SECTION 33 12 16
RUBBER-SEATED BUTTERFLY VALVES

PART 1 GENERAL

1.1 SCOPE

A. Provide rubber-seated butterfly valves as listed in the Bill of Material at the end of this Section, and as shown on the Drawings.

B. Except as modified or supplemented herein, all butterfly valves supplied under this Specification shall be designed and manufactured in strict compliance with AWWA C504 for valves up to 72 inch diameter, and AWWA C516 for 78 inch diameter and larger. All Class 250 valves shall have ductile iron bodies with flange dimensions and drilling per ANSI B16.1, Class 125.

C. Valves supplied under this Specification may include 2 installation types: Buried or In-Plant. The type of valves, class of valves and type of actuators to be supplied are identified in the Bill of Material.

D. Valves shall be identified by the Item numbers listed in the Bill of Material.

1.2 REFERENCES

A. The following is a list of standards which may be referenced in this Section:

1. American National Standards Institute (ANSI):
   a. B16.1, Cast Iron Pipe Flanges and Flanged Fittings.
2. American Society for Testing and Materials (ASTM):
   a. A 564 - Standard Specification for Hot-Rolled and Cold-Finished Age-Hardening Stainless Steel Bars and Shapes
   b. D 429 - Standard Test Methods for Rubber Property—Adhesion to Rigid Substrates
3. American Water Works Association (AWWA):
   a. C 207 - Standard Steel Pipe Flanges for Waterworks Service—Sizes 4 In. Through 144 In. (100 mm Through 3,600 mm)
   b. C 504 - Standard for Rubber-Seated Butterfly Valves.
   c. C 550 - Standard for Protective Interior Coatings for Valves and Hydrants.

1.3 SUBMITTALS

A. Shop Drawings:

1. Make and model of each equipment assembly.
2. Weights of valve assemblies and individual components.
3. Manufacturer's catalog information, descriptive literature, Specifications, and identification of materials of construction.
4. Detailed structural and mechanical drawings showing the equipment fabrications and interface with other items. Include dimensions, size, and locations of connections to other work, and weights of equipment associated therewith.
5. Submit the following calculations for each valve and service condition:

   a. Maximum valve torque.
   b. Valve actuator torque capacity.
   c. Shaft sizing if valve is beyond scope of AWWA C504 or C516.

B. Quality Control Submittals:

1. Manufacturer's Certificate of Compliance with AWWA C504 or C516.
2. Certified copies of reports on the Performance, Leakage and Hydrostatic Tests.

C. Operation and Maintenance Manual:

1. Complete, detailed operating instructions for each piece of equipment, including actuators.
2. Explanations of all safety considerations relating to operation.
3. Information and instructions for lubrication and adjustments.
4. Special shipping, storage and protection, and handling instructions.
5. Manufacturer's written/printed installation instructions.
6. Routine maintenance requirements prior to startup.
7. Maintenance instructions with illustrations as necessary.
8. Recommended schedule of maintenance.
9. Lubrication schedule and table of alternate lubricants.
10. List of special tools and equipment required for maintenance.
11. Recommended spare parts list.
12. Include all information submitted under Section A. Shop Drawings.

1.4 EXTRA MATERIALS

A. Furnish, tag, and box for shipment and storage any special tools required to maintain valve.

PART 2 PRODUCTS

2.1 GENERAL

A. Service:

All valves shall be suitable for throttling service and/or frequent operation as well as service involving long periods of inactivity. Valves shall be capable of operating satisfactorily with flows in either direction. Valves shall be suitable for use in potable and non-potable service.

B. Installation:

1. Buried: All valves specified as Buried in the Valve Schedule shall be for buried service in horizontal waterlines with the valve shaft horizontal and operating nut shaft vertical. Body of valves will be buried and the actuators will be installed in manholes.
2. In-Plant: All valves specified as In-Plant in the Valve Schedule shall be for service inside buildings or other structures in a relatively dry environment, protected from weather. The actuator shall be directly mounted to the valve body. Unless otherwise shown on the Drawings, the valves shall be installed with valve shaft horizontal

C. Shut Off Pressure:

The maximum static differential pressure across the valve will be the same as the class of the valve. At rated pressure, the valve shall be bubble tight for flows in either direction.

