

SECTION 1019
VALVES AND APPURTENANCES

1019-1 GENERAL: Valves shall have manufacturer's name and pressure rating cast in raised letters.

- a. All valves to include operator, actuator (handwheel, chain wheel, extension stem, floor stand, or operating nut), chain, wrench, and accessories to allow a complete operation from the intended operating level.
- b. Valve to be suitable for intended service. Renewable parts not to be of a lower quality than specified.
- c. Valve same size as adjoining pipe, unless otherwise called out on the Drawings or in the Supplements.
- d. Valve ends to suit adjacent piping.
- e. All valves shall have no leakage (drop-tight) in either direction at the valve rated design pressure unless otherwise allowed for this section or in the stated valve standard.
- f. Size operators and actuators to operate valve for the full range of pressures and velocities.
- g. Valve to open by turning counterclockwise.
- h. Factory mount operator, actuator, and accessories.
- i. Above ground gate and plug valves, 18" and less, shall have a handwheel operated worm gear actuator unless specified otherwise in the Contract Documents. Exposed valves whose operator is five (5) feet or higher above surface from which valve will be manipulated shall be furnished with chainwheel operators.
- j. Valve vaults shall be required for underground gate valves 14 inches and smaller and for plug valves 20 inches or smaller as shown on the Contractor documents. Valves larger than described above, shall be direct buried.
- k. Direct buried valves shall have mechanical joint ends with a PVC valve box and cast iron valve box cover. Box shall be a single joint of 6-inch AWWA C900 PVC cut to required depth. The cast iron valve box cover shall be provided with the word "SEWER" cast in raised letters. One 6-foot long T-handle wrench with 2-inch square nut end shall be provided for each project. Boxes not in pavement shall be set in a 4-inch thick, 2-foot square concrete slab.

1019-2 MATERIALS:

- a. Bronze and brass valve components and accessories that have surfaces in contact with water to be alloys containing less than 16 percent zinc and 2 percent aluminum.
- b. Approved alloys are of the following ASTM designations: B61, B62, B98/B98M (Alloy UNS No. C65100, C65500, or C66100), B139 (Alloy UNS No. C51000), B584 (Alloy UNS No. C90300 or C94700), B164, B194, and B127.

- c. Stainless steel Alloy 18-8 may be substituted for bronze.

1019-3 FACTORY FINISHING:

- a. Epoxy Lining and Coating:
 - 1. Use where specified for individual valves described herein. Lining in accordance with AWWA C550 unless otherwise specified. Coating to be the same material and application process as the lining.
 - 2. Either two-part liquid material or heat-activated (fusion) material except only heat-activated material if specified as "fusion" or "fusion bonded" epoxy.
 - 3. Minimum 7-mil dry film thickness except where limited by valve operating tolerances.

1019-4 GATE VALVES:

- a. **Gate Valve 3-Inches and Smaller (Non-rising Stem):** All-bronze, screwed bonnet, packed gland, single solid wedge gate, Class 125 rated 200 psi CWP, complies with MSS SP-80 Type 1.
- b. **Gate Valve 3-Inches and Smaller (Rising stem):** All-bronze, screwed bonnet, packed gland, single solid wedge gate, Class 125 rated 200 psi CWP, complies with MSS SP-80 Type 2.
- c. **Gate Valve 3-Inches and Smaller (for Type 1A Station):** Type 316 stainless steel, Class 200, handwheel operated non-rising valve stem and FNPT connections.
- d. **Resilient Seated Gate Valve 3-Inches to 36-Inches:** Ductile iron body, resilient seat, bronze stem and stem nut, ANSI Class 125 flanged ends, non-rising stem, in accordance with AWWA C509 or AWWA C515, full port, fusion-epoxy coated inside and outside per AWWA C550, NSF Standard 61 certified where used for potable water service.
- e. **Resilient Seated Gate Valve 3-Inches to 36-Inches, for Buried Service:** Ductile iron body, resilient seat, bronze stem and stem nut, mechanical joint ends, non-rising stem, in accordance with AWWA C509 or AWWA C515, 2-inch operating nut, full port, fusion epoxy coated inside and outside per AWWA C550, NSF Standard 61 certified where used for potable water service.

1019-5 PLUG VALVES: Valves shall be full port (100% port area), nonlubricated eccentric type with resilient faced plugs. Valves shall be in accordance with AWWA C 517. Valves shall be epoxy lined and coated. Minimum pressure rating shall be 175 psi for less than 14-inch valves; 150 psi for valves 14-inch and larger.

- a. Flanges shall be faced and drilled to ANSI 125/150-lb standard; mechanical joint ends shall conform to AWWA C 111 or C 153; and threaded ends shall be NPT.
- b. Body shall be cast iron conforming to ASTM A 126, Class B or ductile iron. Plug cast iron with round or rectangular port of no less than 100% of connecting pipe area and coated with Buna-N and seats welded nickel.
- c. Plug stem shall be of one-piece construction and made of ASTM A126 Class B Cast

Iron or ductile iron with a resilient facing per ASTM D2000-BG and ANSI/AWWA C 517 requirements. Radial shaft bearings shall be of self-lubricating type 316 stainless steel. The top thrust bearing shall be Teflon. The bottom thrust bearing shall be Teflon or Type 316 stainless steel or bronze, stem seal multiple V-rings, or U-cups with O-rings of nitrile rubber, grit seals on both upper and lower bearings. Cover Bolts shall be corrosion resistant with zinc plating.

