

Instruction Manual Type 9200 T-Ring Butterfly Valve Bodies

Form 2432, March 1974

Introduction

The Type 9200, shown in figure 1, is a heavy-duty butterfly valve body designed for stringent shutoff requirements. An elastomer or TFE T-ring seat is used to obtain shutoff. The available construction variations of the Type 9200 are described below. The method of effecting the T-ring seal varies with the type of construction.

Specification A—The pressure-activated T-ring is contained in the body as shown in figure 2. External sealing pressure forces the T-ring against the disc periphery only when the disc is closed. There is no contact between the disc and T-ring when the disc is opening or closing. Specification A valves are available with elastomer T-rings only.

Specification 8-1—The adjustable elastomer T-ring seat is contained between the body and retaining flange as shown in figure 3. The adjusting set screws and compression ring force the T-ring against the disc periphery to provide interference between the T-ring and disc.

Specification B-2-Similar to Specification B-1 except with TFE T-ring

Specification C-1—The adjustable elastomer T-ring seat is contained in the valve disc as shown in figure 4. The adjusting set screws and compression ring force the T-ring against the body bore to provide interference between the T-ring and body bore seating surface.

Specification C-2—Similar to Specification C-1 except with TFE T-ring

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Figure 1. Type 9200 Butterfly Control Valve Body

Installation



Do not install the valve in systems where the service conditions exceed those for which the valve was designed, or damage to the valve and personal injury may result.

1. Inspect the valve for shipping damage and be certain that the body cavity is free of foreign materials.

2. Clean out adjoining pipelines to remove all foreign material that could damage the valve seat.

3. In these cases where a flow direction arrow is attached to the valve body, install the body so that the flow through the valve will be in the direction indicated. (Although some seat materials and service conditions require flow in one direction only, the Type 9200 is normally capable of flow in either direction and will have no flow arrow attached.)

 Be certain that the pipeline flanges are in line with each other and that the disc is fully closed before inserting the valve into the pipeline.









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Figure 4. Type 9200 Specifications C-1 and C-2

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Type 9200

CAUTION

If the flanges are out of alignment or if the disc is open, difficulties in installation and/or damage to the valve may occur. Be certain that flanges and adjacent piping will not interfere with the opening of the valve disc. Review the dimension drawings to ensure that the inside diameters of the adjacent flanges and piping are large enough to allow disc lotation without interference.

5. Center the valve between the pipe flanges. Although the valve may be installed in any position, the normal position is with the valve shaft horizontal and the actuator vertical above the valve body.

 Follow accepted piping practices when installing the valva. Provide suitable flange bolting and flange gaskets.

 If a power actuator is furnished with the valve body, refer to the appropriate actuator instruction manual for information regarding installation and operation of the actuator.

8. If a sealing system is supplied for Specification A constructions, refer to the seal system instructions for operation information.

Specification A Sealing Pressure

Required sealing pressure for Specification A valves is equal to (a) 50 psig or (b) the valve inlet pressure plus one-half the outlet pressure, whichever is greater. Maximum allowable sealing pressure is equal to (a) the maximum allowable pressure of the sealing system being used or (b) 2.5 times the inlet pressure, whichever is lower.

Operation

Specification A

On power-actuated valves when the disc is in the fully closed position, the seal pressure is applied to the back of the elastomer T-ring, forcing the T-ring against the disc periphery. Immediately upon activation of the actuator to open the valve, the seal pressure is released, allowing the disc to leave the seat without any force being exarted on the elastomer T-ding by the disc. The disc is then positioned at the required angle of operation.

When the disc is brought from its open position to its closed position, there is a delay before seal pressure is applied. The sealing system is tripped just as the disc is entering the seal and allows the disc to close fully (completely in the seat) before the seal pressure is applied. This operation is factory adjusted on each valve; if problems arise, the system can be re-adjusted per the seal system instructions.

On valves without power actuators, the sealing pressure must be released with the manually operated losding valve before the valve is opened and re-applied after the valve is closed.



Never apply pressure to the sealing system unless the valve disc is fully closed, or damage to the T-ring may result.

Specifications B-1, B-2, C-1, and C-2

For Specification B-1 and B-2 valves, the valve disc rotates into contact with the T-ring seat on closing. For Specification C-1 and C-2 valves, the valve disc rotates the T-ring into contact with the body bore seating surface on closing. No sealing pressure is required.

Maintenance

WARNING

To avoid personal injury and damage to the process system, isolate the control valve from all pressure and welcase pressure from the valve body and actuator before disassembling.

