



# Worcester Controls

18510-P

## 82/83 Series 150# and 3003 Flanged 1/2" - 1 1/2" One-Piece and 2" - 10 " Two-Piece Ball Valves

### Installation, Operation and Maintenance Instructions

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**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 1200°F or below 400°F may occur. Do not store within 50 feet of any source of ozone.**

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#### 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 handle and/or stem ¼ turn clockwise to close, and ¼ turn counter-clockwise to open. When handle and/or stem flats (½"-1½"), or stop plate pointer and/or stem groove (2"-10") are 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 Flowserve's published Pressure-Temperature Chart.
3. 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. These conditions should be checked with the Worcester Control Valve Brochure.

4. As shipped from the factory, valves (except oxygen prepared (V20, V33 or prefix code "X") and valves with V38 or V46 option) 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 the Worcester Actuator Sizing Manual.

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

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#### CAUTION:

7. **The fluoropolymer body seal (T), the fluoropolymer coated stainless steel "S" gasket (M), the graphite body seal (Z), and the Grafoil laminated gasket (G) make excellent seals. However, some points of caution in their use need emphasizing.**
    - a. **No teflon part (except seats) is reusable. Coated stainless steel "S" gaskets and graphite body seals, and Grafoil laminated gaskets are also not 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 the coating of the stainless steel "S" gasket during installation. Light lubrication of these seals and gaskets can help to prevent damage.**
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## 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 ½"-1½" 82/83 Valves

FOR VALVES WITH TWO STEM NUTS AND A LOCKWASHER:

1. Tighten retaining nut (lower nut) until Belleville washers are flat, the nut will "bottom".
2. Back off retaining nut ¼ 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 two nuts in place.)

FOR VALVES WITH SELF-LOCKING STEM NUT:

1. Tighten self-locking stem nut until Belleville washers are flat, the nut will "bottom".  
Back off nut ¼ turn.

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

### For 2"-10" 82/83 Valves

1. Tighten retaining nut ¼ turn at a time until seepage stops.

## 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 & 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 valve size in repair kit ordering code. (Use Series 82 designation for both 82 and 83.)

**NOTE: V51 high cycle stem packing option is used on 2"-6" sizes only and is not used with AF Series valves.**

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 ½"-1½" One-Piece Valves:**
  - a. Remove valve from line. Unscrew end plug and set aside. If the body seal was not removed with the end plug, remove it from the valve and discard. Remove and discard the rear seat. Place valve in closed position and remove the ball.

**NOTE: If required, end plug disassembly tools are available from your distributor or from Flowserve.**

- b. Remove handle nut, lockwasher, also separate handle and stop or one-piece handle/stop (if manual valve). (This step is not applicable to valves with self-locking stem nut.)
- c. Remove retaining or self-locking stem nut. Prevent stem from turning with wrench.
- d. Remove and discard Belleville washers. Push stem into ball cavity and remove. On the ½" size, the far seat must be removed before pushing stem into cavity.
- e. Remove and discard stem seal(s), stem seal protector (if any), thrust bearing, and thrust bearing protector (if any),

### Example Repair Kit Orders

Valve Size	Prefix (if required)	RK	Series	Material	Revision #	or P, T, C, etc., Number
3"	AF	RK	82	TZ	R1	—
2"		RK	82	T	R1 V51	—
4"		RK	82	RT	—	T0914

which may be on the stem or in the body stem cavity. Remove and discard the far seat. Retain the follower.

**To Disassemble 2"-10" Two-Piece Valves:**

- f. 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.
- g. 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.

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.

General Note: Depending on whether a standard or AF Series valve is being disassembled, stem seals may be three-piece or one-piece. Also, the 2½"-10" 82/83 Series valves have one metal stem washer, and the 2½"-10" AF82/83 Series valves have two metal stem washers under the stem seal(s).

