SECTION 15100

VALVES

[\*Note to the Engineer: This specification section encompasses all forms of valves, keep language for valves applicable to project only.]

# GENERAL

## DESCRIPTION

### This section includes materials, testing, and installation of valves and valve appurtenances.

## REFERENCE STANDARDS

### ANSI b16.1 – Cast Iron Pipe Flanges and Flanged Fittings

### ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength

### ASTM A193 – Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service

### ASTM A194 – Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure or High-Temperature Service, or Both

### ASTM A126 – Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings

### ASTM A48 – Standard Specification for Gray Iron Castings

### ASTM A276 – Specification for Hot- and Cold-Finished Bars of Stainless and Heat-Resisting Chromium-Nickel-Manganese Steel

### ASTM A536 – Ductile Iron Castings

### ASTM B62 – Standard Specification for Composition Bronze or Ounce Metal Castings

### AWWA C105 – Polyethylene Encasement For Ductile Iron Piping For Water And Other Liquids

### AWWA C110/A21.10-08 – Ductile-Iron and Gray-Iron Fittings

### AWWA C506 – AWWA Standard for Backflow Prevention Devices – Reduced Pressure Principle and Double Check Valve Types

### AWWA C507 – Ball Valves (6-in. through 60-in.)

### AWWA C508 – Swing-Check Valves for Waterworks Services (2-in. through 24-in.)

### AWWA C517 – Resilient-Seated Cast-Iron Eccentric Plug Valves

### AWWA C210 – Liquid Epoxy Coating Systems for the interior and Exterior of Steel Water Pipelines

### AWWA C500 – Gate Valves For Water And Sewerage Systems

### AWWA C504 – Rubber Seated Butterfly Valves

### AWWA C509 – Resilient Seated Gate Valves For Water And Sewerage Systems

### AWWA C550 – Protective Epoxy Interior Coatings For Valves And Hydrants

### NACE – National Association of Corrosion Engineers

### SSPC – The Society for Protective Coatings

## RELATED-WORK-DESCRIBED-ELSEWHERE

### The Contractor shall refer to the following Specification section(s) for additional requirements:

#### EVMWD (DISTRICT) Standard Drawings

#### Section 01300 – Shop Drawings and Submittals

#### Section 09800 – Painting and Coating

#### Section 15000 – General Piping System and Appurtenances

#### Section 15044 – Hydrostatic Testing and Flushing of Pressure Pipelines

#### DISTRICT Approved Materials List

## SUBMITTALS

### Submit shop drawings in accordance with Standard Specifications Section 01300.

### Submit Shop Drawings, manufacturer's catalog data and detail construction sheets showing all valve parts and describing material of construction by material and specification (such as AISI, ASTM, SAE, or CDA). Submittal shall include valve dimensions including laying lengths, dimensions and orientation of valve operators, as installed on the valves. Submittals shall also indicate valve linings and coatings with manufacturer's and paint numbers listed.

### Submit proof of NSF certification for the lining materials to be used.

### Polyethylene wrap for valves in accordance with Section 15000.

### Manufacturer’s data for valve boxes. Identify riser materials.

## MANUFACTURER’S TESTING REQUIREMENTS

### The following items shall be performed prior to shipment of valves.

#### Submit certification from manufacturer stating that each resilient wedge gate valve and each butterfly valve has successfully passed hydrostatic tests in accordance with AWWA C509 and AWWA C504, respectively.

#### Submit certification that each resilient wedge gate valve and butterfly valve shall be hydrotested by the manufacturer after the interior and exterior coatings have been applied and cured and after actuator has been mounted and adjusted.

#### Submit certification that each resilient wedge gate valve and butterfly valve shall be dry film thickness tested and holiday detection tested by the manufacturer prior to the valve being shipped in accordance with AWWA C550.

#### The manufacturer shall provide notarized certification that each resilient wedge gate valve and butterfly valve supplied has successfully completed the tests required by AWWA, ANSI, ASTM and Section 15000.

#### Each valve shall be shipped with end seals and wrapped in shipping plastic.

## VALVE IDENTIFICATION

### The coating for resilient wedge gate valves used for potable water shall be per manufacturer’s standard requirements.

## DELIVERY, STORAGE AND HANDLING

### Valves shall not be stored in contact with bare ground and valves shall not be stacked.

### The port openings shall be covered with plastic, cardboard or wood while in transit and during storage in the field

### These covers shall remain in place until valves are ready to be installed.

### Valves shall be delivered and stored in accordance with AWWA C550.

## manufacturers and models

### Valves shall be selected from the DISTRICT Approved Materials List wherever possible.

# MATERIALS

## GENERAL

### All valves shall be new and of current manufacture. The Contractor shall furnish and install each specific type of valve from a single manufacturer and use it throughout the Work. Valves shall be furnished in the sizes and in accordance with the type of ends as shown on the Plans and as herein specified.

### Valves shall be provided with stem extension if depth of valve nut exceeds 5-feet.

### The manufacturer shall have manufactured tight-closing valves of the valve type intended for use for a period of at least five years.

### All valves shall have a rated minimum working pressure of at least 150 psi and shall be of appropriate pressure class for the pipe connecting to them. All valves shall be certified to meet the test pressure as specified and shall have a rated working pressure that exceeds the full working pressure specified.

