

SECTION 331200 – WATER UTILITY DISTRIBUTION EQUIPMENT

Scope:

Contractor shall provide and install all valves as shown on the Drawings or specified herein. Valves shall be of same manufacturer throughout where possible. Manufacturer's name and pressure rating of the valve shall be clearly marked on the valve body. Valves shall comply with ANSI/NSF 61 as related to the Safe Drinking Water Additives Program. Any brass part of the fitting or valve in contact with potable water shall be made of a "No-Lead Brass", defined for this specification as UNS Copper Alloy No. C89520 Or C89833 in accordance with the chemical and mechanical requirements of ASTM B584 and AWWA C-800. This "No-Lead Brass" alloy shall not contain more than nine one hundredths of one percent (0.09% or less) total lead content by weight.

Submittals:

- A. Drawings:** Submit complete shop drawings of all valves and appurtenances to the Owner for approval. Clearly indicate make, model, location, type, size and pressure ratings. Include operating and maintenance data for all valves.
- B. Affidavit of Compliance:** The valve manufacturer shall include as a part of the submittal package, a written affidavit of compliance with ANSI/NSF 61 and also include specific reference to the authorized certifying agency along with the approval identification detail.

Products and Implementation:

- A. Resilient Seated Gate Valves:** The Contractor shall install resilient seated gate valves as indicated on the Drawings, or specified by the Owner. Resilient seated gate valves size 4-inch through 24-inch shall conform, in general, with AWWA C 509 as amended to date, shall be equipped with O-ring packing and shall be as follows:
 - (1) **General Construction:** Resilient seated gate valves shall be of the highest quality and finish, and shall open and close freely and easily. With the valve open, an unobstructed waterway shall be afforded, the diameter which shall not be less than the full nominal diameter of the valve. If guides or guide lugs are used, the design shall be such that corrosion in the guide area does not affect sealing. Resilient seats may be applied to the body or gate and shall seat against a corrosion-resistant surface. The surface may be either metallic or non-metallic. Resilient seats shall be bonded or mechanically attached to either the gate or valve body. The mating surface of the resilient seat shall be machined to a smooth, even finish. All stems shall be forged bronze stems.
 - (2) **Working Pressure:** Water working pressure for valves shall be 250 psi.
 - (3) **Operation:** All valves shall open left. Valves shall be operated by a nut. Operating nuts shall conform to the present standard of the Owner, and shall have an arrow cast on them, indicating the direction for opening the valve.
 - (4) **Marking:** Each valve shall be plainly marked with the manufacturer's name or particular mark, the year of manufacture, the size of the valve, and designation indicating working pressure, all cast on the bonnet or body.
 - (5) **Spacing:** In-line valve spacing will not exceed 2,400 linear feet for water mains being used for distribution that are less than or equal to 24-inch in size, unless otherwise approved by the Owner. For transmission mains, valve spacing will be determined in the design of the project.

- (6) Vertical Installation: Valves shall be for vertical installation only, with operating nut and N.R.S.
- (7) Testing: All gate valves shall be tested in accordance with AWWA standards.
- (8) Jointing: All gate valves shall be furnished with mechanical joints and necessary bolts, glands and gaskets except valves in hydrant runs, and these shall be flanged and mechanical joint. Valves for use on plastic pipelines may be furnished with Aquagrip connections if approved by the Owner.
- (9) Manufacturer: Valves shall be furnished as manufactured by Mueller, Clow, or equal.

B. Butterfly Valves: The Contractor shall install the butterfly valves complete with valve operators and accessories as shown on the Drawings or specified on water transmission mains larger than 24-inch in size. Valves and accessories shall be in accordance with the applicable ASTM and/or ANSI/AWWA Specifications, as amended to date, and shall be manufactured by Henry Pratt, Dezurick or approved equal.

