

E818/828 Series Fugitive Emissions 150# and 300# Flanged 2" - 8" Two-Piece Ball Valves

Installation, Operation and Maintenance Instructions

CAUTION: Flowserve recommends that all products 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 the valve cavity.
2. When installing, use standard gaskets suitable for the specific service. Tighten flange bolts or studs evenly. Follow ANSI standards for flange bolt torques.

B. OPERATION

1. The operation consists of turning the stem (by manual or automated means) $\frac{1}{4}$ turn clockwise to close, and $\frac{1}{4}$ turn counterclockwise to open. When the handle (if used) and/or stem flats or groove are in line with the pipeline, the valve is open.
2. These valves will provide bubble-tight shutoff when used in accordance with Worcester's published Pressure-Temperature Chart.
3. Do not leave the ball valve partly open (throttling operation) without having first determined whether the pressure drop and/or flow rate are detrimental to the valve seats. These conditions should be checked with Worcester's Control Valve Brochure or the factory.
4. As shipped from the factory, valves (except oxygen prepared (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.

5. Media which can solidify, crystallize or polymerize should not be allowed to stand in ball valve cavities.
6. 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: The fluoropolymer body seal (T) and the graphite body seal (Z) make excellent seals. However, some points of caution in their use need emphasizing.

- **No fluoropolymer part (except seats) is reusable. Graphite body seals are also not reusable. Upon disassembly of the valve, they should be discarded and replaced with new parts.**
 - **Care must be taken to avoid scratching the fluoropolymer during installation. Light lubrication of these seals can help to prevent damage.**
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C. MAINTENANCE

For maximum stem seal life, proper packing adjustments procedure must be followed.

Tighten packing gland bolts to the torque values in the table on the next page. Alternate between the two gland bolts when tightening to maintain the alignment of the gland plate with the top of the valve body. Some rocking of the gland plate can be tolerated; however, excessive misalignment may cause premature failure of the stem packing.

NOTE: After adjustments, packing creep will occur over several hours. Bolt torque measured then will be less.

Valve Size	Gland Bolt Torque (In-Lbs)	
	"T" Packing	"G" Packing
2" E818/828	85 - 95	210 - 230
3" E818/828	175 - 200	270 - 295
4" E818	175 - 200	270 - 295
4" E828/6" E818	240 - 265	340 - 365
6" E828/8" E818	375 - 400	500 - 525
8" E828	950 - 1000	1450 - 1500

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 be 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.

All persons involved in the removal and disassembly of the valve should wear the proper protective clothing such as face shield, gloves, apron, etc.

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.

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 valves, the "P" number, "T" number, "C" number, or similar number, as found on the nameplate. Some series, such as AF and FZ have their own repair kits, which are ordered by the prefix. (Use Series 818 or 828 designation.)

Examples:

Valve Size	Fugitive Emission Designation	Prefix (if required)	RK	Series	Material	Revision No.	P, T, C or similar No.
3"	E	AF	RK	818	TZ	R3	—
2"	E		RK	828	T	R3	—
4"	E		RK	818	RT	—	T0914

2. Special handling and cleaning procedures are necessary for oxygen and vacuum service valves. Refer to industry practices when overhauling these units.
3. To Disassemble 2"-8" Two-Piece Valves:
 - a. Valve should be placed with the end connector (smaller body section) uppermost and on a clean surface, the valve preferably clamped or bolted down. To disassemble end connector from body, remove body stud nuts from mid-flange.
 - b. Strike end connector with mallet and close the valve. The mid-flange connection should break open. Repeat if not successful at first try. The end connector should now be lifted vertically from the body and placed on the clean surface with mid-flange end uppermost.
 - c. With the valve still in the closed position, the ball may now be lifted from the body cavity, and the seats and body seal are now exposed in either body or end connector. These should now be removed. Care must be taken to avoid scratching the machined faces on which they make contact with valve body and end connector.
 - d. Remove the handle assembly and stop (if any), gland bolts, Belleville washers, gland plate and follower from the top of the valve.
 - e. Push the stem down into the body cavity and remove.
 - f. Remove the thrust bearing and stem packing from the body.