2.2 MATERIALS

A. Class of Valve: specified in the Bill of Material.

B. Valve Bodies: Short body pattern. All Class 250 valve bodies shall be ductile iron. Disc stops on the body will not be allowed.

C. Valve Discs: Gray iron or ductile iron. All Class 250 valve discs shall be ductile iron. Discs having hollow chambers that can entrap water will not be allowed.

D. Valve Seat:

1. Rubber seats may be applied to either the body or the disc. The mating seat surface, in either case, shall be 304 stainless steel or sprayed in accordance with AWWA C504.
2. Rubber seats shall be EPDM.
3. Rubber seats mounted on the disc shall be a continuous full circle 360-degree seal, clamped thereon with retaining rings and threaded fasteners.
4. Rubber seats mounted in the groove of the valve body on valves 24-inch diameter and smaller may be bonded to the body. Bonded seats must withstand a 75-pound pull in accordance to the 90 degree stripping test procedure "Method B" of ASTM D 429.
5. Rubber seats mounted in the valve body on valves larger than 24-inch shall be full circle 360 degree and shall be retained in the valve body by mechanical means in such a manner that the seat can be adjusted to provide a tight shutoff. Valve shaft shall not penetrate the rubber seat.
6. Seat retaining hardware shall be 304 stainless steel.

E. Valve Shaft:

1. The valve shaft shall be 304 stainless steel. Shafts for Class 250B valves shall be ASTM A 564, UNS Designation S17400, condition H1150.

F. Shaft Seal:

1. For valves 24 inch diameter and smaller:
   a. Self-compensating V-type packing.
   b. O-ring type contained in a corrosion resistant cartridge.
2. For valves 30" diameter and larger:
   a. Self-compensating V-type packing.
   b. Adjustable packing with bronze or stainless steel pull down packing gland follower.
3. On Buried valves, the shaft seal area and exposed valve shaft shall be totally enclosed to prevent infiltration of material around the shaft seal and valve shaft during backfilling. Adjustable packing glands shall be accessible either through the bonnet or by removing the enclosure around the packing gland.

G. Valve Bearings:

Valves furnished with an externally adjustable thrust bearing shall have the external adjusting mechanism enclosed in a substantial watertight housing.

H. Type of Valve Ends:

1. All valves shall be furnished with flanged ends. Dimensions and drilling shall conform to ANSI B16.1, Class 125. Flanges shall be finished to true plane surfaces within a tolerance limit of 0.005 inch. The finished face shall be normal to the longitudinal valve axis within a maximum angular variation tolerance of 0.002 inch per foot (0.017%) of flange diameter. Flanges shall be machined to a flat surface with a serrated finish in accordance with AWWA Standard C207.
2. The flanges shall have full-sized bolt holes through the flanges, except that drilled and tapped holes will be acceptable only in the areas where the shaft passes through the body. Flanges with all holes tapped will not be allowed.

I. Valve Bonnet:

1. Buried valves shall be furnished with a separate one piece cast iron or fabricated steel extension bonnet with (if applicable) access openings fitted with removable covers, located to permit access to the stuffing box for tightening the adjustable packing. The extension bonnet shall be 24 inches in length and shall be of a single diameter over its entire length. Minimum thickness of removable cover shall be 14

gauge (.0747 inch) and shall be attached to extension sleeve with a minimum of four 1/4 inch diameter cap screws. Gasketing of the opening is not required.

J. Name Plates:

1. Corrosion-resistant nameplates shall be provided. There shall be one valve nameplate attached to the valve body, or on Buried valves, attached to the valve actuator, extension bonnet or support stand. The valve nameplates shall include the normal valve data and the serial number. There shall be one actuator nameplate attached to the valve actuator.

2.3 VALVE ACTUATORS:

A. Unless otherwise specified in the Bill of Material, valves shall be furnished with manual actuators. The maximum velocity for actuator design shall be based on operating requirements shown in the Bill of Material. For valves requiring electric actuators, see Specification

B. Buried Valves

1. The actuators shall be worm gear type and shall be Auma GS, Limitorque Type HBC, Rotork IW, or EIM Type WD.
2. Actuators shall be equipped with 2-inch square wrench nuts in accordance with AWWA C509. The valves shall open with a clockwise rotation of the nut.