- (1) General: The butterfly valves shall be rubber seated and shall fully comply with AWWA Specifications C 504. The seat shall be natural rubber or synthetic rubber compound which shall be mechanically retained or bonded to the valve body or mechanically retained on the valve disc. All butterfly valves and operators shall be designed for 250 psig operating pressure. 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° from full open position to the tight shut position. A certification attesting to operation and leak test shall be furnished with the valves upon shipment. Wafer type valves are not acceptable.
- (2) Valve Body: The valve body shall be of cast iron conforming to ASTM A 126, Class B, with flanged ends and drilling in accordance with ANSI B 17.1, Class 125 or with manufacturer's standard mechanical joints conforming to ANSI 21.11, with necessary nuts, bolts, glands, and gaskets. Drilled and tapped holes are permitted where required at the body bearing trunnions. The body shall be designed to withstand the internal forces acting directly and the forces resulting from the thrust of the operating mechanism. Trunnion bosses shall be located at diametrically opposite points in the valve body which shall be accurately bored to accept permanently self-lubricated shaft bearing bushings. The trunnion box at the outer trunnion shall include a factory set two-way bronze thrust bearing and a cast iron thrust bearing cover.
- (3) Valve Shafts: Valve shafts may consist of a one-piece unit or may be the "stub-shaft" type. Valve shafts shall be turned, ground, and polished. Valve shafts shall be constructed of 18-8 Type 304 Stainless Steel (AWWA A 296). Shaft diameters shall meet requirements established by AWWA C 504, or service required. Valve shafts shall be securely attached to the valve disc by means of taper pins. Taper pins shall be mechanically secured.
- (4) Valve Disc: Valve discs 20-inches and smaller shall be constructed of alloy cast iron ASTM A 436, Type 1 (Ni-Resist), ductile iron ASTM A 536, Class 65-45-12 or cast iron ASTM A 41. Valve discs 24-inches and larger shall be constructed of ductile iron ASTM A 536, Class 65-45-12 or cast iron ASTM A 48 with 18-8, Type 304 stainless steel seating edges. The valve discs shall be designed to withstand bending and bearing loads resulting from the pressure load and operating forces. The faces to the discs shall be smooth and free of external projections. All retaining or pinning hardware in contact with liquids shall be monel or 316 stainless steel.

- (5) Valve Seats: Valve seats shall be natural rubber or Buna “N” rubber. Rubber seats in the valve body shall be retained by 18-8 stainless steel mechanical means, or bonded, without retaining hardware in the flow stream. Rubber seats attached to the disc shall be retained with an 18-8 stainless steel clamp ring and stainless steel bolting. Retaining ring cap screws shall pass through the rubber seat and be self-locking. Mating seat surfaces for resilient seats shall be 18-8 stainless steel. Seats should be a full 360° without interruption. Valve seats shall be designed to permit removal and replacement in the field for valves 30-inches in diameter and larger.
- (6) Valve Bearings: The valve shall be fitted with sleeve type bearings. Bearings shall be corrosion resistant and self-lubricating. Bearing load shall not exceed 1/5 of the compressive strength of the bearing or shaft material. Bearing material must have coefficient of friction no greater than 0.10 which must be maintained regardless of wear.
- (7) Testing: Hydrostatic and leakage tests shall be conducted in strict accordance with AWWA C 504, Section 5, except that the leakage test will be performed after the operator has been mounted on the valve.
- (8) Affidavit of Compliance: The manufacturer shall provide an “Affidavit of Compliance” that the valve furnished complies with the applicable provisions of AWWA C 504.
- (9) Painting: All surfaces of the valve shall be clean, dry and free from grease before painting. The interior and exterior valve surfaces except for disc, seating and finished portions shall receive two coats of asphalt varnish in accordance with Federal Specification TT-V-51C.
- (10) Manufacture: Valves shall be furnished as manufactured by Henry Pratt, or equal.
- (11) Spacing: In-line valve spacing for transmission water mains will be determined for as part of the design for each new transmission main.
- (12) Valve Operators: Valve operators shall conform to AWWA Specification C 504, as amended to date, and shall be equipped with mechanical stop-limiting devices to prevent over travel of the disc in the open and closed positions.
 - a. Manual operators, valve sizes 16” and larger, shall be of the totally enclosed oil bath lubricating gear reducing type. Primary gearing shall consist of a self-locking worm gear constructed of high tensile bronze and a worm constructed of hardened alloy steel with the thread ground and polished. Valve sizes smaller than 16” may have the slotted lever or link-lever design.
 - b. The operators shall be designed to hold the valve in any intermediate position between fully opened and fully closed without creeping or fluttering.
 - c. Extension stems: Valves shall have extension stems, chain wheels, or floor stands or extension bonnets with handwheels as shown. Extension stems shall extend from the valves to the connections with the operators.
 - d. Hand wheels for operators shall be mounted in a vertical plane with horizontal shafts and equipped with locking devices and position indicators.