Outboard Roller Bearings

If the valve is equipped with outboard roller bearings, lubricate the bearings periodically with a good quality roller bearing grease.

Packing

Key numbers used in this section are shown in figure 5. For valves with lubricating-type packing boxes, lubricate the packing periodically. The frequency of lubrication required depends upon the severity of service conditions.

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Figure 5. Packing Box Types

It may be necessary to tighten the packing follower nuts (key 13) to stop leakage. If leakage cannot be stopped in this manner, replace the packing per the instructions below.

For split-ring packing, unsciew packing follower nuts (key 13) and slide packing follower (key 15) away from the valve. Remove old packing rings (key 16).

For lubricating packing boxes, remove actuator mounting bracket. Remove lantern ring (key 45) to gain access to the packing rings behind the lantern ring. Place new rings over the valve shaft. When inserting the rings into the packing box, be certain that the split in each ring is positioned 90° from the split in the adjacent ring.

For ring-type packing, remove the actuator and all accessories. Uncorew packing follower nuts (key 13), Remove backing follower and packing rings (keys 15 and 16). For lubricating packing boxes, also remove lantern ring (key 45) to gain access to the packing rings behind the lantern ring. Install new packing rings on the shaft and insert them into the packing box.

For O-ring packing boxes, disassemble the components of the control valve assembly as far as is required to remove the C-ring follower (key 49). Replace O-rings (keys 47 and 48) in this follower as required.

Replacing T-Ring

Specification A

Key numbers used in the following steps are shown in figure 2 except where indicated.

1. Making certain that the valve disc (key 2) is fully closed, remove valve body from pipeline.

2. Note the location of travel stop (key 9, figure 8) on retaining ring (key 7) in respect to the body. This travel stop will be in either location A or B as shown in figure 2 and must be replaced in the same location during reassembly.

3. Unscrew Allen-head cap screws (key 8) and remove retaining ring and T-ring (key 5).

4. Inspect O-ring (key 6). If O-ring requires replacement, remove it from the body.

5. Clean T-ring and O-ring grooves, and coat the new T-ring with a good quality silicone grease.

6. Making certain that the T-ring seat angle matches the disc seat angle (as shown in the inset in figure 2), install the T-ring in the body. Insert the new O-ring if replacement is required.

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7. Place retaining ring on the body. Using care to avoid damaging the O-ring (key 6), rotate the retaining ring slightly clockwise and counterclockwise to ensure proper alignment on the T-ring. Be certain the travel stop is positioned in the location noted during disassembly.

8. Replace and tighten Allen-haad cap screws (key 8).

9. Replace valve in pipeline per the "Installation" section.

Specifications B-1 and B-2

Key numbers used in the following steps are shown in figure 3 except where indicated.

1. Making certain that the valve disc (key 2) is fully closed, remove valve body from pipeline.

2. Note the location of travel stop (key 9, figure 6) on retaining ring (key 7) in respect to the body. This travel stop will be in either location A or B as shown in figure 2 and must be replaced in the same location during reassembly.

3. Completely loosen adjusting set screws (key 54).

4. Unscrew Allen-head cap screws (key 8) and remove retaining ring, compression ring (key 53), and T-ring (key 5).

5. Inspect O-ring (key 6). If O-ring requires replacement, remove it from the body.

6. Clean T-ring and O-ring grooves. For elastomer T-rings, coat the new T-ring with a good quality silicone grease.

7. Making certain that the T-ring seat angle matches the disc seat angle (as shown in the inset on figure 2), install the T-ring in the body. Inset: the new O-ring if replacement is required.

8. Place retaining ring on the body. Using care to avoid damaging O-ring (key 6), rotate the retaining ring slightly clockwise and counterclockwise to ensure proper alignment on the T-ring. Be certain the travel stop is positioned in the location noted during disassembly.

9. Repiace and tighten Allen-head cap screws (key 8).

10. Adjust the T-ring per instructions in the "Adjustments" section.

11. Replace valve in pipeline per the "Installation" section.

Specifications C-1 and C-2

Key numbers used in the following steps are shown in figure 4 except where indicated.

1. Making certain that the valve disc (key 2) is fully closed, remove valve body from pipeline.

2. Specification C-1 and C-2 valves may be furnished with a travel stop on the body. This travel stop, if furnished, is not removable.

3. Completely loosen adjusting set scraws (key 54).

4. Unscrew Allen-head cap screws (key 8) and remove retaining ring, compression ring, and T-ring (keys 7, 53, and 5).

5. Clean the T-ring groove. For elastomer T-rings, coat the new T-ring with a good quality silicone grease.

6. Making certain that the T-ring seat angle matches the body seat angle, install the T-ring in the disc.

7. Place retaining ring on the disc and rotate the retaining ring slightly clockwise and counterclockwise to ensure proper alignment on the T-ring.

