SECTION 33 11 56 (CHANGE ORDER)

FIELD WELDING OF STEEL PIPE

PART 1 – GENERAL

1.01 DESCRIPTION

A. The Contractor shall provide all appropriate labor, equipment, and material to perform the steel pipe, specials and fittings welding work described in this section. This specification describes the requirements for field welding of steel pipe (and the associated appurtenances).

1.02 RELATED SECTIONS

A. Section 01 33 00 – Submittal Procedures

B. Section 09 97 72 – Coating and Lining

C. Section 31 23 36 – Excavation and Backfill for Water Work

D. Section 33 11 50 – Installation of Steel Pipeline

E. Section 33 11 55 – Fabrication of Steel Pipe

1.03 REFERENCES

A. American Society for Nondestructive Testing Inc. (SNT): SNT-TC1A, Personnel Qualification and Certification in Non-Destructive Testing.

B. ASME SFA-5.1 – Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding

C. ASTM A370 – Standard Test Methods and Definitions for Mechanical Testing of Steel Products

D. AWS D1.1 – Structural Welding Code - Steel

E. AWS A5.1 – Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding

F. AWS A5.5 – Specification for Low-Alloy Steel Electrodes for Shielded Metal Arc Welding

G. AWS A5.20/A5.20M – Specification for Carbon Steel Electrodes for Flux Cored Arc Welding

H. AWS A5.29/A5.29M – Specification for Low-Alloy Steel Electrodes for Flux Cored Arc Welding

I. AWWA C206 – Field Welding of Steel Water Pipe

J. AWWA C210 – Liquid-Epoxy Coatings and Linings for Steel Water Pipe and Fittings

K. AWWA C222 - Polyurethane Coatings and Linings for Steel Water Pipe and Fittings

L. AWWA M11 – Steel Water Pipe: A Guide for Design and Installation

1.04 DEFINITIONS

A. Acronyms:

1. ASNT: The American Society for Nondestructive Testing
2. CIH: Certified Industrial Hygienist
3. CJP: Complete Joint Penetration.
4. CWI: Certified Welding Inspector.
5. FCAW: Flux Cored Arc Welding
6. MT: Magnetic Particle Testing.
7. NDE: Nondestructive Examination.
8. NDT: Nondestructive Testing.
9. PJP: Partial Joint Penetration.
10. PQR: Procedure Qualification Record.
11. PT: Liquid Penetrant Testing.
12. RT: Radiographic Testing.
13. SMAW: Shielded Metal Arc Welding
14. UT: Ultrasonic Testing.
15. VT: Visual Testing.
16. WPQ: Welder/Welding Operator Performance Qualification.

17. WPS: Welding Procedure Specification.

1.05 SUBMITTALS

A. Submit in accordance with Section 01 33 00.

B. Experience and qualification of welding inspection and testing firm(s) and weld inspector(s) including CWI certificates.

C. NDT Personnel certificates.

D. Project specific NDT test procedures and site specific safety requirements when radiographic testing is involved.

E. Sample of weld inspection report.

F. Welding Procedure Specifications in accordance with AWS D1.1 along with project specific Procedure Qualification Records for each type of weld and welding method, qualified by testing.

G. Each welder's certification and project specific WPS qualification records.

H. Welder Qualification Certificates and Welder Qualification Tracking Log (WQTL).

I. WPQ specific to this Project.

J. Weld Inspection Reports and NDT test results submitted within 24 hours of completion.

K. Weld Log.

L. All electronic files to document radiographic testing.

M. Independent testing laboratory and welding inspector qualifications

N. Health and Safety Plan developed and signed by a Certified Industrial Hygienist (CIH) for all welding performed inside a pipe. See article 3.03.

1.06 QUALITY CONTROL

A. The General Requirements, Prequalification, Qualifications and Inspection criteria of AWS D.1.1, Sections 1, 5, 6, and 8 thereof, and the Requirements and Verification criteria of AWWA C206, Sections 4 and 5 thereof, are incorporated as if included fully herein and provide minimal standards for Quality Control. When any conflict exists between these two code standards and any other subsection of this Contract, the more stringent criteria shall apply.

B. Contractor shall at its own expense, hire an independent testing laboratory, subject to the approval of the City, that is certified to perform all testing and inspection required within this specification section. The testing laboratory shall have on staff an ASNT Level III or equivalent person who is qualified to write the project specific weld inspection and test procedures. All welding inspectors shall have minimum 5 years of welding inspection experience and ASNT Level II or AWS CWI certification. At a minimum, the Contractor shall provide a full time Welding Inspector and additional CWI's as needed to keep pace with progress of work during all field welding. Duties of the testing laboratory shall include, but not limited to, review and qualification testing of the WPS, qualification testing of welders, , testing and inspection of all field welds as required by this Contract. Contractor/Testing Laboratory shall provide all apparatus and materials for testing and inspection.