- e. Operators: Operators for buried valves shall have extension stems, 2 inch square operating nuts and valve boxes.
- C. Valve Boxes:** Valve boxes shall be two-piece, with covers. The covers shall have the word "WATER" inscribed on the top. The bottom part of the valve box may be 6-inch cast iron pipe. The top part shall be of the sliding type sized to fit over the 6-inch pipe and be 36 inches in length. Valve boxes and covers shall be constructed of cast iron. The 6-inch pipe shall extend not less than 18 inches into the sliding top.
- (1) Extension stems shall be furnished for all valves so as to bring the 2 inch square AWWA operating nut of such valve within six inches of the top of the valve box. Operating nuts shall have an arrow cast on the top indicating the direction for opening the valve. Provide ground level position indicator. The Contractor shall also provide concrete valve box markers which shall extend a minimum of 12 inches above finished grade where indicated on the Drawings.
 - (2) Tools: One socket wrench of proper length for valve operation shall be provided by the Contractor.
- D. Tapping Sleeve and Tapping Valve:** Tapping sleeves for all taps on Ductile Iron or Cast Iron Mains shall meet AWWA C223-02 and be split solid sleeve, mechanical joint type with flanged valve connections furnished by Mueller model H615. Tapping gate valves with tapping sleeves shall be furnished in accordance with the specifications for gate valves. Hub connection of valve furnished with tapping sleeve shall be mechanical joint. The Contractor shall furnish the valve tapping machine and all other equipment required for installation of the tapping sleeve and valve. Tapping sleeves and valves shall be installed under the supervision of skilled mechanics and tested under the inspection of the Owner's representative. HDPE mains shall not be hot tapped.
- E. Hydrants:** The Contractor shall install fire hydrants as indicated on the Drawings, and as specified herein. Hydrants will be installed at minimum distances required by the fire department with jurisdiction over the particular area where the new water infrastructure is being installed. Where possible, hydrants will be used for flushing on 6-inch lines for all dead ends. All fire hydrants shall meet the requirements of AWWA C 502, and the standards of the Owner. Fire hydrants furnished shall be Mueller "Super Centurion 250", or approved equal. Any variances from the Mueller "Super Centurion 250" shall be approved in writing by the Owner prior to bidding. All fire hydrants shall be installed with Tamper Proof kits.
- (1) Cover: Hydrants shall have a minimum of four feet depth of cover over the leader pipe.
 - (2) Extension Stems: If the hydrant is located so as to require additional cover, the Contractor shall install the required extension sections.
 - (3) Valve Opening: Valve openings shall be not less than four and one-half inches (4-1/2"). Hydrants shall open left.
 - (4) Hose and Pumper Connection: Hose nozzles shall be two (2) in number and two and one-half inches (2-1/2") in size. One (1) Pumper connection shall be provided.
 - (5) Threads: Threads for hose nozzles shall be "National Standard".
 - (6) Operating Nut: Operating nut shall be square, flat surfaces and be approximately one inch (1") across.

- (7) Shoe Connection: Shoe connection shall be six inches (6"), furnished with mechanical joint for connection to spigot of mechanical joint hydrant lead.
- (8) General Construction: Hydrants shall be compressive type, self-coiling, non-freezing, and provided with a safety flange and coupling.
- (9) The operating unit shall be totally sealed away from the hydrant barrel and all working parts shall be continuously and automatically lubricated from a large oil reservoir and packing gland. Drain mechanism shall be simple, positive, and automatic in operation.
- (10) The safety flange on barrel and safety coupling on valve stem shall operate to prevent damage to barrel and stem in case of a traffic accident. The force of the impact shall break the flange and spread the coupling. The construction of the flange and coupling shall be such as to permit rapid and inexpensive replacement. They shall be located above the ground line. Hydrant shall be so constructed as to permit facing nozzles in any direction at any time without digging up the hydrant or cutting off the water. This shall be accomplished by removing safety flange bolts and revolving the head.
- (11) All working parts of the hydrant, including the seat ring shall be removable through the top without digging. Seat rings shall be so shaped and arranged as to be readily removable. Seat rings shall be bronze and shall screw into a bronze bushing in the shoe. An O-ring seal between the shoe and seat ring shall provide a watertight non-wearing, permanent seat between shoe and seat ring. This seal shall always come out with main valve removal. Hose connections shall be either threaded and locked-in-place or breech-locked into the hydrant.

F. Pressure Reducing & Sustaining Valve: The Contractor shall install these where shown on the plans or as directed by the Owner. These valves will be installed where high-pressure systems connect to the lower pressure systems, in particular where the additional pressure would cause line pressure to exceed the rated working pressure of the pipeline material. Valves shall be manufactured by Cla-Val for system configuration management.