- i. Remove handle assembly (if any) by loosening handle screw.
  - j. Remove retaining nut. Prevent stem from rotating by holding stem with wrench.
  - k. Remove stop or valve stem spacer (2"-6" actuated valves). Remove and discard Belleville washer(s) (if present). Remove and retain the follower.
  - l. Push stem into body cavity and remove. Remove and discard stem seal(s) and thrust bearing. Remove and retain stem washer(s) (if any).
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(s) and stem seal(s) contact, must be undamaged, clean and free of pit marks and scratches.

5. Reassembly:

Refer to exploded views and also stem build illustrations on the following pages 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. If metal stem washer(s), 2½"-10" sizes only, and/or Belleville washer(s) were furnished on valve, they must be reused.

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, except for valves with V20, V33 or V38 options, which are assembled dry, lightly lubricate the ball, seats, body seal, stem seal(s), and thrust bearing(s), with a lubricant compatible with the media being handled. White petroleum jelly is a good general purpose lubricant. For oxygen prepared valves (prefix "X") use a PTFE-based lubricant such as Fluorolube S-30 or equivalent.

**½"-1½" One-Piece Valves:**

- a. On all except the ½" size, install the far seat in the body cavity.
- b. 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. Thrust bearing and stem seal protectors are placed outside of seals and bearings. The seals/bearings must contact the body.

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

**NOTE:** Anti-static fire-rated valves (AF82 & AF83) use a graphite stem seal which is metallic silver gray in color. Also a black, carbon-filled fluoropolymer or a gray graphite thrust bearing must be used for proper grounding of the stem to body.

- c. 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).

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.

- d. 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.)
- e. Install far seat (½" valves only), ball, body seal, second seat and end plug. When end plug and body are metal-to-metal, end plug raised face may project up to .009" beyond flange surface. End plug must be fully tightened against machined

step in body. If in doubt, assemble end plug without seat and seal, make a witness mark, and reassemble the full assembly.

**NOTE:** For valves with coated stainless steel "S" gasket body seal, the wide flange is placed facing the ball (see view A-A on page 5). Be sure the body seal is well lubricated.

**2"-10" Two-piece Valves:**

Insert new seat in body. Make sure seat rests firmly on back surface of recess.

- g. Reassemble stem assembly by putting new thrust bearing onto stem and inserting through body cavity into stem hole. For 2½"-6" sizes the thrust bearing can be distinguished from the stem seals by the darker color of the 25% filled fluoropolymer used in the thrust bearing. For the 2", 8" and 10" size valves the stem seals and thrust bearing are the same size and color, and are interchangeable. Put metal stem washer (2½" and larger only), new stem seal(s), and follower onto stem. Fire-rated valves use one or two metal stem washers (install the same quantity that was removed), a graphite stem seal, which is metallic silver gray and thicker than the thrust bearing, and a Belleville washer (2"-6" only) installed concave side up above follower.

**NOTE:** FOR 2"-6" ACTUATED VALVES HAVING A GRAPHITE STEM SEAL AND BELLEVILLE WASHER, A SECOND BELLEVILLE WASHER IS USED. THE BELLEVILLES SHOULD BE INSTALLED WITH THE LARGER DIAMETER SIDES TOUCHING EACH OTHER. THE STEM SPACER IS NOT USED.

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.

Two Belleville washers are used with this V51 option and they are installed over the follower with the larger diameter sides touching each other. The stem spacer is not used.

On anti-static fire-rated valves (AF82 & AF83) a black, carbon-filled fluoropolymer thrust bearing must be used for proper grounding of stem to body.

- h. Add stop, pointing in correct direction, or valve stem spacer (for 2"-6" actuated valves) and stem nut. Using a wrench to prevent the stem from turning, tighten the stem nut until stem packing is fully compressed or Belleville(s), if used, are fully flattened. Then back off ¼ turn. Excessive tightening causes higher torque and shorter stem seal life.
- i. With valve in closed position (stop plate pointer and/or stem groove 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.

