

SECTION 15110
BUTTERFLY VALVES

PART 1 - GENERAL

1.01 SCOPE

The Contractor shall furnish and install rubber-seated butterfly valves in all locations as shown on the Plans. All butterfly valves shall be as specified herein.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

The Contractor shall provide and install all work in accordance with the latest edition of all applicable regulations and governing codes, including the following standards:

ANSI/AWWA C504 Rubber-Seated Butterfly Valves.

AWWA C550 Protective Interior Coatings for Valves and Hydrants.

Where a conflict in requirements occurs the more stringent requirement shall govern.

1.03 RELATED WORK SPECIFIED ELSEWHERE

Section 15100-Valves, General

1.04 CONTRACTOR SUBMITTALS

The Contractor shall submit shop drawings, test and compliance certifications of all valves .

1.05 QUALITY ASSURANCE

- A. Butterfly valves shall be furnished be the products of firms which have been regularly engaged in the manufacture of such items for a period of at least five (5) years.
- B. All valves shall be tested at the factory in accordance with AWWA Standard C504, Section 5.2.4 and the Contractor shall furnish a manufacturer's Certified Test Report with each valve.
- C. All valves specified herein shall be furnished with an affidavit from the manufacturer(s) certifying that the valves furnished comply with all applicable provisions of the AWWA Standards as revised and cited below.

PART 2 - PRODUCTS

2.01 BUTTERFLY VALVES

- A. General

The butterfly valves shall be manufactured in accordance with the applicable provisions of ANSI/AWWA Standard C504-94, "Rubber-Seated Butterfly Valves" as modified herein. The valves shall be designed for installation in a horizontal pipeline, unless otherwise shown on the Plans, with the valve shaft in a horizontal position and the operating shafts in a vertical position. The valve may be installed under buried or submerged conditions now or in the future and shall always be of a suitable design for those conditions. The valves shall be AWWA Class 150B.

B. Valve Body

The valve body shall be made of cast iron conforming to ASTM Standard A126, "Gray Iron Castings for Valves, Flanges and Pipe Fittings", Class B, or ASTM Standard A48, "Gray Iron Castings", Class 40. No disc stops shall be allowed on the body.

C. Mechanical Joint Valves

Mechanical joint valves shall have ends complying with ANSI/AWWA Standard C111/A21.11-90, "Rubber-Gasket Joints for Ductile-Iron and Gray-Iron Pressure Pipe and Fittings". Mechanical joint gaskets, glands, and high strength cast gray or ductile iron tee-head bolts and hex nuts shall be included with the valve. Follower glands held in place with set screws will not be acceptable. Bolt holes in the flanges of the mechanical joints shall be equally spaced and shall straddle the vertical centerline. Gaskets shall be shipped separately in suitable protective containers.

D. Flanged Valves

Flanged valves shall have ends faced and drilled conforming to ANSI Standard B16.1, "Cast Iron Pipe Flanges and Flanged Fittings", Class 125. Bolt holes shall not be tapped except as may be required by the shaft hubs. Flanged valves shall have short bodies with laying lengths as specified in Table 2 of ANSI/AWWA Standard C504-94. Bolt holes in the flanges shall be equally spaced and shall straddle the vertical and horizontal centerlines. All joint materials for flanged valves will be furnished with the valve.

E. Valve Shafts

Valve shafts shall be one piece straight through, or two piece stub-type, AISI Type 316 stainless steel or Monel construction. Shaft design and sizing shall preclude any disc edge-to-seal excess or insufficient clearance due to "sag", "play" or "tolerance add up" in the disc-shaft-bearing assembly. All nuts, bolts, pins or other items within the valve or in contact with water shall be of AISI Type 316 stainless steel, or approved equal.

F. Pins

The pins connecting the disc and the shaft of all valves shall be mechanically secured. All valves with one-piece through shafts shall have at least two pins. Valves 24-inch and smaller with two-piece stub type shafts shall have one or two pins in the primary or operating shaft and at least one pin in the secondary shaft. Valves 30-inch and larger with two-piece stub type shafts shall have at least two pins in the primary or operating shaft and at least one pin in the secondary shaft. Each pin on the primary or operating shaft shall be sized to take full design load imposed on the disc. Pins shall be either force fit or mechanically locked. Mechanical

locking shall be by lock washers, lock nuts, force fit or other sturdy and corrosion resistant means. No roll pins will be allowed. Riveted or welded type pins will not be allowed.

