Section 02522

BUTTERFLY VALVES

PART 1 G E N E R A L

1.1 SECTION INCLUDES

1. Butterfly valves.

1.2 MEASUREMENT AND PAYMENT

1. Unit Prices.
    1. Payment for butterfly valves 20 inches in diameter and smaller will be on unit price basis for each.
    2. Payment for butterfly valves 24 inches in diameter and greater is on a unit price basis. Unit price includes cost of required manhole for butterfly valves 30 inches in diameter and greater and box for butterfly valves 24 inches in diameter.
    3. Refer to Section 01270 - Measurement and Payment for unit price procedures.
2. Stipulated Price (Lump Sum). If Contract is Stipulated Price Contract, payment for work in this Section is included in total Stipulated Price.

1.3 REFERENCES

1. ASME B 16.1 - Cast Iron Pipe Flanges and Flanged Fittings.
2. ASTM A 126 - Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
3. AWWA C 504 - Standard for Rubber-Seated Butterfly Valves.
4. AWWA C 550 - Standard for Protective Interior Coatings for Valves and Hydrants.

1.4 SUBMITTALS

1. Conform to requirements of Section 01330 - Submittal Procedures.
2. Submit manufacturer's product data for proposed valves and actuators for approval.
3. Submit manufacturer's affidavit for proposed valves and actuators certifying compliance with specifications.

4. Submit manufacturer's affidavit that butterfly valves were manufactured in the United States, and conform to applicable requirements of AWWA C 504 and that they have been satisfactorily tested in the United States in accordance with AWWA C 504 using test pressure of 150 psi in both directions. Submit Proof-of-Design and hydrostatic testing procedure in accordance with AWWA C 504.

5. Submit manufacturer's affidavit that coating for interior surfaces of valves conform to applicable requirements of AWWA C 550. Submit results of holiday test and thickness measurements of coatings.

6. Furnish, at time of delivery, affidavit of compliance, as specified in Section 6.3 of AWWA C 504 certifying compliance with applicable portion of AWWA C 504 and modification or supplements herein. Furnish certified drawings and material test records by manufacturer covering items included in Section 4.3 of AWWA C 504, for review. Furnish certified copies of test reports covering items in Sections 4.5.8.5.5, 4.5.8.5.8 and 5.2.1 through 5.2.4.3 of AWWA C 504 for review.

7. Submit data indicating maximum torque required to open valve, maximum torsional strength of shaft and torque output of actuator.

8. Provide submittal information on CD-ROM in Adobe portable document format (*.PDF).

9. Include number of turns to operate valves to fully open/closed.

1.5 QUALITY CONTROL

1. Perform valve leakage tests in both directions at 150 psi in factory and field. Hydrostatic field tests of 150 psi shall be made against dished head plug or similar arrangement.

2. For purposes of interpreting referenced AWWA tests, the following shall apply: Shutoff pressure is 150 psi; cycle consists of rotating disc from fully opened to fully closed position, for valves larger than 72 inches, proof of design shall require 1000 cycles and shall be performed on valve greater than 72 inches of like design and construction. When proof of design tests are performed on valve delivered to job site, replace disc, bushing, shaft and seals with new and unused items, and test and certify as described above.

3. Hydrostatic Testing by Manufacturer:

    1. Hydrostatic testing to be witnessed by City Engineer prior to shipment of valves. Provide minimum 4 weeks notice to City Engineer to schedule witness testing. When possible, maximize number of valves to be tested during a plant visit, no more than two visits will be allowed per project to witness test valves, unless otherwise approved by City Engineer. City will pay expenses for each visit up to total of two visits incurred by City Engineer to witness testing of each grouping of valve(s)per project. Expenses for subsequent or extended visits by City Engineer

for defective valves, improper scheduling or valve failures are to be paid by Contractor. Witness of hydrostatic testing by City Engineer will only be in regards to compliance with this specification and will not constitute approval by City Engineer nor relieve Contractor of obligations to comply with contract documents.

2. Document serial number on valve at time of testing and reflect in certified test records furnished to City Engineer. Identification plate must be permanently affixed to valve and actuator prior to hydrostatic testing.

3. Hydrostatic testing to conform to AWWA C504 except as modified below:

    1. Install actuator prior to hydrostatic testing. Test actuator to verify actual number of turns match manufacturer's published number of turns. Verify valve stops are in correct positions.