- k. Carefully place the end connector into the body using two or three 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:

Stainless Steel Studs		
Valve Size	82-150# Class	83-300# Class
2"	33 Ft.-Lbs.	170 Ft.-Lbs.
2½"	82 Ft.-Lbs.	170 Ft.-Lbs.
3"	33 Ft.-Lbs.	170 Ft.-Lbs.
4"	82 Ft.-Lbs.	170 Ft.-Lbs.
6"	170 Ft.-Lbs.	214 Ft.-Lbs.
8"	170 Ft.-Lbs.	214 Ft.-Lbs.
10"	334 Ft.-Lbs.	521 Ft.-Lbs.

Carbon Steel Studs		
Valve Size	82-150# Class	83-300# Class
2"	87 Ft.-Lbs.	178 Ft.-Lbs.
2½"	87 Ft.-Lbs.	178 Ft.-Lbs.
3"	87 Ft.-Lbs.	178 Ft.-Lbs.
4"	87 Ft.-Lbs.	178 Ft.-Lbs.
6"	178 Ft.-Lbs.	253 Ft.-Lbs.
8"	178 Ft.-Lbs.	253 Ft.-Lbs.
10"	439 Ft.-Lbs.	684 Ft.-Lbs.

- l. Replace handle assembly and tighten hex head screw (manual valves only).

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

Example:

3" - 82 66 T 150 - R1 Stem

6" - AF82 46 RZ 150 - R1 Ball

OR

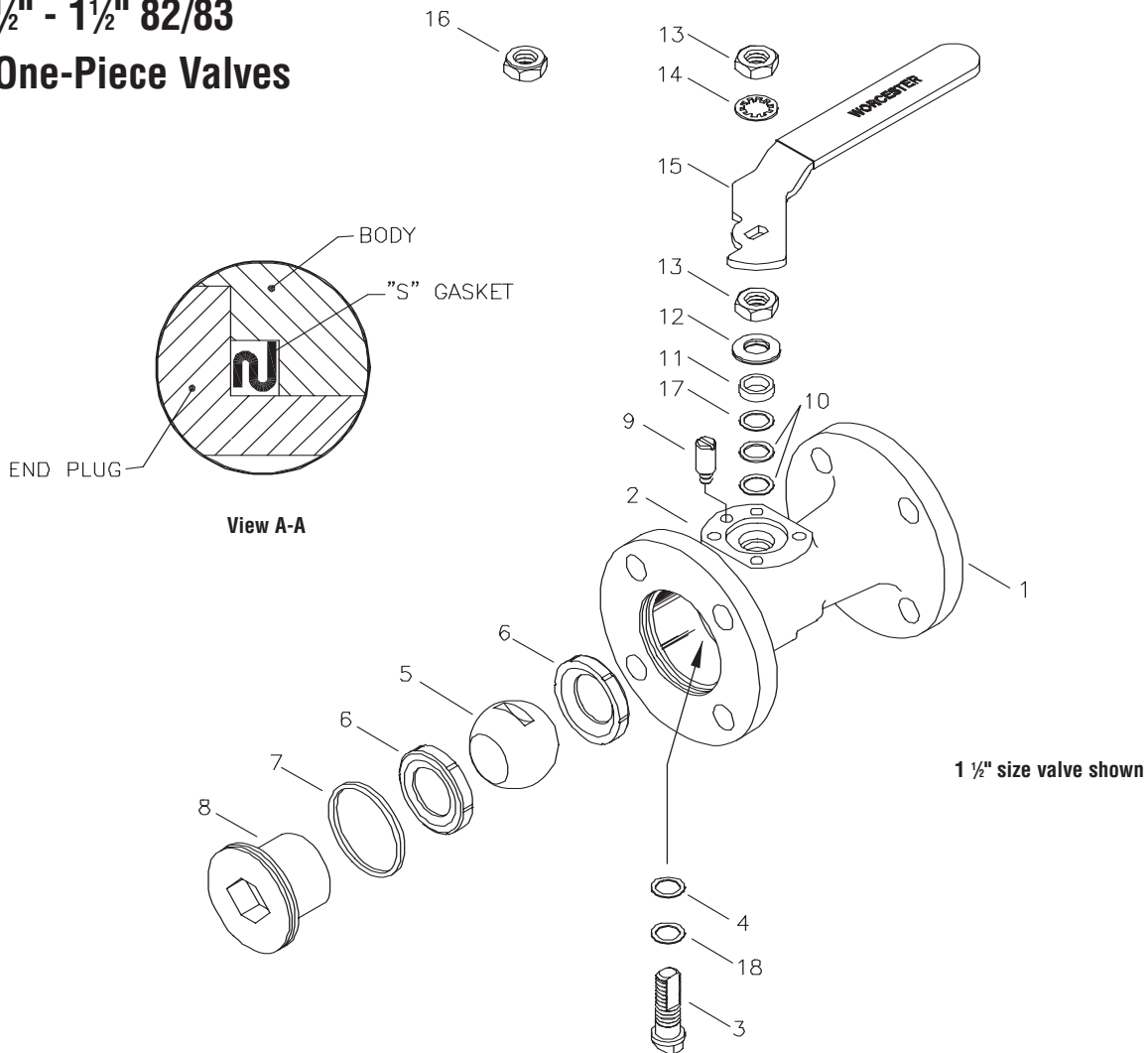
- b. Valve Size, Style and 5 Character Code, known as a "P" Number, "T" Number, "C" Number, or similar number, the designation for a non-standard product.