8. Replace and tighten Allen-head cap screws (key 8).

Adjust the T-ring per instructions in the "Adjustments" section.

10. Replace valve in pipeline per the "Installation" section.

Replacing Valve Disc

If replacement of the valve disc is required, follow the "Replacing T-Ring" instructions to the point at which the retaining ring and T-ring have been removed. Then proceed with the instructions below. Key numbers used in the following steps are shown in figure 6.

1. Remove actuator, mounting bracket, packing followers (key 15) and packing.

2. If the ends of the taper pins (key 3) are peened, grind off the peened portion. Drive out taper pins.

3. If there is one set of taper pins in the disc, pull shaft (key 4) out of body and remove disc (key 2). Two sets of taper pins indicate that stub shafts are used. Each shaft portion must be pulled out of the body; do not attempt to drive the shaft portions through the disc.



CAUTION

When installing a new disc, also install a new shaft and taper pins. Attempting to use a new disc and old shaft will require drilling new taper pin holes in the shaft, thereby weakening the shaft. The weakened shaft may fail in service. A new shaft may be used with an old disc, using the taper pin holes in the old disc as guides for drilling taper pin holes in the shaft.

4. With inboard bushings (key 19) installed, place valve disc in the body. For large valves, block the body in the horizontal position. Be certain the clearance under the body is equal to at least one-half the disc diameter. With the disc vertical, use a hoist of suitable capacity to place the disc in the body. Be cerain the taper pin holes are on the actuator side of the body.

5. Align the disc shaft hole with the packing box holes in the body.

6. Insert the shaft through the body and disc. Make certain the key seat in the shaft is on the actuator side of the body.

7. Replace bushing retainers and packing box parts (keys , 18, 17, 16, 15, and 13).

8. Install taper pins. The disc should be centered in the body bore.

9. Re-install T-ring and retaining ring per instructions in the "Replacing T-Ring" section. For Specifications B-1, B-2, C-1, and C-2, adjust the T-ring per instructions in the "Adjustments" section.

10. Install the valve in the pipeline per instructions in the "Installation" section.

Adjustments

Specifications 8-1, 8-2, C-1, and C-2 T-Ring

Adjust the T-ring as required to compensate for wear and to retain satisfactory shutoff capability.

1. Rotate valve disc to the fully closed position.

2. Loosen all adjusting set screws (key 54, figure 3 or 4) so that there is clearance between the T-ring and its seating surface at all points around the i-ring.

3. Select one adjusting set screw (key 54) as a starting point at d tighten that screw 1/4 turn (clockwise rotation).

4. Moving clockwise around the retaining ring (key 7, figure 3 or 4), tighten each set screw 1/4 turn. Continue until the T-ring contacts its seat at one point.

5. When contact at one point has been made, return to the set screw selected as the starting point. Move around the retaining ring in a clockwise pattern, and wherever there is clearance between the T-ring and its seat, tighten the set screw at that point 1/4 turn. Bypass any screws where the T-ring is in contact with its seat.

6. When contact has been made at all points on the T-ring, tighten each set screw on Specifications B-1 and C-1 an additional 1/4 turn. No further tightening is required on specifications P-2 and C-2.

7. Replace the valve in the pipeline per instructions given in the "Installation" section.

Double-Thrust Bearings

It is unlikely that the thrust bearings will require adjustment. If it does become necessary to adjust the bearings, proceed as follows. Key numbers used in the following steps are shown in figure 6.

i. Making certain the valve disc is in the closed position, remove valve from pipeline.

2. Loosen the screws found in each clamp-type collar (key 27).

3. With the valve disc closed, center the disc in the body bore.

4. 'With the valve disc centered, position one clamp-type collar against each end of the bearing bracket (key 21) hub. Then, tighten the screw in each collar.

5. For Specifications B-1, B-2, C-1, and C-2 valves, adjust T-ring per the procedure above if the adjustment was disturbed in centering the disc.

Replace the valve in the pipeline per the "Installation" section.

Actuator Linkage

Due to the large number of different types of actuators that can be used with the Type 9200, it is not practical to present detailed instructions for the various types. However, to simplify this adjustment and to ensure proper valve disc closura, an internal travel stop is normally furnished with the valve. When checking or adjusting the linkage, the disc may be closed until contact is made with this travel stop. Adjust linkage to close the disc to this point.