C. Welding Procedure Specification /Procedure Qualification Record (WPS/PQR)

1. All welding procedure specifications shall be qualified by the Contractor in accordance to AWS D1.1: Clause 6, Part B and accepted by the City Representative.

2. Charpy V Notch (CVN) testing shall be included in the weld qualification tests; CVN testing shall follow the procedure specified in AWS D1.1, Clause 6, Part D except as follows:

   a. Five (5) specimen option shall be used.

   b. The temperature of the material at the time of testing shall be +30 degrees F.

   c. Acceptance: the minimum individual energy adsorbed shall be 20 lbf-ft. and the minimum average energy adsorbed shall be 25 lbf-ft.

D. Welder/Welding Operator Performance Qualification (WPQ)

1. Welding shall be done by experienced, skilled and certified operators experienced and skilled in steel pipeline welding using methods and materials similar to those involved in this project.

2. Welding shall be performed by qualified welders meeting the requirements of AWS D1.1, Clause 6, Part C.

3. Prior to performing any work, all welders shall be tested in accordance with AWS D1.1 Clause 6, Part C and the Contractor’s accepted welding procedures. Previous welder qualification certificates shall not be acceptable. The testing shall be performed after the Project’s notice-to-proceed is given.

4. Each welder passing the qualification test shall be issued an identification symbol that shall be placed next to all welds performed by the welder.

5. Welder qualification tests shall be performed using the Contractor's accepted qualified welding procedures. Should there be any reason to question the quality of a welder's work, the City Representative shall have the right to require requalification of the welder or have the welder removed from the project at no additional cost to the City and/or any schedule extension.

6. All cost of performance qualification tests and retest of welders shall be the responsibility of the Contractor.

E. Welder Qualification Tracking Log

1. A Welder Qualification Tracking Log (WQTL) shall be prepared. The WQTL shall include each welder's name, identification symbol, and each procedure that the welder is qualified to perform. This summary shall be continuously updated as new welders are hired onto the project and as new procedures are accepted. The log shall be resubmitted to the City Representative after each update.

F. Shop Drawings

1. All shop drawings, that require field welding, shall identify the base metal specification, weld type, weld size and weld location.

2. All welds shall be identified on the shop drawings.

G. Air Test of Circumferential Joints

1. As soon as practicable after completion of the welding of each double welded lap joint, butt strap joint, and joints for appurtenances, the Contractor shall test the joint by forcing air under a pressure of 40 pounds per square inch into the joint through the tapped holes provided for this purpose as indicated on the Drawings.

2. Test air pressure shall be measured by two (2) calibrated digital pressure gauges installed on opposite sides of each joint.

3. While the joint is under this pressure, every part of every weld forming a part of the joint shall be swabbed with a heavy soap solution and examined for leakage. The joint shall be held under pressure for at least fifteen (15) minutes or until all welds have been swabbed with the soap solution and visually inspected, whichever is longer in duration.

4. If, with the air hose connected to one of the test holes at a joint, air does not blow out through the other hole(s) when they are opened, the tests shall be repeated with the hose connected to the hole or holes through which air did not pass; or hoses may be connected to all holes in a single test.

5. After successful completion of the test, the tapped holes shall be filled by welding.

H. Other Non-Destructive Testing of Welded Joints

1. All welds regardless of type shall be visually inspected for fit up and intermediate weld passes shall be periodically, visually inspected. All final weld passes shall be visually inspected. Additional testing and inspection shall be performed as indicated below for butt/grooved and fillet welds.

2. Butt or Grooved Welds:

   a. One hundred (100) percent of all (CJP) butt welds made manually or semi-automatically shall undergo non-destructive testing using UT.

3. Fillet Welds: Inspect 10 percent of all butt strap welds with PT or MT. All fillet welds (e.g. specials and fittings) shall be100% dye penetrant or mag particle tested to verify weld quality.

4. Tack Welds: Visually inspect tack welds.

5. Welds to be inspected, if less than 100 percent rate, shall be selected by the City Representative

6. All field welds passing testing and inspection by QC Welding Inspector shall be marked to indicate acceptance or rejection.

