# 4.10 - Valves and Valve Installation

Addendum #1

# 4.10.0 General

### **4.10.1 Section Includes**

- a) Resilient Seat Gate Valves
- b) Butterfly Valves
- c) Valve Operations
- d) Gate Valves and Ball Valves
- e) Air Release Valves

# 4.10.2 General Description

Valves which are to be installed shall be the types and sizes and at the locations indicated on the Plans. Butterfly valves shall conform to AWWA C504, Class 150B and have an integral ISO 5211/MSS SP-101 pad for direct mounting of actuator, and resilient seat gate valves shall conform to AWWA C509 with capability for direct mounting of actuator. All valves and fittings shall be 150 psi working pressure or better, unless otherwise specified in the Contract Documents. All valves shall turn counterclockwise to open. Unless otherwise shown on the Plans or directed by the OWNER, all valves shall be installed in the vertical position. Valves shall be equipped with slip-on, mechanical, or flanged joints suitable for use with the pipe on which they will be installed. Where practicable, valves installed underground shall be mechanical joint or slip-on, and valves installed above ground shall be flanged. All valves shall be furnished with the necessary bolts, nuts, glands, gaskets, and other accessories necessary for their complete installation. All manual operated valves shall have a two inch (2") square wrench nut and valves larger than four inch (4") shall be equipped with Worm Gear for operation unless otherwise specified.

It is the intent of these specifications that all valves, valve boxes, and accessories furnished under this Contract shall be of the best quality for the use of purpose intended, and all materials incorporated shall meet the requirements of the service intended, regardless of the pressure specified for the valve.

All valves shall be fully supported by cast-in-place concrete or valve stands. The concrete shall be placed on firm, undisturbed soil. The pipe and fitting joints shall remain accessible for repair. The minimum depth of concrete for valve foundations shall be six inches (6") for twelve inch (12") valves and smaller and shall be eight inches (8") for valves larger than twelve inches (12"). Reinforcement shall consist of 4x4 W2.9xW2.9 (6 gauge) or approved equal. The concrete shall extend a minimum of four inches (4") beyond all contact points with the valve.

# 4.10.3 Resilient Seat Gate Valves

All valves four inches (4") through thirty-six inches (36") shall be non-rising stem resilient seat gate valves, unless otherwise shown on the Plans or directed by the OWNER, as manufactured by American Darling, East Jordan Iron Works, J&S, Mueller, M & H or U.S. Pipe. The valves shall be tested for zero leakage past the seat at 200 psi and hydrostatically shell tested at 400

psi. The valves shall be wedge disc type and shall contain a machined surface in the valve body with solid guide lugs on the disc that travel within channels cast in the sides of the valve. The valve shall contain a bronze stem nut and O-ring seals above and below the thrust collar with a thermoplastic anti-friction washer above the thrust collar. Interior and exterior of the valve shall be epoxy coated, 8 millimeters, dry film thickness, minimum. For each valve eighteen inches (18") and larger, the manufacturer shall provide an affidavit of compliance to demonstrate compliance with AWWA C509. Results of the Shell and Seat Tests shall be included with each affidavit. The affidavit shall demonstrate that the valves are of recent manufacture and that the valves have been tested within ninety (90) days of receipt. The CONTRACTOR shall operate each valve prior to installation to ensure free and proper functioning. During the operation, the CONTRACTOR shall allow the OWNER the opportunity to visually inspect and to operate the valves.

Resilient seat gate valves twenty inches (20") and larger shall be supplied with spur gear operators installed by the valve manufacture, unless otherwise specified on the Plans.

### **4.10.4 Butterfly Valves**

Butterfly valves shall be solid shaft type 304 SS extending through the body and meeting AWWA C504, as manufactured by DeZurik, Clow, GA Industries Mueller, or Pratt-or Val-Matic. All keys and pins used in securing valve discs to shafts shall be stainless steel. Valve body shall be high-strength cast iron ASTM A126 Class B or ASTM A536 Grade 65-45-12 ductile iron with 18-8 Type 304 stainless steel body seat. Valve vane shall be high-strength cast iron ASTM A126 Class steel valve vane shall be high-strength cast iron ASTM A126 Class B or ASTM A536 Grade 65-45-12 ductile iron with 18-8 Type 304 stainless steel body seat. Valve vane shall be high-strength cast iron ASTM A48 Class 40, having rubber seat mechanically secured with integral 18-8 stainless steel clamp ring or SS pins and 18-8 stainless steel nylon locked screws forming a leak-tight joint. Valve disc shall have SS3 316 seat edge and seat made from Buna-N that shall seal tightly agains full rated differential pressure. Valve seats shall be 18-8 stainless steel. Shaft seals shall be O-ring type. The interior and exterior of the valve shall be NSF-61 Certified epoxy coated, 6-8-mil dry film thickness, minimum, per AWWA C550.