Example: 6" 8366 T 300 P 2577 Ball

The terminology shown in the part listings on the following pages are standard. Please use them when ordering parts.

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

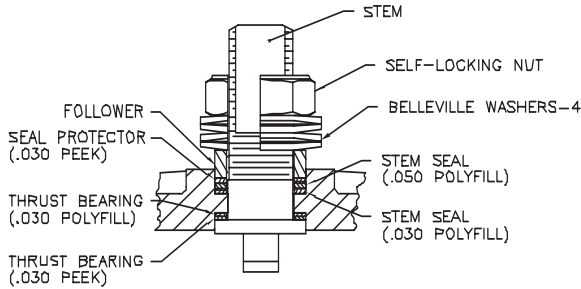
**1/2" - 1 1/2" 82/83  
One-Piece Valves**



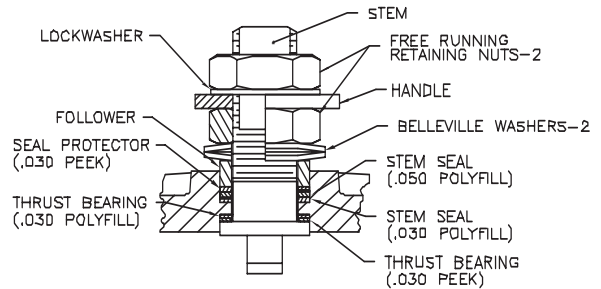
ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
1	1	Body	11	1	Follower
2	1	Nameplate (Not Shown)	12	2 or 4	Belleville Washer (See Section D.5.c.)
3	1	Stem	13	2	Retaining Nut
4	1	Thrust bearing	14	1	Lockwasher
5	1	Ball	15	1	Handle (Manual Valve Only)
6	2	Seat	16	1	Self-Locking Stem Nut (Automated Valve Only)
7	1	Body Seal	17	1	Stem Seal Protector (See Section D.5.b)
8	1	End Plug	18	1	Thrust bearing Protector (See Section D.5.b)
9	1 or 2	Stop Pin (Manual Valve Only)	19	1	Stop (1" Manual Valve Only) (Not Shown)
10	1 or 2	Stem Seal (See Section D.5.b.)			