### **Connections:** Valves shall have connector ends in compliance with the Standard Design Requirements and as shown on the Plans. Where not indicated, the valves shall have the same type of connection as the pipeline in which valves are to be installed and conform to the Specifications.

### Cast or mold onto the valve body or bonnet the name of the manufacturer and the valve size. Do not attach identification plates to the valve body or bonnet.

### Bolts, Nuts and Washers shall be furnished in accordance with Section 15000.

### Polyethylene Encasement shall be in accordance with Section 15000.

### Painting and Coating: All valves referenced in this section shall be painted and coated, interior and exterior, in accordance with Section 09800.

## BUTTERFLY VALVES

### All butterfly valves shall be of the tight-closing, rubber-seat type, with rubber seats which are recess mounted and securely fastened to the valve body and in full compliance with AWWA C504. Valves shall be bubble tight at rated pressures and shall be satisfactory for applications involving valve operation after long periods of inactivity. Valve discs shall rotate 90 degrees from the full open position to the tight shut position. Valves shall meet the full structural requirements of the applicable classes of AWWA C504.

### Valve bodies shall be constructed of cast-iron ASTM A126, Class B unless otherwise specified on the Plans. Flange drilling shall be in accordance with ANSI B 16.1 standard for cast-iron flanges. Two trunnions for shaft bearings shall be integral with each valve body. Body thickness shall be strictly in accordance with AWWA C504.

### All valve discs shall be constructed high-strength cast iron in accordance with ASTM A48, Class 40. All disc seating edges shall be smooth and polished.

### Shafts of all valves shall be turned, ground, and polished. Valve shafts shall be constructed of 18-8, Type 304 stainless steel.

### Valve seats shall be of a continuous natural rubber or a synthetic rubber compound mounted on the body and a stainless steel seat mounted on the disc. Bonded-in seats must be simultaneously molded-in, vulcanized, and bonded to the body and the seat bond must withstand 75-pound pull under test pressure in accordance with ASTM A276. Valve seats on valves 24-inches and larger shall be field adjustable and replaceable without dismantling operator, disc, or shaft and without removing the valve from the line. Valves employing a complete rubber liner will not be acceptable in any size.

### Each valve shall be provided with one or more thrust bearings in accordance with AWWA C504. Thrust bearings which utilize a ferrous metal bearing surface in direct rubbing contact with an opposing ferrous metal surface will not be acceptable.

### Valves shall be fitted with sleeve-type bearings. Bearings shall be corrosion resistant and self lubricating. Bearing load shall not exceed 2,500 psi.

### The use of a stop or lug cast integrally with or mechanically secured to the body for the purpose of limiting disc travel by means of direct contact or interference with the valve disc in either the open or closed position will not be acceptable.

### Valve operators shall be designed to hold the valve in any intermediate position between fully opened and fully closed without creeping or fluttering.

### For buried service operation, valve operators shall be of the enclosed worm gear type. For non-buried service, operator shall be enclosed worm gear type with handwheel and valve position indicator.

### Valve shall open with a counterclockwise rotation of the operator.

## GATE VALVES AND TAPPING VALVES

### The flanges of valves may be raised or plain faced. Flanges of valves designed for a working pressure of 200 psi or less shall be faced and drilled to a 125-pound American Standard dimension. Flanges of all valves designed for a working pressure of greater than 200 psi shall be faced and drilled to 250-pound American Standard dimensions.

### Each valve body shall be tested under a test pressure equal to twice its design water working pressure, in accordance with AWWA C500.

### All interior parts of valves manufactured of bronze or brass, except valve stems, shall conform to the requirements of ASTM B62. Gate valve stems shall have a minimum tensile strength of 70,000 psi, a yield strength of 40,000 psi, and elongation of at least 15 percent in 2 inches. The stem is to be visibly marked so that it meets this requirement.

### All valves connecting to mains shall be flanged on the main side, unless otherwise specified.

### **Gate Valves:** Gate valves shall conform to AWWA C500. Gate Valves shall be designed for a minimum working water pressure of 150 psi (and appropriate for the pressure class of the pipe connecting to them) and shall be iron bodied, bottom wedging, ABIP double disc with parallel seats, non-rising stem opening to the left, and provided with O-ring stem seal, and a 2-inch square operating nut for buried service and handwheel for above ground service. All interior parts of gate valves, including discs, but not including valve stems, shall be constructed of bronze conforming to the requirements of ASTM B62. After the valves are assembled and tested, the manufacturer's name or symbol, the size of the valve, the year of manufacture, and the working water pressure shall be cast in the bonnet or body of the valve. Gate valves shall be furnished with flanged ends as specified by the Approved Materials list.

### **Tapping Valves and Sleeves:** Tapping valves shall conform to and be tested in accordance with AWWA C500 with the exception of the ends and the seat rings. The valves shall be designed for a minimum working water pressure of 150 psi and shall be iron bodied, bottom wedging, ABIP double-disc with parallel seats, opening to the left, provided with a 2-inch square operating nut, non-rising stem, and O-ring stem seal. The ends shall be flanged. The flange on one end shall have slotted bolt holes to fit all standard tapping machines. Seat rings shall be oversized to permit the use of full-size cutters. The cast-iron tapping sleeves may be provided with mechanical joints, caulking joint, or corey type.