# 4.10.5 Valve Bodies

- a) Clear Water Opening: The diameter of the clear waterway opening through the valve shall be not less than the rated size of the valve.
- b) Flanges: Flanged valves shall meet the AWWA C504 "short body" face-to-face dimension and be faced and driller per ANSI B16.1. Flanges shall be furnished to true plane surfaces within a tolerance limit of 0.005 inch; the finished face shall be normal to the longitudinal valve axis within a maximum angular variation tolerance of 0.002 inch per foot of flange diameter.
- c) Mechanical Joint Ends: Where mechanical joint ends are specified, either mechanical joint or push-on ends conforming to ANSI A21.11 will be acceptable.

# **4.10.6 Valve Operations**

Operator mounting arrangements and handwheel positions shall be as indicated on the Plans or as directed by the OWNER.

# 4.10.6.1 Manual Operations

Unless otherwise required by the OWNER, the direction of rotation of the wheel or wrench nut to open each valve shall be to the left (counterclockwise). Each valve body or operator shall have cast thereon the word OPEN and an arrow indicating the direction to open.

Hand-wheel diameter shall be at least eight inches (8") but not more than twenty-four inches (24") for thirty inch (30") or smaller valves.

Wrench nuts shall be standard AWWA wrench nuts as described in Section 4.16 of AWWA C500.

# **4.10.6.2 Electrical Operations**

Electric actuators shall be sized by the manufacture to meet required torque requirements of type/size /class of valves to be automated, as indicated on the Plans or directed by the OWNER.

Electric actuators shall be open / close or full modulating as indicated on the Plans or directed by the OWNER, as manufactured by Auma AC, Limitorque MX or Rotork IQ/IQT.

Filter Drain valve actuators shall be designed to integrate with the plant's existing filter control panels.

Clarifier Drain valve actuators require new control panels as none currently exist. For specifications, see above section 4.1.4(a) Clarifier Valve Actuator Controls.

In order to maintain the integrity of the enclosure, setting of the torque levels, position limits and configuration of the indication contacts etc. shall be carried out without the removal of any actuator covers and without mains power over an Infra red or Bluetooth® wireless interface.

Actuator enclosure shall be watertight to IP66/IP68 7m for 72hrs, NEMA 4, 6. The motor and all other internal electrical elements of the actuator shall be protected from ingress of moisture and dust when the terminal cover is removed for site cabling, the terminal compartment having the same ingress protection rating as the actuator with the terminal cover removed.

Actuators shall **be open / stop / close with discrete inputs for open / stop / close commands.** have 4-20 mA input for position instruction and Actuators shall have 4-20 mA transmission for position indication as well as discrete indicators for open / close status. Position indication shall be in percent (%) open or closed.

Valve shall be equipped with open / close buttons and position indicators panels on the valve for local controls.

The actuator shall incorporate local controls for Open, Close and Stop and a Local/Stop/Remote mode selector switch lockable in any one of the following three

positions: local control only, stop (no electrical operation), remote control plus local stop only. It shall be possible to select maintained or non-maintained local control.

The actuator local position indication shall include a dedicated numeric/symbol digital position indicator displaying valve position from fully open to fully close in 0.1% increments. The display shall be backlit to enhance contrast at all ambient light levels and shall be legible from a distance of at least 5m (16ft).

Valve shall be operable by indicating position (% open, close, open), as appropriate, and by pulse input in both local and remote modes. Hand-wheel override operator shall be included for manual operation. Actuator close speed from full open to full close shall not be less than 3 minutes nor more than 15 minutes.

Power supply shall be 110 Volt single phase, 60 HTz.

Valve adaption and hardware shall be provided by either the valve or actuator manufacture. Actuators shall be inspected for proper installation, tested, commissioned by a certified and trained actuator manufacture service technician. Actuator training shall be provided by the actuator manufacture by a certified and trained service technician.

