/or stem groove going across the pipeline), insert ball into body so that stem slot engages tang on stem.

NOTE: *For diverter valves, install ball as follows:*

V1 (90° Valves) With handle and/or groove in stem in line with body main axis, viewed from end plug side (normally upstream) one ball port is to the right, one is down, and the other is on opposite end of valve.

V2 (180° Valves) Using same 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 reassembled and installed with the hole upstream (end plug side), when valve is closed, to ensure that cavity relief is upstream. Any valve with this option will have an arrow on the body pointing downstream. This arrow is stamped on the body or on a metal tag welded to the body.

6) Install and make sure body seal rests squarely on seal surface of body.

CAUTION: If the body seal is installed on the end plug, it will be damaged. Insert seat and seat seal (if any) in recess of end plug, and slide the end plug into the body as far as it will go.

7) Secure end plug in place by threading in the end plug retaining screws and tightening each one firmly. Proper installation will allow no more than .010 protrusion of the end plug beyond the valve body.

8) Replace handle assembly (wrench block and extension) and tighten hex head screw (manual valves only).

9) Upon reinstallation of the valve in the line, retighten the end plug retaining screws after the flange bolts are fully torqued.

After the valve is assembled, it should be cycled a few times to ensure that the valve operates smoothly with no chattering of the ball. The normal operation is an initial high torque to “break” from the closed position to a smooth running lower torque mid-cycle, to a high torque at the end of the 90° cycle or open position. The torque is similar when closing.

3. When ordering parts, please provide the part name and the following information as found on the valve nameplate:

   a. Valve Size and Style and Revision Number.

      Example: 3” - 466 T 150 - R8 Stem

      6” - AF5146 RT 150 - R2 Stem

      3” - CL514C7 RT 150 Stem

   b. Valve Size, Style and 5 Character Code (known as a “P” Number, “T” Number, “C” Number, or similar number), the designation for a non-standard product. Example: 6" 5246 T 300 P2577 Ball

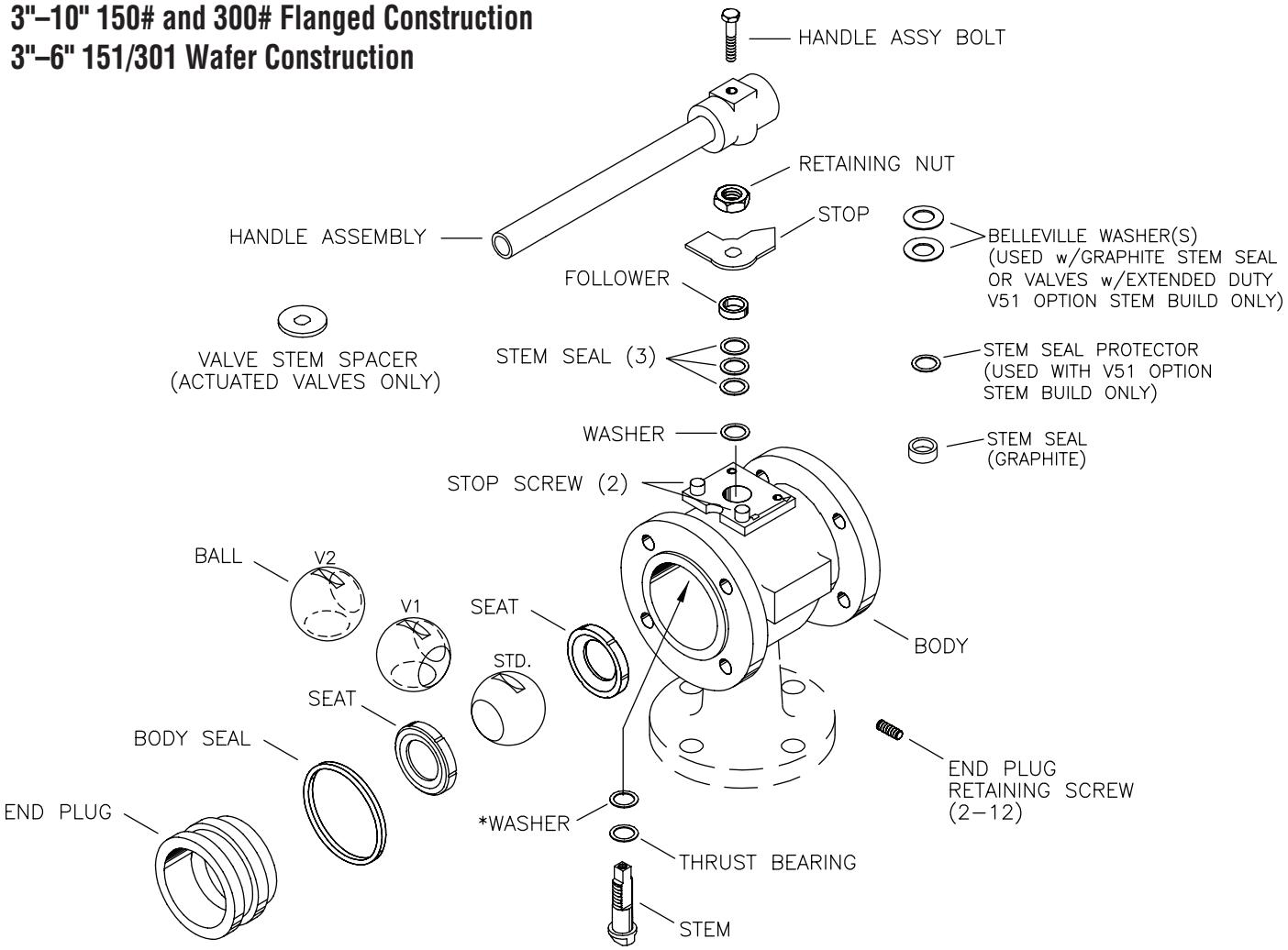
   c. Porting (if a diverter valve) must also be specified when ordering these parts. Example: 3" D5166 T 150 V1 R5 Ball

      The terminology shown in the exploded view parts listing on the following page(s) is standard.

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3"–10" 150# and 300# Flanged Construction
3"–6" 151/301 Wafer Construction

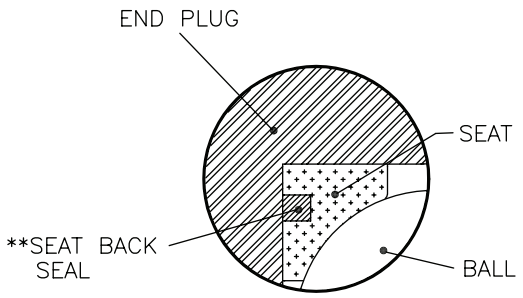


NOTE:

FLANGED VALVE IS SHOWN. FOR WAFER VALVE, DISASSEMBLY IS EXACTLY THE SAME.

*THIS WASHER IS NOT USED ON ALL VALVE STYLES, USE EXISTING WASHER WHEN PRESENT.

**USED WITH "A" OR "G" SEATS ONLY.



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