## RESILIENT WEDGE gate VALVES

### All valves shall be new and of current manufacture. Resilient wedge gate valves may be used only for nominal pipe sizes from 3-inches to 12-inches in diameter.

### Valves shall be furnished and installed with the type of ends shown on the Plans and as herein specified.

### Valves shall be manufactured to meet all applicable requirements of the latest edition of AWWA C509. Flange drilling shall be in accordance with ANSI B 16.1 standard for cast iron flanges.

### Valves shall have non-rising stems, opening by turning counter-clockwise. Buried valves shall be provided with 2-inch square operating nut with arrow cast in metal to indicate direction of opening, and above ground valves shall be equipped with a handwheel. Valve stems shall be cast integral with stem collar and furnished of cast, forged, or rolled bronze. Stem nuts shall be independent of the wedge and shall be made of solid bronze. All body nuts and bolts shall be AISI type 316 stainless steel.

### Cast-iron wedge shall have sealing surfaces of the wedge permanently bonded with resilient material to meet ASTM tests for rubber to metal bond ASTM D429. Each valve shall have a smooth unobstructed waterway free from any sediment pockets. Stuffing boxes shall be O-ring seal type with two rings located in stem above thrust collar. Low friction torque reduction thrust bearings shall be located both above and below the stem collar.

### Valves shall have hydrostatic shell test of 400 psi and shutoff test of 200 psi. At the 200 psi shutoff test the valve must be bubble tight - zero leakage will be allowed.

### **Anchors:** Provide anchors on resilient wedge gate valves. Anchor type depends on valve size and working pressure as shown in the Standard Drawings and shall be one of the following installations.

#### Provide steel anchor straps and bolts, or reinforcing steel. Hot dip galvanize steel straps and bolts after fabrication. Completely encase in concrete after placing on valve.

#### Provide reinforced concrete anchor and adapter with thrust collar. Design and sizing of the anchor will be based on the highest pressure the main will be subjected to, such as test or surge.

## plug valves

### **General:** Valves shall be of the non-lubricated eccentric type with resilient plug facings as described below. Valves of 12-inches and smaller shall have a working pressure rating of 175 psi, and valves larger than 12 inches shall have a pressure rating of 150 psi. Each valve shall be given a certified hydrostatic and seat test. Valves shall be full bi-direction, rated to the fully rated working pressure of each sized valve. A certificate of testing to this standard shall be provided by the manufacturer.

### **Body:** The body shall solid one-piece castings constructed from [ASTM A536, Ductile Iron with flanges conforming to ANSI/AWWA C110/A21.10 with ANSI B16.1 Class 125 drilling] [Cast Iron, ASTM A126 Class B for working pressures up to 175 psig (1200 kPA) with ANSI B16.1 Class 125 drilling]

[\*Note to the Engineer: Bracketed design criteria above shall be populated per project requirements.]

### **Plug:** The plug shall be one-piece casting of ASTM A536, Grade 65-45-12 ductile iron. Two piece plug designs are not acceptable. The plug shall provide full bi-directional shutoff capability. The CLOSED position travel stop for the plug shall be externally adjustable, with the valve in the line under pressure. The plug shall have resilient facing material that is suitable for sewage. The plug shall be fully encapsulated with NBR material.

### **Seat:** The seat shall be 1/8-inch thick welded overlay of not less than 95 percent pure nickel. Seat area shall be at least ½-inch wide and raised with the raised surface completely covered with weld to insure that the plug face contacts only the nickel. Screwed or sprayed seats are not acceptable.

### **Stem Seal:** The stem seal shall be of multiple V-Ring (Chevron) type packing, or a self-adjusting Buna-N U-cup design. Manually adjusted packing gland shall be accessible and adjustable without removing the manual or powered operator or bonnet from the valve, while under pressure. O-rings are not acceptable.

### **Bearings:** The bearings shall be replaceable sleeve type, constructed from sintered, oil impregnated ASTM A743, Grade CF8M, type 316 stainless steel. Bearings shall be permanently lubricated. Bronze bearings (bushings) are not acceptable.

### **Grit Excluders:** Shall be in the form of PTFE washers at the upper and lower journals and shall be provided to prevent the entry of grit and foreign solids into the bearing area.

### **End Connections:** The flanges shall be integrally cast with the body, and shall conform to ANSI/AWWA A21.10/C110 and shall conform to drilling and facing of ANSI B16.1 Class 125 flanges.

### **Flow Way:** The flow way shall be rectangular, or round, and shall be able to pass a Girard EPV-3 pig through a properly designed launcher and receiver.

### **Actuator Mounting Adapter:** The actuator mounting adapter shall be sized to withstand the maximum operating torque of the electric valve actuator. The actuator housing, adapter valve housing and connections to valve shall be designed with a minimum safety factor of 5 based on yield strength or a minimum safety factor of 3 based on ultimate strength of the materials used. Mounting adapter design calculations and shop drawings shall be included in the submittal. Mounting bolts shall not use bonnet bolts allowing removal of actuator mounting adapter and/or actuator without taking valve out of service.