7. When a non-destructive inspection shows a defective weld, additional tests shall be made to determine the extent of the defect or defects. For welds not subjected to 100% nondestructive inspection, two additional areas on the same weld shall be inspected using the same method.

   a. Additional non-destructive examination of the rejected welds shall be made after repairs are completed.

I. Welds Acceptance and Repair

1. The City Representative alone shall decide if the Contractor's efforts are sufficient to ensure Contract requirements are met, and in the event defects occur in the Contractor's welding, the City's Representative shall have the

right to require the Contractor to increase, at the Contractor's own expense, its level of testing and inspection..

2. Any portion of weld which in the opinion of the City Representative appears defective or is found to be defective by the testing specified shall be removed as directed to determine the extent of the defect. Following repair of the weld, the weld shall be restored to its original size and shape.

3. Caulking or peening of defective welds is not permitted.

4. Welds shall be repaired by the same welding procedure and process that produced the weld subject to acceptance of the City Representative provided that, welds in which more than four percent (4%) of the total length of the weld is defective, shall be rejected if the City Representative deems that satisfactory repairs cannot be made.

5. Retest unsatisfactory welds and repair or replace as necessary until welds meet acceptance.

6. The repaired weld defect shall be re-tested until the joint is acceptable.

7. The Contractor shall record and log test results and submit a certified copy to the City Representative for record purposes.

8. Repairs shall be made at no additional cost to the City.

J. Contractor shall create and maintain a log for each welded pipe joint indicating stationing, type of weld and joint, identification of welder, date of weld, identification of CWI, NDT tests performed including air testing and whether pass/fail, and notes if weld had failed and repaired. For radiographic testing, Contractor shall submit all electronic files to document all radiographic testing.

PART 2 – PRODUCTS

2.01 MATERIAL

A. The weld material's chemical composition and mechanical properties shall meet the requirements of AWS 5.1 and ASME SFA-5.1.

B. Welding consumables shall conform to the appropriate AWS classification numbers suitable for the particular type of work and shall be of such composition, quality and size as to ensure quality work. Filler material shall meet the same toughness properties as the base metal.

1. SMAW electrodes shall conform to AWS Specification A5.1 or AWS A5.5. Electrodes shall be of class E7018 H4R.

2. FCAW wire shall conform to AWS Specification A5.20/A5.20M or A5.29/A5.29M. Wire shall be of class E71T-8 or E71T-1.

3. Welding consumables and electrodes shall follow the requirements as outlined in AWS D1.1 Section 7.3 – Welding and Consumables and Electrode Requirements.

PART 3 – EXECUTION

3.01 GENERAL

A. Field pipe joints shall be CJP butt weld joints as indicated on the drawings and as hereinafter specified; except that double full-fillet lap-welded butt-strap field joints shall be used where required for closures or for other purposes, as directed by the City Representative.

B. Perform welding only in presence of Contractor's CWI.

C. Conform to AWS D1.1, AWWA C206, accepted welding procedures, and referenced welding codes. In case of conflict, AWS D1.1 shall govern.

D. Surfaces to be welded shall be cleaned by wire brushing, chipping, or hammering away any loose mill scale, rust, paint, or other foreign matter present on the metal. The cleaning shall extend at least two (2) inches on each side of the weld, except as otherwise specified. Welds shall be cleaned each time the electrode is changed.

E. Contractor shall review the appropriate shop drawing and weld procedure specification prior to welding. Welder(s) shall apply their identifying symbol next to the joint. Once started, the welder(s) who started the weld shall be the same ones to finish it.

F. Rejectable weld defects shall be repaired or redone, and retested until sound weld metal has been deposited in accordance with appropriate welding codes.

3.02 WELDING PROCEDURE SPECIFICATION (WPS)

A. Welding shall be performed by the Shield Metal Arc Welding (SMAW) process or Flux Cored Arc Welding (FCAW-S or FCAW-G) process. All welding methods and procedures shall meet the requirements of AWS D1.1. Unless otherwise specified, welding of steel pipe, fittings and specials shall conform to AWWA C206 as modified herein.

1. The quality of welds shall meet the requirements of AWWA C206. All welded pipe joints shall be welded in accordance to the Contractor's accepted Project Welding Procedures Specifications.

2. Maximum size of welding electrode shall be 3/16". Voltage and amperage shall be per the accepted welding procedure or the acceptance of the City Representative.

3. The alignment of the pipe joints shall be in accordance with AWWA C206: Field Welding of Steel Pipe – Section 4.6.

4. Quality of welds shall meet AWWA C206: Section 4.6 and AWS D1.1 Table 8.1 and Figure 7.4.

5. Fillet welds shall have legs of equal length and of minimum size equal to the thickness of the base metal. The faces of fillet welds shall be flat to slightly convex.