CAUTION: Use care to avoid scratching the surface of the stem and packaging chamber.

4. Visual Inspection:
 - a. The ball and the surfaces against which the seats 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.
 - b. The stem and body surfaces that the thrust bearing and stem seal(s) contact, must be undamaged, clean and free of pit marks and scratches.

5. Reassembly:

Refer to exploded view illustration on page 5 for proper reassembly.

NOTE: Care must be used when handling graphite stem seals, thrust bearings, and body 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.

Valves with a pressure relief hole in the ball (V3) must be reassembled and installed with the hole upstream (end connector side) to ensure that cavity relief is upstream when valve is closed. Any valve with the V3 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.

For all valves, lightly lubricate the ball, seats, body seal, stem seal(s), and thrust bearing, with a lubricant compatible with the media being handled, except for valves with V38 option, which are assembled dry. White petroleum jelly is a good general purpose lubricant. For oxygen prepared valves (prefix code "X"), use a PTFE-based lubricant such as Fluorolube S-30 or equivalent.

2"-8" Two-Piece Valves:

- a. Insert new seat in body. Make sure seat rests firmly on back surface of recess.
- b. Place the thrust bearing on the stem.
- c. Insert the stem and thrust bearing into the body through the ball cavity.
- d. Install the following parts over the stem and into the packing chamber in this order (refer to packing assembly drawings Figures 1 and 2 on page 4):
 - For "T" Packing - Filler ring, 629 seal, lantern ring-T, three Chevron packing rings, and follower T.
 - For "G" Packing - Two graphite packing rings, lantern ring-G, two graphite packing rings, and follower-G.
- e. Install gland plate over stem.
- f. Valves with "T" and "G" packing both use twelve Belleville washers. The arrangement of the washers is different for each type of packing (refer to packing assembly drawings Figures 1 and 2 on page 4):
 - For "T" Packing - Use three sets of two washers on each bolt. Each set consists of two Bellevilles opposing each other with their ODs touching.
 - For "G" Packing - Use three nested Bellevilles opposing three nested Bellevilles on each bolt. The middle two will have their ODs touching.
- g. Lubricate the gland bolt threads with an anti-galling agent, such as Christo-Lube MCG-111. Install gland bolts/Bellevilles through the gland plate and thread them into the body.

Tighten the gland bolts per Section C - Maintenance. Be certain that the bolts do not bind - this can result in improper packing loading.

CAUTION: Tightening the gland bolts can cause the stem to be pushed into the ball cavity. The stem must either be fixtured to prevent this, or be worked back into position when assembling the ball and seats into the body.

- h. For 2" valves, add handle (if used) and tighten the handle set screws.
For 3"-6" valves add stop, and handle assembly (if used) and tighten handle retaining bolt.
- i. With valve in closed position (stem flats going across pipeline), carefully insert ball into body so that stem slot engages tang on stem.
- j. Install and make sure body seal rests squarely in seal surface of body. Insert new seat in cavity of end connector.