### All actuators must be factory mounted and tested prior to shipment by the valve manufacturer.

## check valves

### Swing check valves designed for water, sewage, sludge, and general service shall be of the outside lever and spring or weight type, complying with AWWA C508, and full-opening, and shall be rated for 150 psig, cold water, nonshock. All valve components shall be replaceable without removing the valve body from the line.

### Swing check valves intended for steam, water, oil, or gas in sizes 2½ inches and smaller shall be designed for a steam pressure of 150 psig and a cold water pressure of 300 psig. They shall have threaded ends and caps.

### **Design:** The valve body shall be full flow equal to nominal pipe diameter area at all points through the valve and shall be equipped with a threaded adjustable open stop. The body seat shall be O-ring sealed and field replaceable. The end flanges shall comply with ANSI B16.1 Class 125# and contain integrally case mounting pads. Provide the valve body with a 1 inch drain and vent tap in the flanged bonnet. The drain tap and vent tap shall be fitted with stainless steel plugs.

#### The top access port shall be full size, allowing removal of the disc without removing the valve from the line. The access cover shall be domed in shape to provide flushing action over the disc for operating in lines containing high solids content.

#### The disc shall be of one-piece construction and connected to the shaft with a disc arm and two pivot pins to provide pivot action to allow self-adjusting seating at all pressures. 14” and larger discs shall be convex shape for lift, stabilization and strength. The disc seat shall be resilient with integral type sealing surface for drop tight shut-off at high and low pressures. The resilient seat shall be secured with a Type 316 stainless steel retainer plate and Type 316 stainless steel fasteners for easy replacement.

#### The shaft seals shall consist of V-type packing in a fixed gland with an adjustable follower designed to prevent over compression of the packing and to meet design parameter of the packing manufacturer. Removable, slotted shims shall be provided under the follower flanges to provide for adjustment and prevent over loading of the packing.

#### The cover & Body shall be cast iron ASTM A126 Class B.

### The valve shall be factory equipped with a lever and weight assembly. The lever shall be equipped with three holes for adjusting the bolted weight assembly. When the valve is closed, the lever and weight shall be located 30 degrees below horizontal.

#### When specified, the valve shall be factory equipped with a lever and air cushion assembly mounted between the weight assembly and the valve body. The air cushion assembly shall consist of a clevis mounted tie-rod type closed cylinder with speed control valves.

#### When specified, the valve shall be factory equipped with a lever and spring assembly. The spring shall be mounted to a bracket on the side of the valve body with a bolt assembly to adjust the spring tension.

#### When specified, the lever and weight assembly shall be enclosed within a removable safety guard constructed of perforated metal for visibility.

### [A pre-wired limit switch shall be provided to indicate open/closed position to a remote location. The mechanical type limit switch shall be activated by the external arm and rated for NEMA 4, 6,or 6P and shall have U.L. rated 5 amp, 125 VAC contacts.]

[\*Note to the Engineer: Verify if bracketed requirement above (section 2.06E) are required for project.]

### For requirements pertaining to potable water backflow assemblies, see specifications section 15112, Potable Water Backflow Assemblies.

## ball valves

### **Stainless Steel Ball Valves:** Except as otherwise indicated, ball valves in sizes up to 4 inches shall be provided with lever or handwheel operator. Valve material of construction and trim shall be suitable for the service, on corrosive applications or where the connecting pipes are stainless steel, the valve shall be 316 stainless steel construction with Teflon seat. Valve actuators shall comply with the requirements of Section 15101.

#### **Body:** Ball valves up to 1½ inches in size shall have 316 stainless steel, bronze or forged brass 2 or 3 piece bodies with ends threaded and shall be designed for a pressure rating of no less than 300 psi. Valves 2 to 4 inches in size shall have 316 stainless steel, bronze forged brass 2 or 3 piece bodies with flanged ends and shall be designed for a pressure rating of 150 psi.

#### **Balls:** The balls shall be fabricated of solid 316 stainless steel, brass or chrome plated bronze, to match valve body material, with full openings.

#### **Stems:** The valve stems shall be of the blow-out proof design, and fabricated of 316 stainless steel, brass or bronze, same as valve body material.

#### **Seals:** Viton or Teflon.

#### **Seats:** The valve seats shall be of Teflon or Buna-N.

#### **Fasteners:** All fasteners shall be 316 stainless steel or bronze, same as valve body material.

### **Plastic Ball Valves:** Plastic ball valves designed for use with corrosive fluids shall be fabricated of polyvinyl chloride (PVC), chlorinated polyvinyl chloride (CPVC), or polyvinylidene fluoride (PVDF), suitable for use on the service indicated. Valves shall have manual operators except as otherwise indicated in the Drawings. Valve actuators shall comply with the requirements of Section 15101.

#### **Body:** Plastic ball valves ½” to 2 ½” shall have union ends, and 3” to 8” shall have flanged ends conforming to ANSI/ASME B16.5. Valve shall be class 150# rated.