6. Butt welded joints shall be welded in accordance with AWWA C206. The maximum weld reinforcement allowed for ID and OD of pipe is 1/8".

3.03 WELDING

A. Contractor shall submit and implement a Health and Safety Plan developed and signed by a Certified Industrial Hygienist (CIH) for all welding performed inside a pipe.

1. The Plan shall address, but not limited to, ventilation controls and area air monitoring for welding operations inside the pipe. Personal air monitoring may be needed to validate ventilation controls and air quality and the CIH shall ascertain this need.

2. The Plan shall account for type of metal, the means and methods of welding, and the health and safety of other Contractor and City personnel who may enter the pipe when welding is occurring.

3. If the area air monitoring is performed by the Contractor's own forces and not by the CIH, then the CIH shall perform verification area air monitoring at least once for the 10 cumulative working days of welding inside a pipe.

4. Air monitoring data that are recorded by the Contractor or CIH shall be submitted to the City Representative within 2 working days. Such Air monitoring data shall include the acceptance criteria for each constituent monitored. Any exceedance of the acceptance criteria shall be immediately conveyed to the City Representative along with corrective actions to be taken.

B. Accepted welding procedures shall be available to the welders at the job site at all times when welding is occurring.

C. For all welds, the maximum single pass thickness shall not be greater than 3/16" or otherwise accepted by the City Representative.

1. Each pass shall be thoroughly cleaned of dirt, slag, or flux before succeeding bead is applied.

2. Each pass shall be fused into the plate/coil at each side of the welding groove or fillet, and shall not be permitted to pile up in the center of the weld. The weld profile for fillet and butt welds shall be in accordance with AWS D1.1, Figure 7.4, "Acceptable and Unacceptable Weld Profiles".

3. .Undercutting along the side will not be permitted

D. Ground clamps shall be attached to the pipe section to be welded on at a location that will prevent any weld current from passing through an insulated flange joint. Any damage to an insulated flange joint from arcing shall be repaired to the City Representative's satisfaction at no additional cost to the City.

3.04 FIELD JOINTS

A. Field welds joining adjacent pieces of pipe shall be complete joint penetration butt welds unless otherwise shown on the drawings. Where shown on the drawings, connections between the existing pipe and the new pipe shall be made using butt straps with double welds (both inside and out).

B. Butt-strap field joints conforming to the details indicated on the drawings and required for closure and at other locations shall be accepted by the City Representative.

3.05 MANUAL WELDING

A. For all manual welded butt joints, the maximum single pass thickness shall not be greater than 3/16" or otherwise accepted by the City Representative.

1. All weld passes, including the final one, shall be thoroughly cleaned of dirt, slag, or flux before a succeeding bead is applied.

2. Each pass shall be fused into the plate at each side of the welding groove or fillet, and shall not be permitted to pile up in the center of the weld.

3.06 FIELD BUTT STRAP JOINTS

A. Butt-strap field joints conforming to the details indicated on the drawings will be required for closure and at other locations.

END OF SECTION

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. 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
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.

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 flange protectors of waterproof plywood or weather-resistant pressboard, of at least the outside diameter of the flange, shall be fastened to each flange to protect both the flange 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 valve ends shall be fitted with flanged fittings as shown on the drawings. Drilling of end flanges shall be in accordance with ANSI/AWWA B16.1 Class 125.

E. Valve body shall be ductile iron in accordance with ASTM A536 Grade 65-45-12. Valve disc shall be ASTM A743 cast CF8M stainless steel with a 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.

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 flange to prevent lifting of the coating. Flange 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.

L. Butterfly valve shall be equipped with 2" square operating nut and suitable for direct buried installation. A valve box rated for H20 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. or approved equal.

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, flange faces shall be thoroughly cleaned. After cleaning, insert gasket (NSF61 certified) and bolts, and tighten the nuts progressively and uniformly. If flange leak under pressure, loosen or remove the nuts and bolts, reseat 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, 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 butterfly valves to verify proper installation of valves. The representative shall be available for one (1) regular working day (Monday through Friday - 8 hours per day) on three (3) separate occasions for a total of three (3) days on site. It is the responsibility of the Contractor to pay all expenses related to this required field inspection. Services furnished include installation and certification, commissioning and testing and training. It is the Contractor's responsibility to coordinate and schedule services based on the schedule of construction activities.

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

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