**New Style 1/2" – 1 1/2" 82/83 Valve Stem Builds**

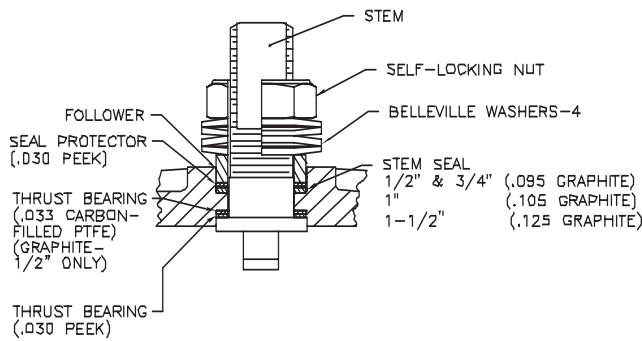
**Automated Valve Shown**



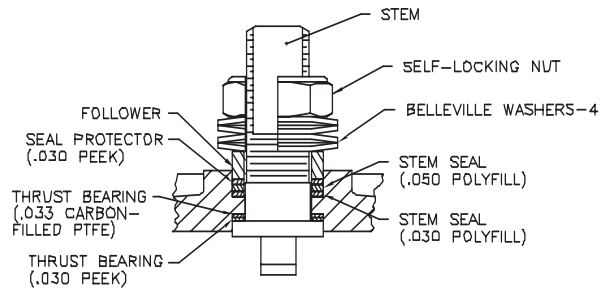
**Manual Valve Shown**



**Fire Valve – Automated Valve Shown**



**V17 Option – Automated Valve Shown**



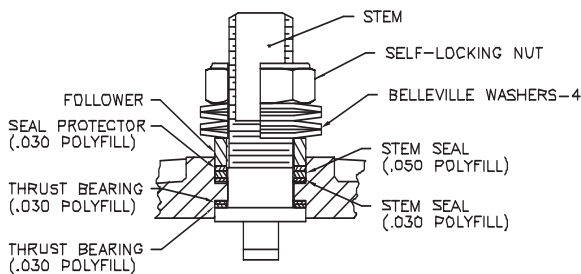
**NOTE:**

STEM BUILD COMPONENTS SUCH AS STEM SEAL(S), THRUST BEARING(S), & SEAL PROTECTOR (IF USED) ARE THE SAME FOR MANUAL AND AUTOMATED VALVES.

FOR FIRE VALVES & VALVES WITH V17 OPTION USED IN OXYGEN SERVICE, USE POLYFILL STEM SEAL AND THRUST BEARING PROTECTORS IN PLACE OF PEEK MATERIAL.

FOR COLORS OF VARIOUS STEM COMPONENTS, SEE COLOR CHART BELOW.

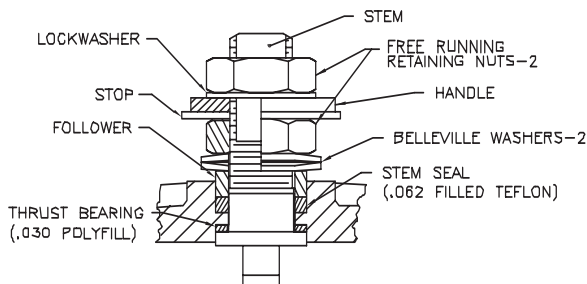
**Oxygen Service Valve Automated Valve Shown**



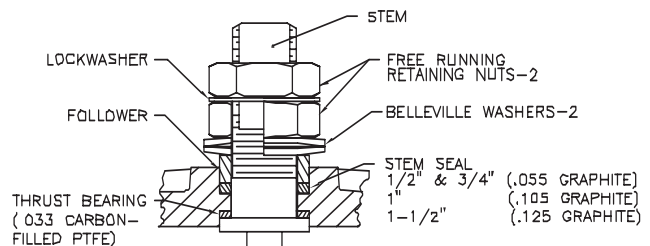
COLOR CHART FOR VARIOUS STEM COMPONENT MATERIALS	
MATERIAL	COLOR
POLYFILL	BLACK
PEEK	TAN
GRAPHITE	SILVER GRAY
CARBON FILLED PTFE	BLACK
FILLED TFE	OFF WHITE