#### **Ball:** The ball shall have full size port.

#### **Seat:** Teflon.

#### **Seal:** Viton union O-ring body seals, and stem seals.

#### For sodium hypochlorite applications, vented ball valves shall be provided.

#### **Fasteners:** All fasteners shall be 316 stainless steel.

## AIR RELEASE AND VACUUM RELIEF VALVES

### All assemblies shall be as shown on the DISTRICT Standard Drawings or as detailed on the plans. Valves and fittings shall equal or exceed the pressure rating of the pipe to which they are attached. The valve shall be a combination type and shall be a minimum of 1-inch in size. Air release and vacuum relief valves shall be selected from the Approved Materials List.

### **Combination Air Valves for Water:**

#### The valve shall have NSF 61 certification for potable water applications.

#### The valve shall have a single float design and shall be designed to ensure a drip tight sealing at system operation pressure as low as 3 psig.

#### The float shall operate in concert with a rolling seal design that creates the closure of the valve preventing water from escaping the valve at system operation under pressure of 3 psig and higher, while being able to automatically adjust its position to allow for controlled intermittent air release. Valves that do not incorporate the rolling seal solution shall not be considered equal or acceptable. Valve designs that do not intentionally allow for intermittent release of air during operation shall not be considered equal or acceptable.

#### Air flow alone will not prematurely shut the valve.

#### The valve shall have a male NPT connection inlet and size as indicated on the drawings. In addition the valve shall have a 1-1/2 inch NPT connection for attaching a vent pipe.

#### The sealing pressure shall be 3 psi and the working pressure shall be 250 psi, while the maximum working temperature shall be 140 degrees F, with maximum intermittent temperatures of up to 194 degrees F. Air valves which are not rated for minimum sealing pressure of 3 psi and maximum working pressure of 250 psi shall not be considered equal or acceptable.

#### The reinforced nylon valve weight shall be 10 lb. or less. Valves in excess of 10 lb. shall not be considered equal or acceptable.

#### The valve body shall be constructed of NSF certified reinforced nylon. Valves constructed of cast iron or ductile iron shall not be considered equal or acceptable. Valves that do not carry and maintain the applicable NSF certification(s) shall not be considered equal or acceptable.

#### The float shall be constructed of polypropylene.

#### The rolling seal shall be constructed of EPDM rubber and provide smooth positive opening, closing, and leak free sealing over the range of pressures 3 psi and higher, that the system may experience, including static system pressure. For lower minimum sealing pressures, other rubber materials are available.

#### All metal hardware shall be 316 stainless steel. All O-rings shall be of NBR 70 with pressure ratings equivalent to the overall working pressure of the valve.

#### All valves supplied under this section shall be hydraulically tested to a minimum pressure of 360 psi. Valves which are not tested to a minimum pressure of 360 psi shall not be considered equal or acceptable.

### **Combination Air Valves for Wastewater:**

#### The valve body shall be conical in shape to maintain maximum air gap between the wastewater and the sealing mechanism. Wastewater shall not come in contact with the sealing mechanism at any time during normal operation at the valve’s working pressure. The valve shall have a double float design with the upper float enclosed in the upper section of the valve. The lower float shall be located in the main body of the valve. The valve shall be designed to ensure a drip tight sealing at operating pressure as low as 1 psi.

#### The float shall operate in concert with a rolling seal design that creates the closure of the valve preventing water from escaping the valve at system operation under pressure of 1 psig and higher, while being able to automatically adjust its position to allow for controlled intermittent air release. Valves that do not incorporate the rolling seal solution shall not be considered equal or acceptable. Valve designs that do not intentionally allow for intermittent release of air during operation shall not be considered equal or acceptable.

#### A spring cushioned joint between the sealing mechanism and float/stainless steel rod assembly shall perform without jamming or allowing air escape under vibrations or float bouncing related to the turbulence from pump start and stop or flow fluctuations. High velocity air will not shut the valve.

#### The valve shall have an 11/2 inch male NPT camlock connection at its outlet for connection of a vent pipe or for use in valve flushing or cleaning.

#### The valve shall have two 1/4 inch ball valves, one connected to the lower valve body and one connected to the upper valve body to relieve internal pressure.

#### The valve shall have a funnel shaped lower body to automatically drain wastewater and other debris from the valve.

#### The working pressure shall range from .725 to 150 psi and the valve shall be tested to 250 psi. Air valves which are not rated for minimum sealing pressure of 3 psi and maximum working pressure of 150 psi shall not be considered equal or acceptable. The maximum working temperature shall be 140 degrees F with maximum intermittent temperatures of up to 194 degrees F.

#### The valves shall be manufactured with flanged ends to meet requested flange standards.

#### Valves in 2 in and 3 in sizes shall also be available with a threaded NPT connection.

#### The body and lower flange shall be constructed of [reinforced nylon] (standard) or [316 stainless steel] optional.

#### The upper float shall be made of solid polypropylene and have a rolling seal mechanism constructed of nylon, EPDM and stainless steel components.

#### The lower float shall be constructed of polypropylene and shall have a minimum clearance of 1” from each side wall to prevent blockage of the float.

#### All metal hardware shall be 316 stainless steel. All O-rings shall be of BUNA-N with pressure ratings equivalent to the overall working pressure of the valve.