#### **Control power:**

Actuators will have the ability to supply all control power internally for controls and indications with 120 volt single phase or 24 VDC to filter control panel or clarifier drain control panel as required.

#### **Power supply:**

Filter Drain actuators: shall be 110 Volt single phase, 60 Hz. With a power disconnect located next to actuator.

Clarifier Drain actuators: shall be 480 volt, three phase, 60 Hz. With a power disconnect located in the valve control panel.

#### **Control and Power wiring:**

Connections, terminations, wiring size and type, spares shall be coordinated with actuator manufacture to ensure proper installation to meet actuator and control panel requirements for proper operation. All new wiring, conduit, control panels or integrations to existing control panels shall be installed and terminated by General and/or Electrical contractor.

Filter Drain actuators: Shall be integrated and controlled from current Filter Control panels.

Clarifier Drain Actuators: Shall be controlled and powered from a Valve Control Panel that will be supplied by the actuator manufacture. It will include main power disconnect, individual actuator disconnect. Open /stop /close switch; open / close indication; % Open indication. See above section 4.1.4(a) Clarifier Valve Actuator Controls.

### 4.10.7 Gate Valves and Ball Valves

Unless otherwise shown or specified, all two inch (2") valves shall be all brass, non-rising stem gate valves as manufactured by James Jones. Valves smaller than two inches (2") shall be brass ball valves as manufactured by James Jones.

### 4.10.8 Valves Boxes

All buried valves shall be provided with valve boxes. Valve boxes shall be cast iron, extension sleeve type, suitable for the depth of cover required. Valve boxes shall be not less than five inches (5") in diameter, shall have a minimum thickness at any point of 3/16-inch, and shall be provided with suitable cast iron bases and covers. Covers shall have cast thereon designation of the service for which the valve is used.

Valve and valve boxes shall be set plumb. Each valve box shall be placed directly over the valve it serves, with the top of the box brought flush with the finished grade. After being placed in proper position, earth shall be filled in around each valve box and thoroughly tamped on each side of the box.

### 4.10.9 Air Release Valves

Air release valves shall be provided and installed by the CONTRACTOR at the locations as noted on the Plans. The air release valves shall be as specified on the Plans, or approved equal. Valve boxes shall be constructed as detailed on the Plans.

### 4.10.10 Drawings and Data

Complete drawings, details, and specifications covering the valves, actuators and their appurtenances shall be submitted in accordance with the submittals section.

### 4.10.11 Installation

For underground installations, valves shall be carefully lowered into position to prevent damage to any part of the valve. Place the valve in the proper position with stem truly vertical and securely hold until connections have been made. Furnish all bolts, nuts, gaskets and any other required hardware. The CONTRACTOR shall adjust the valve boxes to the proper length to conform to the finished or planned ground surface elevation. The CONTRACTOR shall provide a firm foundation for each valve. The firm foundation shall consist of compacting the sub-grade and placing minimum of six inches (6") of concrete with #3 rebar centered each direction. All sub-surface valves shall be wrapped in polyethylene sheeting of approximately 8 mil thickness. Wrapping shall precede concrete placement.

### 4.10.12 Start-up

The CONTRACTOR shall have the valve actuator manufacturer's field service representative perform start-up on all new actuated valves. Manufacturer's rep shall, at a minimum, perform the following services:

- 1. Inspect valve actuators covered by these Specifications.
- 2. Supervise adjustments and installations checks:
  - a. Open and close valves electrically under local manual control and demonstrate that all limit switches are properly adjusted and that switch contacts are functioning

properly by verifying the inputs are received at the remote input/output (RIO) panels or local control panel, as appropriate.

- b. Position modulating valves electrically under local manual control and demonstrate that valve position feedback potentiometer is properly adjusted and that feedback signal is received at the RIO panels or local control panel, as appropriate.
- c. Simulate a valve position command signal at the RIO panel or local control panel, as appropriate, and demonstrate that the valve is controlled to the desired position without excessive "hunting".
- 3. Provide the OWNER with a written statement that the valve actuator manufacturer has verified that the actuators have been installed properly, that all limit switches and position potentiometers have been properly adjusted and that the valve actuator responds correctly to the valve position command.

# 4.10.13 Measurement and Payment

Measurement and payment for this item will be based on the lump sum price bid. Payment will include full compensation for installation of valve, actuator, wiring, set-up, start-up, etc. in accordance with the specifications, Plans and /or instructions of the OWNER.