G. Valve Disc

Valve discs shall seat at an angle of 90 degrees to the pipe axis. Valve discs shall be made of cast iron (conforming to ASTM Standard A48-83(1990), Class 40, "Gray Iron Castings"; ASTM Standard A126-84(1991), "Gray Iron Castings for Valves, Flanges and Pipe Fittings", Class B; or ASTM Standard A536-84, "Ductile Iron Castings", Grade 65-45-12; of cast steel conforming to ASTM Standard A216-93, "Steel Castings, Carbon Suitable For Fusion Welding for High-Temperature Service", Grade WCB, or of alloy cast iron conforming to ASTM Standard A436-84, "Austenitic Gray Iron Castings", Type 1 or 2; or ASTM Standard A439-83(1994), "Austenitic Ductile Iron Castings", Type D2, and with a maximum lead content of 0.003 percent). The seating edge of the disc for its full width shall be AISI Type 316 stainless steel, Monel metal, or nickel-chrome (18-20) applied by the plasma arc-weld process. Valves with angle seating or fabricated steel discs are not acceptable. Sprayed metal seating edges are not acceptable. Welded seating edges shall be at least 3/32-inch thick.

H. Valve Seats

Valve seats shall be secured to the valve body only. Seats secured to the valve discs are not acceptable. Valve seats shall be made of new synthetic rubber and may be reinforced by the manufacturer. Rubber seats on valves 24-inch and smaller shall be secured to the valve bodies by vulcanizing, or by cementing and clamping. On valves 30-inch and larger, the seat shall be mechanically held by means of grooves machined or cast in the valve body and shall be designed in such a way as to hold the seats from popping out when secured or when subjected to compression. The seats shall be fully adjustable and replaceable with the valve installed. All parts of clamps and fastening devices shall be made of AISI Type 316 stainless steel or other approved non-corrodible material. Bolts may be used to hold rubber-seat clamps in place, but the bolts shall not go through the rubber seat itself. Durometer hardness, reinforcement, dimensions and section of the rubber seat shall be selected and matched to the valve size and clearances such that adequate seal contact pressure is generated without excessive amounts of seal material being extruded into the annulus between the disc edge and body. In addition to meeting the above conditions, bidders shall present conclusive evidence proving that seats of the offered design are being successfully used in 30-inch and larger butterfly valves furnished by the same manufacturer. Sprayed or plated mating seat surfaces are not acceptable.

I. Valve Bearings

Valve bearings shall be self-lubricating, corrosion resistant, sleeve type and with thrust bearings as required by Section 3.6 of ANSI/AWWA Standard C504-94. Shaft to bearing clearance under maximum loads shall be such that excessive or insufficient clearances cannot develop between disc and seat surfaces particularly when the disc is in the sealed (vertical) position.

J. External Ferrous Items

All external ferrous items, except cast iron, shall be hot-dipped galvanized in accordance with ASTM Standard A123-89a, "Zinc (Hot-Galvanized) Coatings on Iron and Steel Products", or ASTM Standard A153-82(1987), "Zinc Coating (Hot-Dip) on Iron and Steel Hardware", or stainless steel.

K. Shaft Seals

Shaft seals shall be as required by Section 3.7 of ANSI/AWWA Standard C504-94.

2.02 OPERATORS

- A. Manual operators for valves 24-inch and smaller shall be of totally enclosed worm gear or traveling-nut type, permanently lubricated, suitable for buried or submerged operation in accordance with ANSI/AWWA Standard C504-94.
- B. Manual operators for valves 30-inch and above shall be totally enclosed worm gear operators, permanently lubricated, suitable for buried and submerged operation, and shall be Limitorque type HBC, or approved equal, in accordance with ANSI/AWWA Standard C504-94, with AWWA input shaft stop.
- C. Manual operators shall be provided with completely enclosed mounting brackets or adapters.
- D. The operators shall be sized to provide the maximum torque as shown in Table 4 of ANSI/AWWA C504-94 for the class and size of valve specified. In addition, the operator shall be capable of withstanding an input torque of 300 ft.lbs. on the operating nuts and all operators on valves 30-inch and larger shall be equipped with an AWWA input shaft stop. The operator shall be equipped with adjustable stops to prevent over travel of the disc in both the closed and open positions, with standard AWWA 2-inch square operating nuts with skirts, or with extension shafts as listed herein and with a shear pin in the operating nut designed to protect the operator from damage due to overload. All valves shall open by turning the operating nuts counterclockwise. Each operator for the valves 30-inch and larger shall be equipped with a brass plate die-stamped with letters and numerals, at least ½-inch high, indicating the number of turns necessary to fully open the valve from a fully closed position as determined by factory test. The plate shall be secured to the operator so that it may be read from the top when the valve is in an installed position. As previously specified, operators shall be for buried, submerged conditions which precludes installation of a position indicator. However, where valves and operators are ordered for above grade service a position indicator shall be located in the top of the operator to show the position of the butterfly valve. This indicator shall remain synchronized during operation. The position indicator shall be weatherproof.
- E. After mounting, each operator shall be factory adjusted to insure that the valve will operate from a fully open to a fully closed (seated) position without further adjustment by the installing contractor. An affidavit from the manufacturer certifying to this, stating the number of turns required to fully open the valve from a fully closed position as determined by factory test and certifying that the valve is set to open in a counterclockwise direction shall be shipped with the valve. Both copies of this certification shall be signed, sealed and dated by a licensed professional engineer registered to practice in the state wherein the tests and adjustments are performed.