**All Other 1/2" – 1 1/2" 82/83 Valve Stem Builds**

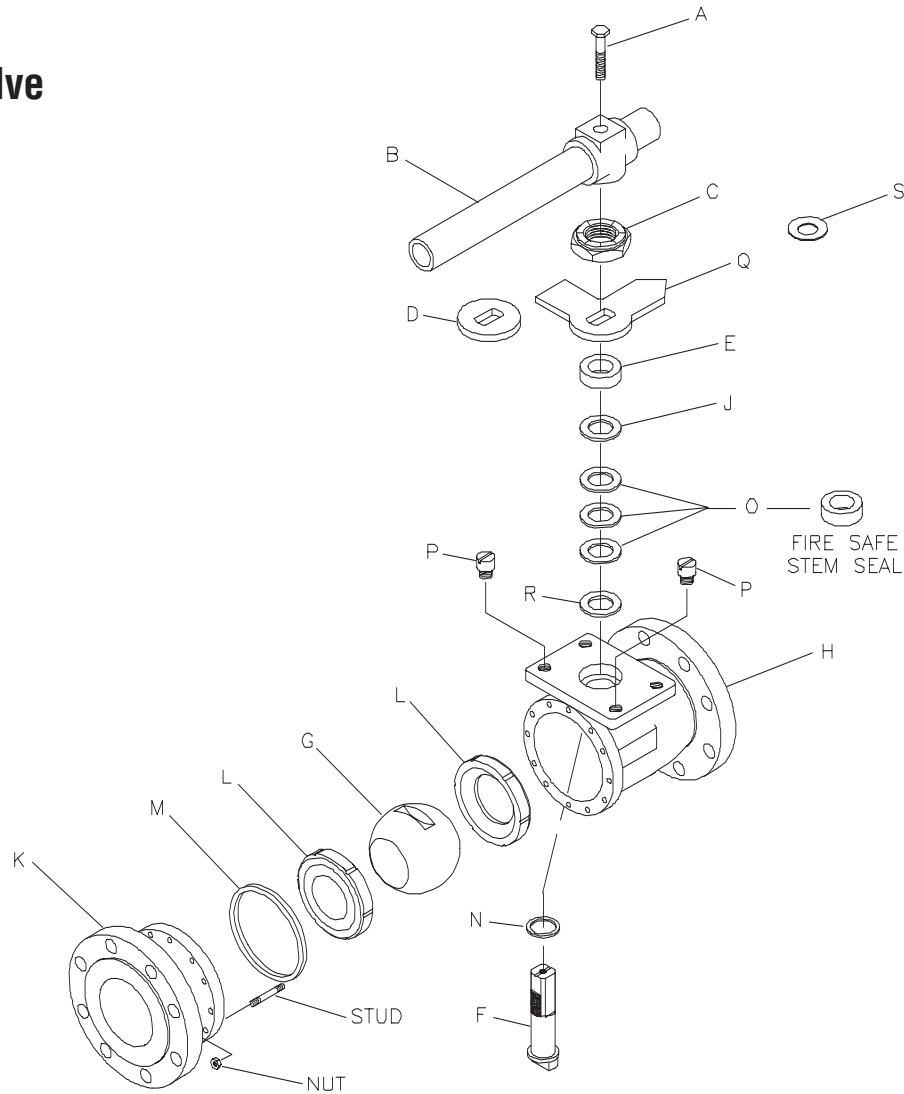
**Standard Manual Valve Shown**



**Fire Valve – Automated Valve Shown**



## 2" - 10" 82/83 Two-piece Valve



ITEM	QTY	DESCRIPTION	ITEM	QTY	DESCRIPTION
A	1	Handle Screw	L	2	Seats
B	1	Handle Assembly	M	1	Body Seal
C	1	Retaining Nut	N	1	Thrust bearing
D	1	Stem Spacer (2"-6" Actuated Valves Only)	O	1 or 3	Stem Seal
E	1	Stem Follower	P	2	Stop Bolt
F	1	Stem	Q	1	Stop
G	1	Ball	R	1 or 2	Stem Washer (2½"-10" Only)
H	1	Body	S	1	Belleville Washer (Used with Graphite Stem Seal Only 2"-6" valves with extended duty V51 option stem build or actuated valves with graphite stem seal use two Bellevilles.)
J	1	Stem Seal Protector - PEEK (used with Extended Duty V51 Option Stem Build Only)			
K	1	End Connector			

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.

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