    2. Fully open and close valve prior to performing shell test and prior to each leakage test.

    3. Perform shell test first.

    4. When tested with water, adequately dry seat and disc.

    5. When tested with air, fill top of valve with water to aid in viewing possible leakage.

    6. Pressure Gauges: Calibrated within past 12 months; 0-500 psi range in increments of 5 psi, present calibration certificates prior to hydrostatic testing.

    7. If seat adjustment is required during hydrostatic testing, perform valve leakage test again in both directions. Once seat adjustment is made, fully open and fully close valve three (3) times, and repeat leakage test.

4. Field Testing

    1. When valve arrives at the job site, Contractor is to operate valve fully open and closed twice in presence of City Engineer. Document number of turns to open and close each time.

    2. Install operator nut plum.

    3. After valve is installed, repeat the operation test and document number of turns in presence of City Engineer.

4. Manufacturers representative must be present to witness the operation test again at the substantial walk thru. Verify valve operate fully open/closed twice at the appropriate number of turns.

PART 2 P R O D U C T S

1.6 VALVES AND ACTUATORS

1. Butterfly Valves and Actuators: Conform to AWWA C 504, except as modified or supplemented herein. Provide valves manufactured by American-Darling, Pratt, or approved equal.

2. If type of valve is not indicated on Drawings, use butterfly valves for line valve sizes 24-inch and larger. When type of valve is specified on Drawings, no substitute will be allowed, unless otherwise approved by City Engineer.

3. Butterfly valves shall be short-body, flanged design and installed at locations as shown on Drawings.

4. Direct-bury valves and valves in subsurface vaults shall open clockwise. Above-ground and plant valves shall open counterclockwise.

5. Provide flanged joints when valve is connected to steel or PCCP.

6. Butterfly Valves and Actuators (Additional Requirements for Large Diameter Water Lines):

    1. Provide valves manufactured by American-Darling, Pratt[(1)] or Dezurik[(1)], or approved equal. Provide all valves for single project, from same manufacturer. [(1)]as modified for seat replacement in field for City of Tomball.

    2. Valves larger than 72-inches in diameter design: Allowable stresses at rated pressure not to exceed one-third of yield strength or one-fifth of ultimate strength of material used.

    3. Provide manual actuators for single project, from same manufacturer.

    4. Shaft connecting actuator to valve body must be fully enclosed. Bonnet and extension to be fully enclosed and watertight.

1.7 VALVE CONSTRUCTION

1. Valves: AWWA C 504, Class 150B. Body: Cast iron, ASTM A 126, Class B. Flanges: ASME B 16.1, Class 125 lb.

2. Discs for Butterfly Valves: Either cast iron or ductile iron. Valves greater than 54" in diameter must utilize flow through disc.

3. Seats: Buna-N or neoprene, and may be applied to disc or body. Seats shall be mechanically secured and may not rely solely on adhesive properties of epoxy or similar bonding agent to attach seat to body. Seats on disc shall be mechanically retained by stainless steel (18-8) retaining ring held in place by stainless steel (18-8) cap screws that pass through rubber seat for added retention. When seat is on disc, seat shall be retained in position by shoulders located on both disc and stainless-steel retaining ring. Mating surfaces for seats: Type 304 or 316, stainless steel and secured to disc by mechanical means. Sprayed-on or plated mating surfaces will not be allowed. Seat must be replaceable in field for valves greater than 30 inches in diameter. Valves with segmented retaining rings will not be accepted.

4. Coat interior wetted ferrous surfaces of valve, including disc, with epoxy suitable for potable water conditions. Epoxy, surface preparation, and epoxy application: In accordance with AWWA C 550 and coating manufacturer's recommendations. Provide three coats of two component, high-build epoxy with minimum dry film thickness of 12 mils. Epoxy coating: Indurall 3300 or approved equal. Coatings shall be holiday tested and measured for thickness.

5. Valve shaft and keys: 24 inches in diameter and greater valves require a minimum of two (2) taper pins used for attaching valve shaft to valve disc, use of torque plug for purposes of attaching valve shaft to valve disc is not permitted: Type 316 stainless steel. Shaft Bearings: Stainless steel, bronze, nylon, or Teflon (supported by fiberglass mat or backing material with proven record of preventing Teflon flow under load) in accordance with AWWA C 504. Sinter stainless steel bearing material. Design valve shaft to withstand 3 times amount of torque necessary to open valve.

