

SECTION 33 12 16
BUTTERFLY VALVES

PART 1 – GENERAL

1.01 WORK INCLUDED

- A. Contractor shall provide all components and testing as required to provide complete and functional valve installation including but not limited to the following:
 - 1. Butterfly Valves with Manual Actuators
 - 2. Valve Boxes
 - 3. Stem Extensions and Covers
 - 4. Mechanical Joint Restraints and,
 - 5. Valve Position Indicators
- B. Work under this section includes furnishing the butterfly valves, furnishing all labor, materials, equipment, and incidentals required to install, complete and ready for operation and test butterfly valves, as shown on the Drawings or specified herein.
- C. Butterfly valves shall be suitable for buried service.

1.02 RELATED SECTIONS:

- A. Section 01 45 00 – Quality Control.
- B. Section 01 78 23 – Operations and Maintenance Data
- C. Section 33 13 00 - Sanitary Work Practices and Disinfection of Water Utility Distribution

1.03 REFERENCES

- A. The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by basic designation only. When a date is given for reference standards, the latest edition available on the date of Notice Inviting Bids shall be used.
 - 1. ASTM A48 – Gray Iron Castings
 - 2. ASTM A276 – Stainless Steel Bars and Shapes
 - 3. ASTM D429 – Test Methods for Rubber Property – Adhesion to rigid substrates
 - 4. ANSI A21.11/AWWA C111 – Rubber Gasket Joints for Ductile Iron Pressure Pipe and Fittings

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5. AWWA C504 – Standard Specification for Rubber Seated Butterfly Valves.

1.04 SUBMITTALS

- A. Two weeks after NTP, the Contractor shall submit for approval in accordance with Submittal Procedures:
1. Complete specifications including:
 - a. Catalog information and cuts of items, options, and accessories supplied.
 - b. Valves and manual actuator being supplied.
 - c. Descriptive drawings and literature for each equipment item to be furnished under this Section.
 - d. All exceptions to the Specifications noted.
 2. Provide a schedule for the delivery of the valves. The Contractor shall give the City
 3. Representative a minimum of 15 days notice prior to delivery of the valve.
 4. All butterfly valves shall be buried. Contractor shall submit a plan for the careful placement and burial of each valve including details on initial support during installation, bedding, backfill, connection of operating stem, sleeve and actuator.
 5. Submit plan for completion of the final coatings across the valve and pipe joints, and protection of the coating during burial procedure.
 6. The Contractor shall submit five (5) copies of a complete operation and maintenance manual.
 7. The Contractor shall submit six (6) copies of field testing procedures for each valve size furnished under this section. Submit for review and approval by the City Representative.
- B. The Contractor shall be required to submit an Affidavit of Compliance which states that the butterfly valves furnished comply with all applicable provisions of AWWA C504-10 Rubber Seated- Butterfly Valves.
- C. The Contractor shall verify its compliance to NSF61 by submitting a NSF61 certification per specification 33 13 00 - Sanitary Work Practices and Disinfection of Water Utility.

1.05 QUALITY CONTROL

- A. All materials used shall be new, of high grade, and with properties best suited to the working environment.
- B. Manufacturers of valves and manual actuators furnished under this Section shall have a minimum of ten (10) years verifiable experience in the manufacture of such equipment.

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- C. Inspection of the butterfly valves with manual actuators may also be made by the City representative or other representative of the City after delivery. The equipment shall be subject to rejection at any time on account of failure to meet any of the Specification requirements, even though submittal data may have been accepted previously. Equipment rejected after delivery shall be marked for identification and shall be removed from the job site at once.

1.06 WARRANTY

- A. The Contractor shall furnish a two (2) year warranty for all work covered by this section per the requirements of Section 01 78 36 – Warranties.

1.07 SHIPPING AND STORAGE

- A. The manufacturer's suggested storage requirements shall be placed on the outside of the unit or shipping container when delivered to the jobsite or City approved storage location.
- B. Valves shall be complete in all respects when shipped. The manufacturer shall use care in preparing valves for shipment. All cavities shall be drained of water. All unpainted steel and iron-machined surfaces shall be coated with a protective slushing compound. Full-faced mechanical joint protectors of waterproof plywood or weather-resistant pressboard, of at least the outside diameter of the mechanical joint, shall be fastened to each mechanical joint to protect both the joint and the valve interior. Components shipped unattached shall be adequately protected and identified for correct field assembly.