Figure 6. Type 9200

Ordering Replacement Parts

To order replacement parts, specify the key number and name of each part required from the "Parts Refurence" section. Also state the original material of the part, if known, the desired quantity, valve type number, size, serial number, and all other pertinant nameplate information. The correct part will be selected based on this information.

in all correspondence with the sales representative, mention the serial number of the valve.

Parts Reference

Lak	Part Name
1	Body
2	Valve Disc
3*	Taper Pin
4	Valve Shaft
5*	T-Ring
6*	O-Ring (Specifications
	A. 8-1, and 8-2 only)
7	Retaining Ring
8	Alten-Head Cap Screw
9	Travel Stop
10	Set Screw
11*	Kev
13	Packing Follower Nu.
14	Packing Follower Stud
15	Packing Follower
18*	Packing Ring
17*	Packing Washer
18	Retaine Bushing
19	Inboard Bushing
20	Bushing
21	Searing Bracket

22 Lock Washer

Hex Head Screw
Clamp-Type Coilar
Lantern Ring (Lubricating and purging packing
Fitting (O-ring packing boxes only)
O-Ring (O-ring packing boxes only)
O-Ring (O-ring packing boxes only)
O-Ring Follower (O-ring packing boxes only)
Hex Head Bolt (O-ring packing boxes only)
Spacer Block
Washer
Compression Ring (Specifications 8-1, 8-2, C-1, and C-2 only)
Adjusting Set Screw Specifications B-1, B-2, C-1, and C-2 only)

Part Name

Key

Type 9200 * 4) WORLDWIDE MANUFACTURING SALES SERVICE FISHER SA Fisher Controls Company

Fisher Controls Company, Marshallown, Iowa 50158 + Other Rante Hoodstock, Ont. Carappolis, Po. McKinney, Tex. Joluco, Edo de Mexico, BECTRONIC INSTRUMENTATION / Isher Process Faulo Ud. Conwall, Eng.

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ENGINEERING AND RESEARCH DEPAH MENT

Mr. Richard J. Stenzel Fisher Controls Company Continental Division 200 Main Street Coraopolis, PA 15108

Subject:



Peach Bottom Atomic Power Station Qualification of Purge and Vent Valves

a) Fisher letter to PECo. dated 10/29/79
b) PECo. letter to Ni 7 dated 10/25/79
c) NRC letter to PECo. dated 9/27/79
d) PECo. letter to Fisher dated 9/21/79
e) PECo. letter to Bechtel dated 9/20/79
f) PECo. Notes of 8/24/79 Meeting with MRC
g) NRC letter to PECo. dated 11/29/73
h) PECo. Memorandum dated 12/26/78
i) Fisher letter to PECo. dated 3/20/79
j) Fisher letter to PECo. dated 3/20/79
k) Telecon, D. R. Melwig to R. Stenzel dated 5/16/79

Dear Mr. Stenzel:

This letter is intended to summarize your recent discussions with D. R. Helwig regarding the need for a "qualification program" for the Fisher butterfly valves installed at Peach Bottom. We have been in constant communication regarding these valves since our receipt of reference g). Copies of references b) through h) are enclosed for your use.

At our August 24, 1979 meeting with the NRC, the Staff elaborated on their concerns regarding the operability of large diameter butterfly valves used for containment purging and venting. We were advised that these concerns had been discussed previously with technical representatives of your company. Subsequent to our meeting with the staff, letters were written to Bechtel and you [references d) and e)] requesting information to enable us to respond to the Staff's concerns which we had not considered previously.

More recently, the Commission has formalized their concerns and transmitted guidelines for the demonstration of operability via reference c). This information was telecopied to you upon receipt. Subsequent to your discussions with D. R. Helwig, a committment was made to the NRC to complete a "demonstration of operability" by April 30, 1980 (reference b).

The attached sketch indicates the arrangement of your butterfly valves in the Peach Bottom Containment Atmospheric Control System. Copies of P&ID M-367 and drawings showing installation details of the subject valves were transmitted in reference d). These valves are normally closed during power operation. However, as described in reference h), they are opened for rapid inerting and de-inerting during power operation before and following outages requiring containment access. The NRC is primarily concerned with the ability of these valves to close if a LOCA were to occur while they were open. Our post-LOCA containment pressurization curve has been previously transmitted to you.

In order to effectively coordinate our response to the NRC, the following detailed discussion of our approach to the Staff's concerns is provided below. Item numbers are in accordance with the attachment to reference c).