#### All valves supplied under this section shall be hydraulically tested to a minimum pressure of 250 psi. Valves which are not tested to a minimum pressure of 250 psi shall not be considered equal or acceptable.

## pressure regulating valves

### **Water Pressure Control Valves:**

#### Water pressure control valves shall be globe type, ductile iron ASTM A536 body and ANSI/ASME B16.42 Class 150/300# end flanges, bronze ASTM B62 trim including pilot control, copper and bronze pilot tubing and fittings, Buna N rubber disc, nylon-reinforced Buna N rubber diaphragm, and type 316 stainless pilot trim, steel stem, nut, and spring. The valves shall be set to relief instantaneous over pressurization in manifold and to maintain a minimum pressure for the system setpoint. The pressure control valve shall open when the system demand falls below minimum pump operating flow as recommended by the pump manufacturer. The exact setting will be determined after approval of the pumping units. All fasteners shall be 316 stainless steel.

### **Pressure Relief Valves:**

#### The pressure relief valve shall open when the inlet pressure exceeds the set maximum pressure level. It shall maintain that level and gradually close as the inlet pressure drops below the maximum pressure. The valve shall be a hydraulically operated, adjustable, pilot controlled, diaphragm or piston type globe valve unless otherwise indicated to be angle type valve. All necessary repairs shall be possible without removing the valve from the pipeline.

#### **Valve Body:** The valve body shall be of cast iron to ASTM A48 or ASTM A126, with ANSI/ASME B16.1 Class 125# flanged ends, or the body shall be of ductile iron to ASTM A536, with ANSI/ASME B16.42 Class 150# flanged ends. The valve cover shall be flanged and shall be the same material as the body. Valves shall be rated for 175 psig.

#### **Valve Trim:** The valve stems with position indication, springs, body seat rings, and all bolts, nuts, and washers shall be of Type 316 stainless steel. The valve stems shall have top and bottom guides. All rubber parts shall be of Buna-N. The diaphragms shall be of Nylon-reinforced Buna-N, supported firmly between body and valve cover. The valve pistons and piston liners shall be bronze to ASTM B62, containing no more than 5 percent zinc or 5 percent aluminum.

#### **Valve Controls:** The valve shall be provided with a complete, externally mounted control system, including speed control needle valves, strainers, check valve, isolation valves, and all necessary copper or stainless steel connecting tubing and fittings. The controls shall be capable of achieving all the flow and speed adjustment indicated.

#### All fasteners shall be 316 stainless steel.

## DIAPHRAGM ACTUATED CONTROL VALVES

### This section includes materials and installation of diaphragm actuated control valves of the types indicated on the Plans.

### Submit manufacturer's recommended maximum operating pressure and maximum recommended flow.

### Valves shall be hydraulically actuated diaphragm type. The body shall contain a removable seat insert. A resilient rubber disc shall form a drip tight seal with the valve seat when pressure is applied above the diaphragm. The diaphragm assembly shall form a sealed chamber in the upper portion of the valve, separating operating pressure from line pressure. In the event of valve failure, the valves shall automatically close or shall remain in the closed position.

### The pilot control system shall include a fixed orifice, and all major components of this system shall be manufactured by the same company that manufactures the main valve. Elastomers shall be Buna N, and the main valve diaphragm shall be vulcanized at the stem hole to ensure against wicking of the product within the diaphragm. The diaphragm shall not be used as a seating surface. Guides shall be provided at both ends of the stem. A bearing in the valve cover and an integral bearing in the valve seat shall be provided. Repairs and modification other than the replacement of the main valve body shall be possible without removing the main valve from the line.

### Materials of construction for Class 125 and Class 300 valves larger than 1 inch in size shall be as follows

| **Item** | **Material** |
| --- | --- |
| Main valve body and cover | Ductile iron, ASTM A-536 |
| Main valve trim and seat | Type 303 stainless steel, ASTM A276, or A351 |
| Pilot control system | Cast bronze, ASTM B62, with Type 303 stainless‑steel trim |
| Piping and tubing | Copper (ASTM B75 and B88) and brass (ASTM B43) |

### Valves 2 inches and smaller shall have threaded ends. Valves larger than 2 inches shall have flanged ends.

### Flanges for cast iron valves shall be cast iron, ASTM A 48, Class 30. Class 250 flanges shall conform to ANSI B16.1, Class 250. Flanges shall be flat face. Threaded ends shall comply with ANSI B2.1.

### Interior surfaces of the valve shall be coated at the place of manufacture. Surfaces shall be sandblasted in accordance with SSPC SP 5. Two coats of epoxy resin (Keysite 740, Gilpon, or approved equal) shall be applied to a minimum dry film thickness of 12 mils (total). The paint manufacturer's application recommendations shall be followed, including minimum and maximum drying time between the required two coats. All contaminants adjacent to the seats shall be removed in order to obtain a bond. Seating areas and bronze or stainless steel pieces shall not be coated.

### Boltholes of flanged valves shall straddle the horizontal and vertical centerlines of the pipe run to which the valves are attached. Flanges shall be cleaned by wire brushing before installing flanged valves. Flange bolts and nuts shall be cleaned by wire brushing, threads lubricated with oil and graphite, and nuts tightened uniformly and progressively. If flanges leak under pressure testing, the nuts and bolts shall be loosened or removed, the gasket reseated or replaced, bolts and nuts reinstalled or retightened and the joints retested. Joints shall be watertight.