PART 2 – PRODUCTS

2.01 GENERAL

- A. Butterfly valves shall be of the tight closing, rubber seated type and fully comply with the latest revision of the AWWA Standard C504. The butterfly valve shall be certified by NSF61, and the operators shall be in accordance with AWWA C540 except as modified herein. Valves shall be bubble-tight at rated pressures in either direction. Maximum operating non-shock shut-off pressure and maximum operating non-shock line pressure is 250 psi. The maximum velocity through the valve shall be 16 fps.
- B. All items shall be of the size as shown on the Drawings and all units of the same type shall be identical and the product of one manufacturer.
- C. All items shall have the name of the maker, the nominal size, date of manufacture, and the working pressure for which they are designed, cast, stamped, or permanently marked upon some appropriate part of the body.
- D. All butterfly valves ends shall be fitted with mechanical joints. Mechanical joint dimensions and drillings shall be in accordance with ANSI/AWWAC110 Ductile-Iron and Gray-Iron Fittings.
- E. Valve body shall be ductile iron in accordance with ASTM A536 Grade 65-45-12. Valve disc shall be stainless steel with a 316 stainless steel seating edge. Valve disc shall seat at 90° to the access of the pipe and shall require no torque to hold it in the closed position. Valve disc shall conform to section 3.4 of the AWWA C504.

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- F. Valve seats shall be compatible with chloramines and shall be peroxide cured type EPDM or approved equal and recessed in body. Type 316 Stainless Steel hardware shall be used to restrain the resilient seals for any movement at the maximum rated flow in either direction. Valve seat diameter shall not be less than the nominal size diameter minus one and one half inches.
- Seats shall be replaceable without removing the valve, and shall not be less than 3/8 inch in thickness
- G. Valve shafts shall conform to Section 4.2 of the AWWA C504 and as specified herein.
- Valve shaft shall be turned, ground and polished and shall be constructed of 316 stainless steel. Disc-shaft pins shall be of the same material as the shaft and pass completely thru the disc and shaft. It shall be tightly secured with lock washers and nuts to ensure line vibrations cannot loosen the connection. Valve shaft shall be offset from the seating area.
- Shaft seals shall be provided on projected shafts. Shaft seals shall be standard split V-type packing, standard "O" ring seals, or pulldown type packing. Shaft sealing shall be leak proof and maintenance free. Shaft seals shall be replaceable without removing the shaft.
- H. Key and keyway shall be located at the upper valve shaft. Contractor shall submit for approval, the design of a plug to prevent the key from walking or disengaging from the keyway. A cylindrical plug shall sit against the key within the drive sleeve of the gearbox. The plug shall be machined from solid brass and sized to fit between the valve shaft and the gearbox cover plate. A hole (1/4-20) shall be tapped in the center of the top face of the plug. The hole will allow for the insertion of a bolt for removal of the plug. The exact size of the plug shall be determined by the valve manufacturer in coordination with the gearbox manufacturer.
- The use of adhesives, tack welding, peening, screws, a blind key or keyway with a setback, or any other method shall be not acceptable. See section 2.03 for additional requirements of the gearbox and electric valve actuator.
- I. The interior of the valve body, except exposed finished, machined surfaces, shall be cleaned and sandblasted. The finished surface shall be equivalent to SSPC-SP10, near-white metal abrasive blast cleaning, and sprayed with two coats of an epoxy type coating certified under the ANSI/NSF Standard 61 for contact with potable water. Minimum lining and coating thickness shall be 16 mils. The color for prime coat and topcoat shall be different. The coating shall be applied in strict accordance with the manufacturer's directions.
- J. The coating shall be free of pinholes or holidays. Appropriate "returns" shall be incorporated at all juncture lines of coated and uncoated surface such as valve bore and valve mechanical joints to prevent lifting of the coating. Mechanical joint faces shall not be painted but coated instead with rust inhibitor.
- K. Butterfly valves shall be installed with valve position indicators, 316 stainless steel extension stems, valve boxes, and cast iron stem covers as per details shown on the Drawing.