- Valve closure rate versus time You advised us in reference

 that it was conservative to assume a linear relationship
 in the analysis of valve closure from 37° open. We have
 therefore used a closure rate of 90°/5 sec or 18°/sec for our
 analyses. Your confirmation that this is an appropriate
 assumption and a brief description of basis for this con clusion should resolve this item.
- 2. Flow direction through the value Reference j) transmitted a table of allowable P versus degrees open for conditions of flow into the hub and into the flat of the butterfly disc. A description of your analysis should be sufficient to resolve this item. Torsional shear, shear, bending, tension and compression loads/stresses should be addressed.
- Single valve closure We have assumed that the closure of a single isolation valve is the worst case. An expression of your concurrence is required.
- Containment backpressure effect This is not applicable since all Peach Bottom Atomic Power Station valves are located outside containment.
- 5. Adequacy of accumulator This concern is not applicable since air is not used to close these valves.
- 6. Torque limiting devices This concern is not applicable.

- Piping system effects Reference d) requested that you perform an analysis of these effects. Please advise immediately if additional field installation details are required.
- Disc and shaft orientation This should be addressed in your work on 1, 2, and 7, above.

Seel Integrity - In reference k) you advised that the butterfly value ceats should be replaced every 4 years. Please confirm that this will be sufficient to assure tight shutoff under the following environmental conditions. Since these values are located in the reactor building, but form the boundary between the primary containment and reactor building atomosphers, environmental conditions are given for both locations:

		Inside Containment	Reactor Building
Normal Operation:	Temperature	135 ⁰ F	65 to 110°F
	Humidity	up to 100%	up to 100%
	Radiation	50 R/Hr	.1 R/Hr
180 day post-LOCA:	Temperature	300 ⁰ F	185°F
	Humidity	100%	100%
	Radiation	4.44 x 10 ⁷ Rac	ds 3 x 10 ⁶ Rads

No chemical solutions are used for containment spray at Peach Bottom. Bechtel is currently calculating the appropriate dose to be considered for seal life. We will advise you of the results shortly.

Debris Entrainment - In reference d) we requested your recommendation regarding the sizing of debris screens for the purge and vent lines. Your recommendation and an explanation of the basis for it are required.

<u>Air vs. Water Service</u> - The staff is concerned that value designs have not considered compressible flow effects. They stated that technical papers exist which come to opposite conclusions on this topic. They further stated that they felt each value design needed to be separately evaluated. Although you have previously advised us that compressible flow effects were considered, a technical description of your approach to this problem is required. This was requested in reference d).

Seismic Design - These values must close and maintain a tight seal during, and following a seismic event. They need not remain functional after closure. Your previous analysis of the value assembly and your present evaluation of the mechanical stops should be summarized to support this conclusion. Bechtel and PECO. will assume the responsibility for the seismic design of the air supply for the inflatable seat, wich the exception of the information which you previously supplied regarding the Type 67FR regulators and Type 164A switching values. Please proceed immediately to perform the work requested above. We are anxious to complete all efforts to support our April 30, 1980 committment to the NRC.

Please do not hesitate to contact us for further clarification. Perhaps a meeting in your offices would be appropriate to further discuss details of your work and scheduling.

Very truly yours,

S. J. Kowalski Engineer-in-Charge Power Plant Services Section

Attachment

DRH/CIIVN/5

Copy to: E. C. Kistner J. Moskowitz D. L. Morad M. J. Cooney File: EQUIP 3-1-16 (M-117)

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ENGINEERING AND RESEARCH DEPARTMENT

Mr. David L. Cerny Design Engineer Fisher Controls Company Marshalltown, Iowa 50158

Subject:

Peach Bottom Atomic Power Station Purge and Vent Valves

References:

- a) PECo. letter to Fisher, dated February 5, 1980
- b) Meeting in Philadelphia, January 22, 1980
- c) PECD. letter to Fisher, dated December 3, 1979

Dear Dave:

This letter is to supplement information previously provided in the above references. Bechtel has completed their analysis of the appropriate radiation dose to be considered in your evaluation of seal life. The following values should be assured.

40 year normal operating dose: 5.26 x 10³ Rads

180 day post-LOCA dose: 8 -1.88 x 106 Rads A-8.20 x 108 Rads

The temperature and humidity conditions provided in reference c) remain unchanged.

We await your full report on the Peach Dottom valves which is due by March 1, 1980. Please do not hesitate to contact me if further discussion of any aspect of your work on this problem is desired.

Very truly yours,

David R Helwy D. R. Helwig, P.E.

DRH/cmv/F1 Copy to: S. J. Kowalski D. L. Morad File: EQUIP 3-1-16 (M-117) FEB 1 Q tean



APERTURE



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