6. Packing: Self adjusting and wear compensating, full or split ring V-type, and replaceable without removing actuator assembly.

7. Retaining Hardware for Seats: Type 304 or 316 stainless steel. Nuts and screws used with clamps and discs for rubber seats shall be held securely with locktight, or other approved method, to prevent loosening by vibration or cavitational effects.

8. Valve disc shall seat in position at 90 degrees to pipe axis and shall rotate 90 degrees between full-open and tight-closed position. Install valves with valve shafts horizontal and convex side of disc facing anticipated direction of flow, except where shown otherwise on Drawings.

9. For valves utilizing retaining rings, tighten bolts to a uniform torque. Measure torque prior to testing valve.

1.8 VALVE ACTUATOR CONSTRUCTION

1. Provide actuators for valves with size based on line velocity of 12 feet per second and uni-directional service, and, unless otherwise shown on Drawings, equip with geared manual actuators. Provide fully enclosed and traveling-nut type, rack-and-pinion type, or worm-gear type for valves 20 inches and smaller. Provide worm-gear type for valves 24 inches and larger.

2. Provide actuator designed for installation with valve shaft horizontal unless otherwise indicated on Drawings.

3. Provide bonnet extensions, as required, between valve body and actuator. Space between actuator housing and valve body shall be completely enclosed so that no moving parts are exposed to soil or elements.

4. Provide oil-tight and watertight actuator housings for valves, specifically designed for buried service or submerged service when located in valve vaults, and factory packed with suitable grease.

5. Install valve position indicator on each actuator housing located above ground or in valve vaults. Valves shall be equipped with 2-inch actuator nut only.

6. Indicate direction of opening of valve on exposed visible part of assembly and cast direction of open on 2-inch nut on top of valve operator extension. Paint 2-inch actuator nut and extension shaft black when counter clockwise open and red when clockwise to open.

7. Design worm-gear or traveling-nut actuators to be self-locking and designed to transmit twice the required actuator torque without damage to faces of gear teeth or contact faces of screw or nut.

1.9 VALVE BOXES

1. Provide Standard Type "A" valve boxes conforming to requirements of Section 02085 - Valve Boxes, Meter Boxes, and Meter Vaults.

1.10 VALVE SERVICE MANHOLES

1. For large diameter water lines, provide manholes to dimensions shown on Drawings conforming to requirements of Section 02082 - Precast Concrete Manholes.

PART 3 E X E C U T I O N

1.11 EARTHWORK

1. Conform to applicable provisions of Section 02317 - Excavation and Backfill for Utilities.

1.12 SETTING VALVES AND VALVE BOXES

1. Prior to Hydrostatic testing of water line and valve:

    1. Test valve by opening and closing valve at a minimum of two times to verify valve seats properly.

    2. Verify number of turns from fully open to fully closed position is same as identified in manufacturers submittal.

    3. Adjust valve as required if number of turns do not match.

    4. Remove foreign matter from within valves.

2. Install valves where shown on Drawings or as located by City Engineer. Use valve boxes for 16 inch and 24 inch valves. Set valves plumb and as detailed. Center valve boxes on valves. Carefully tamp earth around each valve box for minimum radius of 4-feet, or to undisturbed trench face when less than 4-feet.

3. Avoid disturbing or overstressing valve body when installing valves. Perform field adjustment of valves under pressure to ensure shutoff occurs in number of rotations as described in valves operation and maintenance manual.

4. Attach two four (4) foot lengths of pipe to each side of valve prior to installation in line.

5. Submit certification that large diameter valve was installed, adjusted, and exercised in accordance with manufacturer's instructions. Manufacturer's certification shall state that all performance characteristics of large diameter valves, as installed, have been met. Adjustments made to valve, for any reason, must be made by manufacturer's representative.

1.13 DISINFECTION AND TESTING

1. Assist City with disinfection of valves and appurtenances as required by Section 02514 - Disinfection of Water Lines and test as required by Section 02515 - Hydrostatic Testing of Pipelines. Do not use valves for throttling without prior approval of manufacturer.

1.14 COATING OF PIPING

1. Coat valves located in vaults, stations, and above ground using ACRO Paint No. 2215, or approved equal. Minimum of two (2) coats shall be applied with minimum of three (3) mil thickness. Apply coating in accordance with manufacturers recommendations.

END OF SECTION