SECTION 15110

BUTTERFLY VALVES

PART 1 GENERAL

1.01 SCOPE

A. Furnish and install rubber-seated butterfly valves in all locations as shown on the Plans in accordance with the latest edition of ANSI/AWWA C504 Rubber-Seated Butterfly Valves and AWWA C550 Protective Interior Coatings for Valves and Hydrants, and the following options and restrictions. Where a conflict in requirements occurs the more stringent requirement shall govern. All components of the valves exposed to water shall comply with NSF/ANSI 61, Drinking Water System Components – Health Effects.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

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

B. ANSI/AWWA C504 Rubber-Seated Butterfly Valves.

1. AWWA C550 Protective Interior Coatings for Valves and Hydrants.
2. Where a conflict in code requirements occurs the more stringent requirement shall govern.

1.03 CONTRACTOR SUBMITTALS

A. The Contractor shall submit shop drawings for all valves larger than 16-inches or as otherwise requested by the Department.

B. Factory Test for large diameter valves for valves 30-inches shall be available and larger upon request.

1.04 QUALITY ASSURANCE

A. Butterfly valves shall be furnished 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. Unless otherwise specified, each valve body shall be tested under a test pressure equal to twice its design water-working pressure.

C. Any valve manufacturer approved for the supply of valves shall have a domestic manufacturing facility in North America, dedicated in part or fully, to valve production. Valve operators (8” to 24”) shall be designed and manufactured by the valve manufacturer

D. Valve manufacturers for valves larger than 12-inches shall have a

factory-employed, field service technician available for startup services

PART 2 PRODUCTS

2.01 BUTTERFLY VALVES

A. General

1. The butterfly valves shall be manufactured in accordance with the applicable provisions of ANSI/AWWA Standard C504, "Rubber-Seated Butterfly Valves" as modified herein. The valves shall be designed for operation 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. Valves shall be suitable for buried and submerged service.

2. The valves shall be AWWA Class 150B, pressure rated at 150 psi. Valves shall be restrained mechanical joint or flanged short-body as required for the application. Flanges for both Valve Class 150B shall be drilled per ANSI B16.1, 125-pound standard bolt pattern.

3. For Valves 24-inches and larger the seat design shall provide field adjustment and replacement capabilities as required by AWWA C504. Proper field adjustment can be performed from either the upstream or downstream side of a pressurized valve.

COMPONENT	MATERIAL	SPECIFICATIONS
Body	Ductile Iron	ASTM A-536, Grade 65-45-12
Valve Shaft	Stainless Steel	Type 316 or 17-4 (14" or larger)
Exposed body, cap screws, bolts and nuts including squeeze-pin	Stainless Steel	ASTM A-276, Type 316
Disc	Ductile Iron	ASTM A-536, Grade 65-45-12
Valve Seat	EPDM Rubber	ASTM D-412
O-Rings	EPDM Rubber	ASTM D-2000

B. Valve Body

1. The valve body shall be made of ductile iron conforming to ASTM A-536, Grade 65-45-12.

2. A seat-in-body design is required. Valves with the seat located on the disc are not acceptable.

3. The ductile iron interior and exterior shall be factory coated with NSF 61 approved 16 mils DFT high solids 2 part epoxy of not less than 65% conforming to AWWA standard C550 (Amerlock® 400, Tnemec 141, or approved equal).

C. Mechanical Joint Valves

1. Mechanical joint valves shall have ends complying with ANSI/AWWA Standard C111/A21.11, "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. Bolts 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. Mechanical joints shall be used in underground applications

D. Flanged Valves

1. 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 3 of ANSI/AWWA Standard C504. 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 by others.

E. Valve Shafts

1. Valve shafts shall be one piece straight through, or two piece stub-type, AISI Type 316 stainless steel or Monel construction. 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

1. 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

1. Valve discs shall seat at an angle of 90 degrees to the pipe axis. For valves 24 inches and smaller, the actual port diameter shall be at least 93% of the nominal valve size. For valves larger than 24 inches, the port diameter shall not be more than 1.25 inches smaller than the nominal valve size. The dimension of the port diameter shall be the clear waterway diameter plus the thickness of the rubber seat.