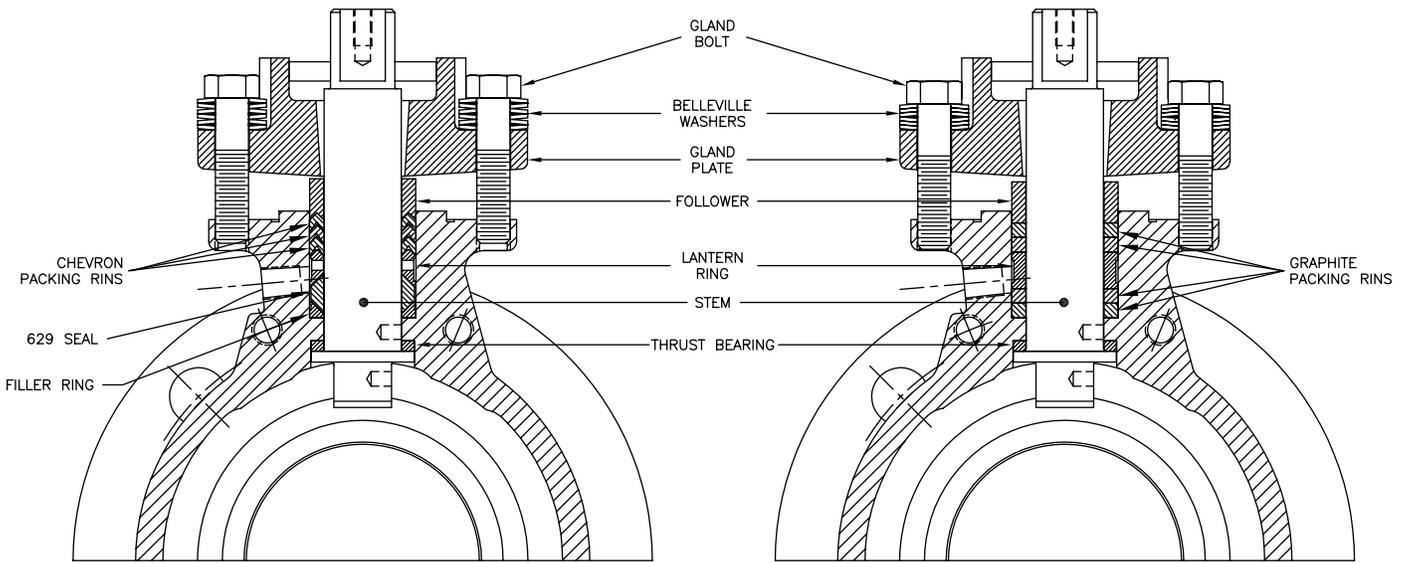
CAUTION: If the body seal is installed on the end connector, it will be damaged.

- k. Carefully place the end connector into the body using 2 or 3 body studs to align the mid-flange holes. When correctly located, strike the end connector with a mallet to push down the end connector further into the body. Tighten all body nuts to the following torques:

Valve Size	Torque (Ft-Lbs)			
	Stainless Steel Studs		Carbon Steel Studs	
	818-150#	828-300#	818-150#	828-300#
2"	33	33	34	34
3"	33	82	34	87
4"	57	82	60	87
6"	82	170	87	178
8"	170	214	178	253

Pressure checking of valve is desirable if practical.