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- L. Butterfly valve shall be equipped with 2" square operating nut and suitable for direct buried installation. A valve box rated for H2O loading shall be provided, and its installation will not transmit shock loads or stress to the valve. The valve box shall be centered over the operating nut of the valve with the box cover.
- M. All valves furnished under this Contract shall be geared such that the operating nut turn counter-clockwise to close.
- N. Bolts shall be per ASTM A193, Grade B&M, Class 2, Type 316 stainless steel. The nut shall be per ASTM A194, Grade 8M, type 316 stainless steel, heavy hex nuts.
- O. Gasket shall conform to section 33 11 00 para 2.01.
- P. MANUFACTURERS:
 - 1. Pratt, HP250II
 - 2. DeZurik, Series BAW
 - 3. Or approved equal

2.02 VALVE ACTUATOR

- A. Valve actuator shall be equipped with worm gear drive in cast iron housing; fully grease packed and O- ring sealed. The gearbox shall include adjustable mechanical end stops in both the open and close position. The actuator's mechanical stops shall withstand an input torque up to 450 ft-lbs. Actuators shall be fully enclosed and designed to produce the specified torque with a maximum pull of 40 lb. on the handwheel or the operator nut. The actuator shall be constructed with machined gearing suitable for manual or motorized operation to allow motorization at a later date without the need to replace the gearbox. The worm shaft shall be supported by ball bearings for smooth rotation. The drive sleeve shall incorporate a two pieces splined nut design to allow easy replacement and location of the valve keyway. Sizing shall be per AWWA C504 guidelines and shall be designed and coated per the manufacture's standard for "buried" service.
- B. The actuator shall be AUMA GS or Limitorque H.B.C. **(NO SUBSTITUTION)**

2.03 MECHANICAL JOINT RESTRAINT

- A. All butterfly valves shall be fitted with mechanical joint restraints. Restraint devices shall consist of multiple gripping wedges incorporated into a gland meeting the requirements of ANSI/AWWA C110/A21.10.
- B. Restraints will have a minimum working pressure of 250 psi.
- C. Gland body, wedges and wedge actuating components shall be 65-45-12 ductile iron material in accordance with ASTM A536
- D. Mechanical joint restraints shall be UL listed.
- E. MANUFACTURERS

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1. EBBA, Megalug Series 1100
2. Or approved equal

2.04 CITY FURNISHED MATERIALS

- A. The City will furnish certain materials, at no cost to the Contractor, for use in the work. The Contractor shall, prior to commencement of work, submit to the City Representative for approval, a written request for these materials, indicating the type of materials, quantities, and dates when required. Additional materials may be requested in writing to the city Representatives as the need arises. A minimum of 72-hour notice (three (3) full business days) shall be given to the City for processing. The City Representative will transmit to the Contractor the list of approved materials.
- B. The following materials will be furnished by the City:
As specified on the drawings
Note the City will not furnish any gaskets nor stainless steel bolts/threaded materials washers or nuts.
- C. The Contractor shall pay special attention regarding responsibility for materials obtained from the City. The contractor shall be responsible for fixing leaks even if these are from visible defects of City furnished materials

2.05 MATERIALS STORAGE YARD

- A. Materials are stored at the San Francisco Water Department Pipe Yard (1990 Newcomb Avenue, San Francisco, CA 94134).
- B. The Contractor shall not enter or remove any material(s) from the SFWD Pipe Yard without providing prior written notification through the Resident Engineer/City representative and then being accompanied by an authorized SFWD employee. The request shall be made at least 48-hours in advance (two (2) full business days).

2.06 PICK-UP, LOADING AND HAULING OF MATERIALS FURNISHED BY THE CITY

- A. The Contractor, at his/her own expense, shall provide the necessary crew, hauling equipment, (e.g., fork lift) transportation, etc., for loading and hauling the materials to the construction site.
- B. The Contractor shall notify the City Representative at least 48-hours in advance (two (2) full business days) prior to scheduling an appointment for pick-up from the SFWD Pipe Yard.
- C. No materials shall be released without the list of approved materials.
- D. Should an exchange of material be required, the fitting to be exchanged shall be returned to the SFWD Pipe Yard before an exchange can be made.