C. In-Plant Valves

1. Manual actuators shall be traveling nut type or worm gear type. Electrically actuated valves shall have worm gears only. Worm gear actuators shall be Auma Model GS, Limitorque Type “PT”, Rotork IW , or EIM Type WO. Traveling nut actuators shall be manufactured by the valve manufacturer, and shall be capable of withstanding 450 foot-pounds of input torque. Actuators shall be provided with handwheels of suitable size to open the valves with the specified maximum pull.
2. Direction of Rotation for open/closing operation as indicated in the Bill of Materials.

D. Design Details

1. Worm gear actuators shall have high tensile bronze worm gears, and a worm of hardened alloy steel. All gearing of the manual actuator shall be totally enclosed and sealed for a lubricant formulated for a temperature range of –10°F to +150°F. Manufacturer shall fill the gear case with lubricant to 90% of full prior to shipment from the factory.
2. Primary gearing shall be supplemented by spur gear attachment to comply with the following conditions of operation for all sizes of valves:
   a. Buried valves: Minimum number of turns for complete opening or closing of valve disc shall not be less than 40.
3. All actuators, including Buried service, shall have valve position indicators.

2.4 SHOP/FACTORY FINISHING

A. Internal Surfaces

1. All internal ferrous surfaces except machined or bearing surfaces shall be prepared for coating by blasting to a “Near White Metal Finish” per SSPC-SP-10. These surfaces shall then be coated with a two-part thermosetting polyamide epoxy in two or more uniform coats, or with fusion bonded epoxy, to a minimum dry film thickness of 10 mils. Epoxy coating shall conform to AWWA C550 and shall be Amercoat 370, Amerlock 400, Tnemec Series 141F Pota-Pox 80, Corvel ECA-1626 or approved equal.

B. External Surfaces

1. All external surfaces except machined or bearing surfaces shall be carefully prepared by removing all dirt, grease, and rust and shall be cleaned to the extent that the coating will bond to all surfaces.
2. Buried valves: the exterior of each valve except flange faces shall be shop coated with two coats of asphalt varnish, or shall be prepared and coated the same as the internal surfaces.
3. In-plant valves: the exterior of each valve except flange faces shall be shop coated with one coat of polyamide anti-corrosive epoxy primer to a dry film thickness of not less than 3 mils.

C. Flange faces shall be shop coated with a rust preventive compound.

D. After above painting is completed, a lubricant compatible with the rubber seal shall be applied to surface of this seal and the mating metal surface to prevent bonding of the two surfaces during shipment and storage. Following application of the seal lubricant, the valve disk shall be placed in a slightly open position for shipment.

2.5 SHOP TESTING

A. The valve manufacturer shall test all valves and shall furnish certified copies of the reports on the Performance test, the Leakage test, and the Hydrostatic test.

2.6 MANUFACTURERS

A. All valves furnished shall be the latest standard products of a manufacturer regularly engaged in the production of equipment of this nature for a period of at least 5 years.

B. Approved Manufacturers:

1. DeZurik
2. Mueller
3. Henry Pratt
4. Val-Matic

PART 3 EXECUTION

3.1 VALVE ASSEMBLY

A. All Buried and In-Plant valves shall be shipped fully assembled.

3.2 INSTALLATION (BY OWNER)

A. In accordance with the manufacturer's written instructions and Shop Drawings.

3.3 FIELD QUALITY CONTROL (BY OWNER)

A. Functional Tests: Operate each valve two complete open-close cycles.

3.4 MANUFACTURER'S SERVICES

A. If the valve is not functioning properly at the time of installation, the Manufacturer shall furnish an authorized service person to repair or adjust the valve to the satisfaction of the Board at no additional cost to the Board.

3.5 SUPPLEMENTS

A. The supplements listed below, following "END OF SECTION," are a part of this Specification.

1. Drawings:

   a. Potable Water Square Operating Nut.

END OF SECTION