2. Valve discs shall be made of cast iron (conforming to ASTM Standard A48, Class 40, "Gray Iron Castings"; ASTM Standard A126, "Gray Iron Castings for Valves, Flanges and Pipe Fittings", Class B; or ASTM Standard A536, "Ductile Iron Castings", Grade 65-45-12; of cast steel conforming to ASTM Standard A216, "Steel Castings, Carbon Suitable For Fusion Welding for High-Temperature Service", Grade WCB, or of alloy cast iron conforming to ASTM Standard A436, "Austenitic Gray Iron Castings", Type 1 or 2; or ASTM Standard A439, "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

1. Valve seats shall be secured to the valve body only. Seats secured to the valve discs are not acceptable.

2. On valves 30-inch and larger, the seat shall be epoxy retained. Valve seat material shall be peroxide cured EPDM rubber seat and shall be fastened integrally with the valve body. The valve disc shall be furnished with a stainless-steel seating edge to mate with the rubber seat in the valve body. Valves with the seat located on the disc shall not be accepted.

I. Valve Bearings

1. 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.

J. External Ferrous Items

1. 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, "Zinc Coating (Hot-Dip) on Iron and Steel Hardware", or stainless steel.

K. Shaft Seals

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

2. Integral shaft bearing seals are required to protect the bearing journals areas from debris, sedimentation, mineral deposits and corrosion particles.

2.02 ACTUATORS 24-INCH AND SMALLER

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. The actuators shall be sized to provide the maximum torque as shown in ANSI/AWWA C504 for the class and size of valve specified. In addition, the operator shall be capable of withstanding an input torque of 300 ft.-lbs.

B. The operators shall be equipped with adjustable stops to prevent overtravel in both the open and closed positions with standard 2-inch square operating nuts.

C. All valve operators shall be factory packed with grease, fully gasketed and sealed for permanent installation and operation.

2.03 ACTUATORS 30-INCH AND LARGER

A. Manual operators for valves 30-inch and larger shall be totally enclosed worm gear operators, permanently lubricated, suitable for buried and submerged operation, and shall in accordance with ANSI/AWWA Standard C504, with AWWA input shaft stop. Worm Gears shall be constructed in accordance AWWA C517 and shall be IP68 rated for continuous duty to 50ft. Actuators shall be enclosed in a ductile iron housing with outboard seals to protect the bearings and other internal components. The actuator shaft and the quadrant shall be supported on permanently angular contact bearings. Input shaft and fasteners shall be made of stainless steel. Gears shall be efficiency optimized 3 stage gear reduction type. Externally adjustable open and closed position stops shall be provided. The adjustable closed position stop shall be used to set closing torque and provide adjustment to compensate for change in pressure differential or flow direction. The following are approved operators for plug valves 30-inches and larger:

1. Limitorque Type HBC or WG Series modified to MDWASD Standard.
2. Rotork Model IW-RL-MD-RAW

B. The Manual operators (actuators) for valves 30-inch and larger shall have the

following:

1. The actuator shaft and the quadrant shall be supported on permanently angular contact bearings. Input shaft and fasteners shall be made of stainless steel. Gears shall be efficiency optimized 3 stage gear reduction type. The input torque shall be 200 lb/ft or less and the number of turns shall allow the valve to open in under 6 minutes.
2. Stainless steel removable and repositionable drive sleeve.
3. Angular contact bearings to support the worm shaft.
4. 450 Ft pounds of input torque.
5. Adjustable travel stops.
6. Ductile Iron Gear Case.
7. 316 Stainless Steel Position Indicator.
8. 431 Stainless Steel Input Shaft machined from one solid piece of metal.
9. Externally adjustable open and closed position stops shall be provided. The adjustable closed position stop shall be used to set closing torque and provide adjustment to compensate for change in pressure differential or flow direction.
10. Valves and gear actuators for buried or submerged service shall have seals on all shafts and gaskets on the valve and actuator covers to prevent the entry of water. Actuators shall be 90% grease filled. Actuator mounting brackets for buried or submerged service shall be totally enclosed and shall have gasket seals.
11. Test certificates, signed by chief engineer of gear operator manufacturer, must be supplied showing full compliance to AWWA C504/C517 available upon the request of the Department.
12. Gears shall have a two-year warranty from date of shipment and shall have a metal tag containing a serial number, ratio; number of turns shall be riveted to the gear for future identification.

2.04 TORQUE LIMITING DEVICE

A. 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 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 Annspach Controls Company of St. Louis, Missouri, or approved equal.

2.05 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

1. Fusion/powder coated exterior coating

2.07 TESTING

A. The butterfly valves shall be tested in accordance with ANSI/AWWA C504 87, 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.

PART 3 EXECUTION

3.01 VALVE INSTALLATION

A. General:

1. 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:

1. 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:

1. 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.

3.02 OPERATORS

A. The operators specified herein for 30 through 72-inch valves shall be sized to provide the maximum torque shown in Table 4 of ANSI/AWWA Standard C504 for the class and size of valve specified.

END OF SECTION