### Threaded joints shall be cleaned by wire brushing or swabbing. Teflon joint compound or Teflon tape shall be applied to pipe threads before installing threaded valves. Joints shall be watertight.

### Valves shall be tested at the same time that the connecting pipelines are pressure tested and in accordance with Section 15044, Hydrostatic Testing of Pressure Pipelines. Valves, operators, or control and instrumentation systems whose pressure rating is less than the test pressure shall be protected or isolated during pressure testing.

### **Valves 2-Inches and Larger:** Specific requirements including appurtenances, pressure ranges and initial pressure settings for the valve are described on the Plans. The type of diaphragm valve along with the model number will also be listed.

### **Solenoid Valves, 1-Inches and Smaller:** Solenoid valves of sizes 1/4 inch through 1 inches for water service shall have forged brass (Alloy C 23000) or bronze (ASTM B 62) bodies with Teflon main seats. Internal plunger, core tube, plunger spring, and cage assembly shall be stainless steel (Types 302, 304, or 305). Unless noted otherwise, solenoid enclosures shall be NEMA Type IV. Valve actuators shall be 120 volts AC. Seals shall be Teflon. Valves shall be ASCO Redhat Model 8210 or 8211, or approved equal.

## MISCELLANEOUS VALVES

### **Corporation Stops:** Corporation stops shall be manufactured of bronze conforming to ASTM B62. The inlet fitting shall be a male iron pipe thread when used with a saddle and the outlet connection shall be a compression type unless otherwise specified.

### **Hose Bibbs and Valves:** Hose bibbs shall be furnished and installed in the locations shown on the Plans and shall be of the sizes required. They shall be brass hose valves, Crane 58 or approved equal. Hose valves shall be Crane 117 or approved equal, with National Standard threads, cap, and chain.

### **Sampling Valves:** Sampling valves shall be cast iron body with stainless steel piston that extends to the inner surface of the vessel or pipe. The valve shall be sealed by two compressible, replaceable Teflon rings, one above the discharge port and one below the discharge port. All fasteners shall be 316 stainless steel.

### **Mud Valves (Plug Drain Valves):** The Mud Valve shall be of the heavy duty flanged type designed to provide a positive seal under both seating and unseating head conditions, resilient to bronze seating for bubble tight seal. The valves shall be rising stem style. Frame, plug and yoke shall be fusion bonded epoxy coated cast iron ASTM A126 Class B, valve operating stem shall be 316 stainless steel. The seat ring shall be bronze ASTM B62, with an accurately machined tapered seating face. The plug seat shall be a seamless molded, tapered resilient ring of EPDM, designed to accurately mate with the seat ring for a positive seal. All fasteners shall be 316 stainless steel.

#### Flange drilling on frame shall be suitable for mounting to flange per ASA-B-16.1 (125 lbs. drilling). Gate shall be operated with 316 stainless steel stem extension to the height required. Stem extension, 316 stainless steel wall bracket stem guides and floor stand shall be furnished by the mud valve manufacturer to make a complete and operable unit. Stem guides shall be maximum span such that the L/r ratio of the unsupported part of the stem shall not exceed 100.

#### Stem extension shall be secure to the valve stem by a 5/16” through bolt, a set screw or a pin roll shall not be acceptable.

### **Hose Bib and Hose Valves:** Hose bibbs (HB) shall be 1 inch in diameter unless otherwise indicated for all connections using secondary effluent and 3/4 inch in diameter for all connections using potable water, and shall consist of a two or three piece brass ball valve (BV2) in compliance with Section 15106. The valve shall be mounted so that the hose nipple is in the horizontal or 45 degrees slanting downward position. All hose bibbs shall be furnished with an isolation ball valve (BV2) installed upstream of hose bibb, All HBs on reclaimed water shall be color coded red and shall have a warning sign prohibiting drinking.

#### Valves and hose connections called out on the Drawings to be quick disconnects shall consist of brass twist claw coupling. All hose bibbs connected to potable water supply shall be equipped with a vacuum breaker.

## Neck Extension & Floor Stand Assemblies

### Neck valve (where specified on the drawings) and shaft extension shall be provided for buried and submerged valves, and be complete with carbon steel, coated in compliance with Section 09800, for buried applications and 316 stainless steel for submerged applications schedule 40(S) pipe (where applicable) and/or shaft extension, pipe/shaft extension guides for adequate supporting. Valve actuator shall be installed a top of the neck extension, typical 3 feet above floor.

#### **Floor Stands:** Shall be provided for all buried and submerged valves and gates, unless otherwise specified on the drawings, and be complete with extension stems and stem guides as necessary to provide support on no more than 5 feet on centers, and shall be of approved design for the given conditions. The extension stem shall be carbon steel, coated in compliance with Section 09800 for buried applications and 316 stainless steel for submerged applications. For manual operation, the stand shall incorporate a handwheel operator with locking ratchet and indicator for direct ungeared, or may incorporate a worm gear and crank operator, or equal. For motor-operated, the floor stand shall be designed for mounting the motor operator, the stem and guide shall be as required above for manual operation.