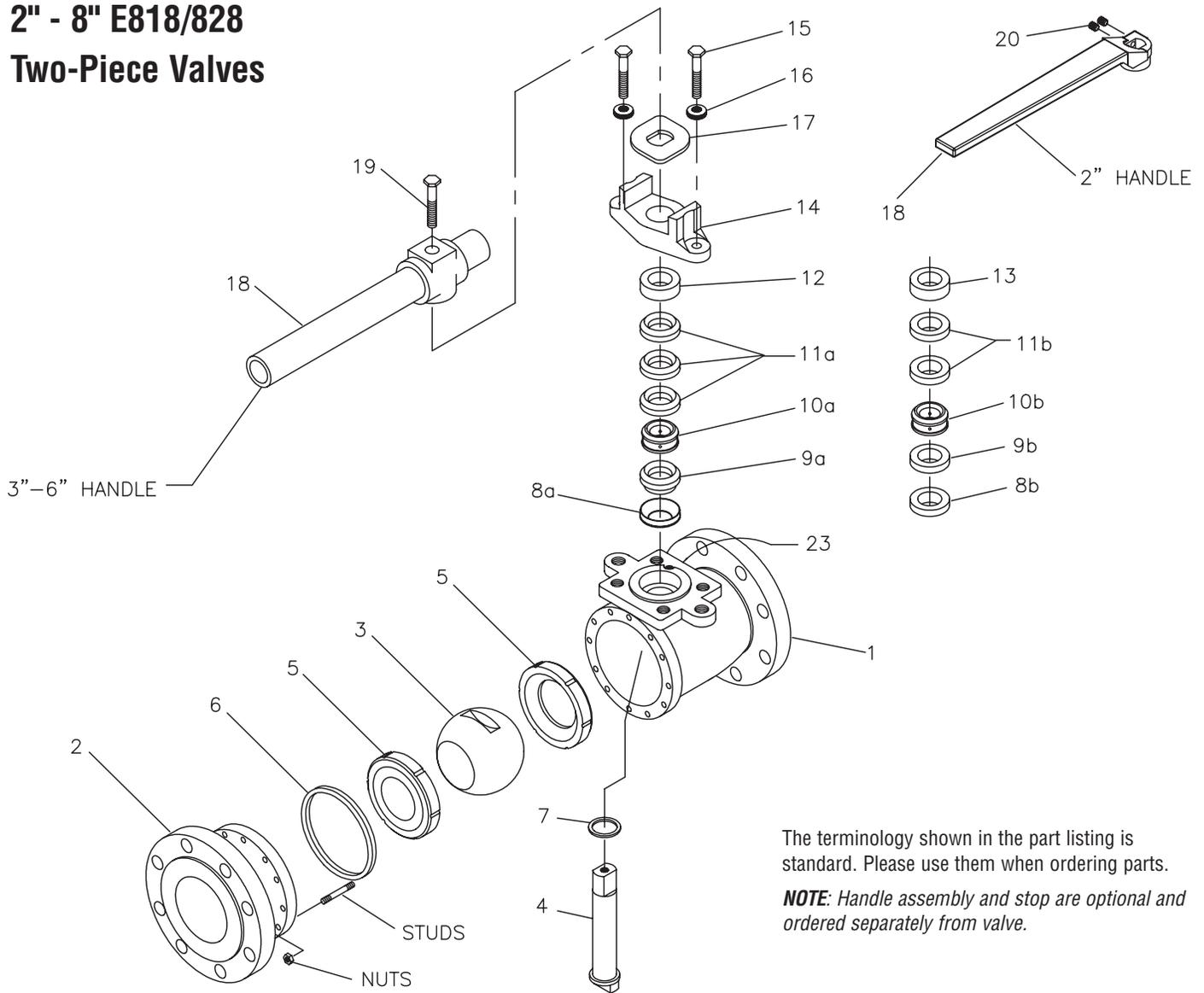
- 6. When ordering parts, please provide the part name and the following information as found on the valve nameplate:
 - a. Valve Size and Style and Revision Number
Examples: 3" - E818 6 66 T 150 - R3 Stem
 6" - EAF828 4 66 RZ 300 - R3 Ball
 OR
 b. Valve Size, Style and Five-Character Code, known as a "P" Number, "T" Number, "C" Number, or similar number, the designation for a non-standard product.
Example: 6" - E828 6 66 T 300 P2577 Ball



**"T" Packing Detail
Figure 1**

**"G" Packing Detail
Figure 2**

2" - 8" E818/828 Two-Piece Valves



The terminology shown in the part listing is standard. Please use them when ordering parts.

NOTE: Handle assembly and stop are optional and ordered separately from valve.

PART NO.	DESCRIPTION	QTY PER VALVE	PART NO.	DESCRIPTION	QTY PER VALVE
1	Body	1	12	Follower T	1
2	End Connector	1	13	Follower G	1
3	Ball	1	14	Gland Plate	1
4	Stem	1	15	Gland Bolt	2
5	Seat	2	16	Belleville Washer	12
6	Body Seal	1	17	Stop	1
7	Thrust Bearing	1	18	Handle Assembly	1
8a	Filler Ring	1	19	Hex Head Bolt (3" - 6")	1
8b	Graphite Ring	1	20	Set Screws (2" only)	2
9a	629 Seal	1	21	Studs	varies per valve
9b	Graphite Ring	1			size/class
10a	Lantern Ring T	1	22	Nuts	varies per valve
10b	Lantern Ring G	1			size/class
11a	Chevron Ring	3	23	1/8" NPT Pipe Plug	1
11b	Graphite Ring	2			

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