2.03 OPERATOR EXTENSION SHAFT

- A. Operator extension shafts shall be designed and furnished by the valve manufacturer and shall each be complete with coupling, standard AWWA 2-inch square operating nut with skirt, shear pins and centering-identification plate, for connection to the valve operator (or input) shaft as specified herein below.
- B. All operator components between the operating nut and the adjustable stops shall be designed to withstand, without damage, an input torque of 300 ft.lbs. The extension shaft shall be a one-piece shaft and shall be furnished with an AWWA 2-inch square operating nut with skirt, mounted and pinned to the top of the shaft. A coupling shall be provided for the bottom of the shaft to connect the extension to the valve operator (or input) shaft. The coupling will be connected to the extension shaft after the exact required length of the shaft has been determined by the field measurement during the valve installation.
- C. The coupling shall be designed for welding to the extension shaft, and mounting and pinning to the valve operator (or input) shaft. The pin through the coupling and valve operator (or input) shaft shall be of a larger diameter than the pin through the top nut and extension shaft, so that if torques exceed the designed limits, the pin through the nut will shear first. The extension shaft shall also be equipped with a combination centering-identification plate as specified below.
- D. Valves 30-inches and larger shall be installed complete with manholes. No extension shafts are required.

2.04 TORQUE LIMITING DEVICE

Each valve shall be provided with a torque limiting device designed to protect the actuator and valve parts. The device shall consist of an overtorque protection mechanism enclosed in a hermetically sealed cast iron housing. The mechanism shall be permanently lubricated and factory set to trip between 200 and 220 ft.lbs. of applied torque. The housing shall have integrally cast, 2-inch AWWA operating nut and matching socket to operate and to fit over the actuator or extension shaft nuts, respectively. The socket shall be provided with a set screw to fit the device. The direction of rotation shall be permanently shown with word and arrow next to the operating nut. The entire device shall be coated inside and out with a 2-part epoxy. The torque limiting device shall be as manufactured by Annspace Controls Company of St. Louis, Missouri, or approved equal.

2.05 (NOT USED)

2.06 FINISHES

- A. Interior Coating
 - 1. The interior coating of the valve bodies shall be a two-part epoxy specially formulated for potable water service and applied according to the coating manufacturer's recommendations.
 - 2. All interior coating products must meet the approval of the United States Environmental Protection Agency for contact with potable water. The coating shall conform to ANSI/AWWA C550-90, "Protective Epoxy Interior Coatings for Valves and Hydrants",

and shall not contain coal tar. All parts of the interior of the valve body and disc, except for rubber or stainless steel, shall be so coated.

B. Exterior Coating

Exterior painting shall be asphalt varnish conforming to Federal Specification TT-C-494A as required by Section 4.2 of ANSI/AWWA Standard C504-87.

2.07 TESTING

The butterfly valves shall be tested in accordance with ANSI/AWWA C504-94, Section 5, Subsection 5.2. The performance test (Subsec. 5.2.1) and the hydrostatic test (Subsec. 5.2.3) shall be performed as stated, but the leakage test (Subsec. 5.2.2) shall be performed bidirectionally; first on one side of the valve, and then on the other. The Contractor shall furnish a manufacturer's certified test report with every valve stating that the valve has met the requirements of the tests.

2.08 ACCEPTABLE PRODUCTS

Valves shall be DeZurik Model BAW, Pratt No. 2F2 (20" or under), Pratt No. XR70 (above 20") or approved equal. Valves and operators shall be modified as necessary to conform with this Specification.

PART 3 - EXECUTION

3.01 VALVE INSTALLATION

- A. General: All valves, gates, operating units, stem extensions, operators, valve boxes, and accessories shall be installed in accordance with the manufacturer's written instructions and as shown and specified. Valves shall be firmly supported to avoid undue stresses on the pipe.
- B. Access: All valves shall be installed to provide easy access for operation, removal, and maintenance and to avoid conflicts between valve operators and structural members or handrails.
- C. Valve Accessories: Where combinations of valves, sensors, switches, and controls are specified or shown on the Drawings, it shall be the responsibility of the CONTRACTOR to properly assemble and install these various items so that all systems are compatible and operating properly. The relationship between interrelated items shall be clearly noted on shop drawing submittals.
- D. The installation of butterfly valves with valve box and riser shall include the installation of extension shaft. The valve operator shall be installed with the extension shaft, coupling, nut and data plate as shown on the plans or Standard Details. Where a plug is located adjacent to a butterfly valve, a short piece of D.I. pipe (nominal size equal to that of the valve) of length sufficient to permit clearance for rotation of the valve disc shall be installed between the valve and the plug.
- E. Installation of butterfly valves 30-inch and larger shall include the installation of a valve manhole as shown in the Standard Details.

- F. Above grade testing of the valve by the installing contractor is required as specified in Section 15100-"Valves, General", 1.05A.

- END OF SECTION -