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PART 3 – EXECUTION

3.01 INSTALLATION OF VALVES

- A. Bolt holes of valves shall straddle the vertical centerline of the pipe run. Prior to installing valves, mechanical joint faces shall be thoroughly cleaned. After cleaning, insert gasket (NSF61 certified) and bolts, and tighten the nuts progressively and uniformly. If mechanical joints leak under pressure, loosen or remove the nuts and bolts, reseal or replace the gasket, retighten and/or reinstall the nuts and bolts, and retest the joints. Joints shall be watertight at test pressures before acceptance.
- B. Thoroughly clean threads of screwed joints by wire brushing, swabbing, or other approved methods. Apply both 3 wraps of approved pipe thread tape and approved joint compound to threads prior to making joints. Joints shall be watertight at test pressures before acceptance.
- C. Contractor shall take all steps necessary to prevent construction generated liquids and debris from entering the potable water supply system. Appropriate barriers shall be in place before and throughout the duration of the construction. All collected liquids and debris and barriers shall be removed from the work site following the successful completion of construction by the Contractor and properly disposed.
- D. Contractor shall install valves with flow direction arrow on the valve body in the direction of the actual flow.
- E. Contractor shall furnish and install all necessary hardware for a complete installation of valves. Any damages to the valves shall be repaired to the City Representative's satisfaction before they are installed. All items shall be installed in accordance with the manufacturer's recommendations.
- F. Installation of valve boxes will be in kind replacement or as shown on drawings. This work includes all restoration of street.

3.02 TESTING

- A. Shop Testing:
 - 1. Prior to shipment, all valves and actuators shall be subjected to hydrostatic, leakage and performance tests as specified in AWWA C504, Section 5.1. Certification of tests and copies of the test reports shall be furnished as specified in AWWA C504, Section 6.3. Actuator shall be mounted on valve at manufacture's facility and valve shall be tested in installation position.
 - 2. For the leakage tests, all valves shall be bubble tight at the valve class pressure as specified in AWWA Standard C504. Tests shall be completed in both directions

Leakage test duration shall be at least five (5) minutes. There shall be no indication of leakage past the valve disc (visible in the form of bubbles in the water pool on top of the disc) during the test period.
 - 3. For the hydrostatic pressure tests, all valve bodies shall be subjected to an internal hydrostatic pressure that is per AWWA Standard C504. Hydrostatic test duration shall be at least ten (10) minutes. During the hydrostatic test,

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there shall be no leakage through the metal, the end joints, of shaft seal, nor shall any part have permanent visible deformation. For performance tests, valves shall be shop operated three times from fully closed to the fully opened position and the reverse under no-flow conditions.

4. Verification of test will not preclude possible warranty claims after installation.

B. Field Testing

1. Valves shall be tested at the same time that the adjacent pipeline is tested. Joints shall not show any visible leakage under test. Hydrostatic test and seat leakage tests shall be conducted in accordance with AWWA C504 for butterfly valves. Repair joints that show signs of leakage prior to final acceptance by the City.
2. Upon completion of installation of each valve, the Contractor shall dry test, open/close the valves, and to verify manual operation. After successful dry test, the Contractor shall perform the hydrostatic field leakage test. Fill pipe from upstream side of pipeline and check valve for leakage. Valve shall be drop-tight. The valve manufacturer's representative shall set any internal stops and limits upon completion of leakage test.

3.03 INSPECTION UPON DELIVERY

- A. Upon delivery, valves may be inspected or tested by the City Representative for compliance with these Specifications. Any valves found not to comply will not be accepted until deficiencies are corrected by the Contractor at no cost to the City. Failure by the City Representative to inspect or witness tests at the manufacturer's plant shall not be construed as waiving inspection upon delivery or testing.

3.04 SERVICES OF MANUFACTURER'S REPRESENTATIVE

- A. The Contractor shall furnish the services of the manufacturer's representative to verify proper installation of butterfly valves. The services of the representative shall not be construed as relieving the Contractor of his/her responsibility for furnishing qualified personnel and mechanics to properly perform the installation.

B. Valve Manufacturer

The Contractor shall furnish the services of the manufacturer's technical representative with specific expertise in gate valves to verify proper installation of gate valves. The representative shall be available for one (1) regular working day (Monday through Friday - 8 hours per day) on two (2) separate occasions for a total of two (2) days on site. It is the responsibility of the Contractor to pay all expenses related to this required field inspection.

1. Installation inspection and certification: Two (2) man-days
2. Commissioning and Testing: Two (2) man-days
3. Training: One (1) man-day

- C. Services for the installation supervision shall be conducted prior to the services rendered for the testing and training of the equipment specified herein.

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3.05 CLEANING AND DISINFECTION

- A. Contractor shall flush, clean and disinfect wetted surfaces of valves per Section 33 13 00 Sanitary Work Practices and Disinfection of Water Utility Distribution prior to being put into service.

END OF SECTION

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