##### Floor stands shall be heavy-duty ductile-iron, rising or non-rising, indicating/non- indicating pedestal type, designed specifically for the intended application. Handwheel shall have arrow cast in, as applicable, and the word “open” indicating direction for valve opening shall be incorporated. The stem guides shall consist of a 316 stainless steel to a cast or fabricated 316 stainless steel bracket. Each guide shall be adjustable in two directions at right angles to each other in a plane perpendicular to the stem.

#### Neck extension and floor stand shall be furnished by the valve Manufacturer and supplied with the valve. All fasteners shall be 316 stainless steel.

## valve boxes

### Provide a valve box for each buried valve consisting of a frame, lid, and one piece extension pipe to the valve body. Construct frame and lid of cast iron and design for traffic loading. Castings shall be smooth, clean, and free from blisters, blowholes, and shrinkage. Machine bearing surfaces of frame and lid to provide a close fit without rocking.

### **Buried Valves:** Where so indicated, buried valves shall be in valve boxes with covers of ample size to allow operation of the valve operators. Valve boxes shall be in accordance with the Approved Materials List. Covers of valve boxes shall be permanently labeled in accordance with the Design Standards. Floor Boxes shall be in accordance with the Design Standards.

## emergency shower and eyewash

### Combination shower and eye/face wash shall include a stainless steel 11" round bowl, an eye/face wash head shall feature inverted directional laminar flow which achieves zero vertical velocity supplied by an integral flow control. Unit shall also include the hydrodynamic designed ABS plastic showerhead with flow control, chrome-plated brass stay-open ball valve equipped with stainless steel ball and stem, and chrome-plated brass in-line 50 x 50 mesh water strainer. Unit shall also include Schedule 40 hot-dipped galvanized steel pipe and fittings, powder-coated cast-iron 9" diameter floor flange, self-adhesive high visibility safety green and bright yellow stripes, universal sign, and 1-1/4" IPS supply. All fasteners shall be 316 stainless steel.

### Emergency eyewash facilities and deluge showers shall be in unobstructed and accessible locations that require no more than 10 seconds for the injured person to reach.

### Combination emergency eyewash and shower shall be CSA certified to meet the ANSI Z358.1 Standard.

### **Alarm:** Model 9001, 120 VAC emergency alarm and light system. Buzzer and flashing light are activated by a double pole, double throw flow switch.

### **Shower Test Kit:** Model 9010 shower test kit 9 (one per project).

### **Universal Sign:** Model 9020 green and yellow ABS plastic 3-sided high visibility sign.

## MANUAL OPERATORS

### **General:** Unless otherwise indicated, all valves and gates shall be furnished with manual operators. Valves in sizes up to and including 3.5-inches shall have direct acting lever or handwheel operators of the manufacturer's best standard design. Larger valves and gates shall have gear-assisted manual operators, with a maximum operating pull of 60 pounds on the operating nut. All valves 4 to 24-inches in diameter may have traveling-nut operators, worm-gear operators, spur- or bevel- gear operators, as indicated, or if not indicated, as appropriate for each valve. All actuators shall have a built in 2” operating nut as part of the valve assembly.

### **Manual Worm-Gear Operator:** The operator shall consist of a single or double reduction gear unit contained in a weatherproof cast-iron or steel body with cover and minimum 12-inch diameter handwheel compatible with a 2-inch nut, suitable for buried service where indicated. The operator shall be capable of 90-degree rotation and shall be equipped with travel stops capable of limiting the valve opening and closing. The operator shall consist of spur or helical gears and worm-gearing. The spur or helical gears shall be of hardened alloy steel and the worm-gear shall be alloy bronze. The worm-gear shaft and the handwheel shaft shall be of 17-4 PH or similar stainless steel. All gearing shall be accurately cut with hobbing machines. Ball or roller bearings shall be used throughout. Operator output gear changes shall be mechanically possible by simply changing the exposed or helical gearset ratio without further disassembly of the operator. All gearing shall be designed for a 100% overload.

# EXECUTION

## TESTING

### Hydrostatic testing of valves shall be per specification section 15044, Hydrostatic Testing and Flushing of Pressure Pipelines.

### Operate valves through 10 full cycles of opening and closing. Valves shall operate from full open to full close without sticking or binding. If valves stick or bind, repair or replace the valve and repeat the tests.

## MARKING

### The DISTRICT Representative shall visually check each valve in the field for proper markings prior to installation. Any valve not displaying the proper markings shall be immediately rejected and the contractor instructed to remove it from the site.

## INSTALLATION OF VALVES

### Flanges shall be cleaned by wire brushing before installing flanged valves. Flange bolts and nuts shall be cleaned by wire brushing, and threads lubricated with oil and graphite. Nuts shall be tightened uniformly and progressively. If flanges leak under pressure testing, nuts and bolts shall be loosened or removed, the gasket reseated or replaced, the bolts and nuts reinstalled or retightened, and joints retested. Joints shall be watertight.

### Threaded joints shall be cleaned by wire brushing or swabbing. Teflon joint compound or Teflon tape shall be applied to pipe threads before installing threaded valves. Joints shall be watertight.

**END OF SECTION**