- (1) The valves shall be installed in 5'-0" diameter reinforced concrete manholes unless otherwise specified by the Owner. The Unit Price bid for this work should include the manhole housing structure, etc.
- (2) The pressure reducing and sustaining valve shall maintain any desired downstream-delivery pressure for which Reducing Pilot Valve is adjusted provided the upstream head does not drop below a determined head. In event upstream head drops to a minimum pressure for which Sustaining Pilot Valve is adjusted, it will cause the main valve to close to sustain the minimum pressure in the higher pressure system, and not serve the lower pressure system, until the head in the higher pressure system comes back to or more than normal.
- (3) The main valve shall operate on the differential piston principle such that the area on the underside of the piston is no less than the pipe area, and the area on the upper surface of the piston is of a greater area than the underside of the piston.
- (4) The valve piston shall be guided on its outside diameter by long stroke stationary vee ports which shall be downstream of the seating surface to minimize the consequences of throttling. Throttling shall be done by the valve vee ports and not the valve seating surfaces.

- (5) The valve shall be capable of operating in any position and shall incorporate only one flanged cover at the valve top from which all internal parts shall be accessible. There shall be no stems, stem guides, or spokes within the waterway. There shall be no springs to assist the valve operation.
- (6) The valve body shall be of cast iron ASTM A-126 with flanges conforming to the latest ANSI Standards. The valve shall be extra heavy construction throughout. The valve interior trim shall be bronze B-62 as well as the main valve operation.
- (7) The valve seals shall be easily renewable while no diaphragm shall be permitted within the main valve body.
- (8) All controls and piping shall be of non-corrosive construction.
- (9) A visual valve position indicator shall be provided for observing the valve piston position at any time.
- (10) The valve shall be completely piped ready for installation. The valve shall be as manufactured by GA Industries, Cla-Val or equal and shall be provided in the diameters as shown on the plans or as requested by the Owner.

G. Air release & Vacuum Break Valve: Air release and vacuum break valves shall be installed where shown on the Drawings and as specified herein. Air release and vacuum break combination valves shall meet the requirements of AWWA C512-99 as amended.

- (1) The air release and vacuum break valve shall be of the compact single chamber design with solid cylindrical HDPE control floats housed in a tubular stainless steel body with epoxy powder coated cast iron or steel ends secured by means of stainless steel tie rods.
- (2) The unit price for air release and vacuum break combination valves shall include concrete vaults as shown in the Drawings and specified herein.
- (3) The valve shall have an integral anti-shock orifice mechanism which shall operate automatically to limit transient pressure rise or shock induced by closure to twice the working pressure. The intake orifice area shall be equal to the nominal size of the valve (i.e. a 6" valve shall have a 6" intake orifice).
- (4) Large orifice sealing shall be affected by the flat face of the control float seating against a nitrile rubber 'O' ring housed in a dovetail groove circumferentially surrounding the orifice.
- (5) Discharge of pressurized air shall be controlled by the seating and unseating of a small orifice nozzle on a natural rubber seal affixed into the control float. The nozzle shall have a flat seating land surrounding the orifice so that the damage to the rubber seal is prevented.
- (6) The valve construction shall be proportioned with regard to material strength characteristics, so that deformation, leaking or damage of any kind does not occur by submission to twice the designed working pressure.
- (7) The valve design shall incorporate an over pressure safety feature that will fail without an explosive effect, such as is normally the case when highly compressed air

is released suddenly. The feature shall consist of easily replaceable components such as gaskets, seals or the like.

- (8) Connection to the valve inlet shall be facilitated by a screwed NPT male end (1" & 2" only) or a flanged end conforming to ANSI B16.1 Class 125 and Class 250 or ANSI B16.5 Class 300 Standards.
- (9) Flanged ends shall be supplied with the requisite number of stainless steel or mild steel screwed studs inserted for alignment to the specified standard.
- (10) The valve shall be as manufactured by Valvematic or approved equal.
- (11) Valve size shall be 2" for all 6", 8" and 12" water mains and 6" for all 24" and 30" water mains.

H. Blow Offs: Blow offs for flushing dead ends will be minimum of 5/8-inch on 2-inch mains, 2-inch on 4-inch mains, and 4-inch on mains 6-inch and larger and set inside a meter box at grade. Blow offs to be used only when hydrants are infeasible. All blow offs shall be sized to provide more than 2 feet per second of flushing velocity in the pipeline and location approved by the Owner.

END OF SECTION