- d. Direct buried valves shall have vaults valve boxes as specified in Subsection 1019-1 and shall have a remote position indicator in valve box showing position of valve. A stainless steel or aluminum centering and I.D. plate shall be provided showing direction of opening and number of turns to open for each valve.
- e. Buried or submerged valves and actuators shall have sealed shafts and watertight gasketed housing covers.

1019-6 CHECK VALVES:

- a. **Rubber Flapper Swing Check Valves (4-Inch and Larger):** Valves shall be rubber flapper type with long body, flanged ends (ANSI B16.1, Class 125) and minimum 150-lb pressure rating. Valves shall be epoxy lined and coated.
 - 1. The valves shall be designed, manufactured and tested in accordance with AWWA C508.
 - 2. The valve body shall have full flow equal of nominal pipe diameter at any point through the valve. The seating surface shall be on a 45-degree angle to minimize disc travel. The top access port shall be full sized to allow removal of the disc without removing the valve from the pipeline.
 - 3. The disc shall be of one-piece construction, precision molded with an integral o-ring type sealing surface that contains steel and nylon reinforcements.
 - 4. Backflow capabilities shall be provided by means of a screw type backflow actuator. The valve will be provided with proximity switch to detect valve position, equipped with EYS condulet seal fitting.
 - 5. The valve body and cover shall be ASTM A126, Class B cast iron or ductile iron. The disc shall be Buna-N, ASTM D2000-BG.
 - 6. The valve shall be cycle tested 1,000,000 times with no sign of wear or distortion to the valve disc or seat.
- b. **Stainless Steel Check Valves (3-Inch and Smaller):** Valves shall be Type 316 stainless steel inline swing type with FNPT ends and minimum 200 psi rating.
 - 1. The valve body shall have full flow equal of nominal pipe diameter at any point through the valve.
 - 2. The disc shall be of one-piece construction, Type 316 stainless steel.
 - 3. A removable cap shall be provided for easy access to internal components.

1019-7 QUICK CONNECT COUPLINGS: Couplings shall be Dover Corporation OPW Division Model 733-DL (threaded, 2-inch and less) or 733-LDS (flanged, 2-1/2-inch to 4-inch) coupler with Model 634A plug or approved equal.

1019-8 COMBINATION AIR VALVE: Valves shall be suitable for sewage service; combine the operating functions of both an air and vacuum valve and an air release valve. The air and vacuum portion shall automatically exhaust air during filling of a system and allow air to re-enter during draining or when a vacuum occurs. The air release portion shall automatically exhaust entrained air that accumulates in system. The valve shall be a single body unit with air and vacuum valve and an air release valve in a single housing.

- a. Rated working pressure shall be 150 psi minimum. Combination air valves on systems where the pump shutoff head exceeds 100 feet shall have a rated working pressure of 250 psi.
- b. Materials:
 1. Body: Shall be 316 stainless steel or glass reinforced nylon.
 2. Covers: Shall be 316 stainless steel or corrosion resistant composite materials.
 3. Internals: Shall be 316 stainless steel or corrosion resistant composite materials.
- c. 2-inch and smaller valves shall be NPT screwed inlet connection and 3-inch and larger valves shall be ANSI Class 125 flanged inlet connections.
- d. The valve shall be supplied with back flushing attachments including hose assembly, nipples, ball or plug valves (as required by Contract Documents), and quick couplings. The hose assembly shall be removable and not a permanent fixture on the valve.
- e. Fitted with body blowoff valve.
- f. All combination air valves with a 3-inch or larger inlet shall be nominal with the same inlet versus outlet sizing.
- g. The valve manufacturer shall provide a written two-year warranty for the entire valve including the body, cover, float, and all internal parts. The valve warranty shall include corrosion coverage for all valve parts.

1019-9 CORPORATION STOPS: Corporation stops shall be ¾-inch Mueller Company H-15029, or approved equal, for 100 psi test pressure.

1019-10 RESTRAINED FLANGE COUPLING ADAPTERS: Flange coupling adapters shall be ductile iron, meeting or exceeding ASTM A 536, grade 65-45-12 with factory fusion bonded epoxy coating. Gaskets shall be Nitrile-Buna N (NBR) compounded for sewer service per ASTM D2000. Hardware shall be 316 stainless steel. Joint restraining devices that impart point loads and/or wedging action on the pipe wall as a means of joint restraint shall not be allowed unless there are no other options for joint restraint available. Restrained flange coupling adapter shall be Alpha FC by Romac Industries or approved equal.

1019-11 FLEXIBLE COUPLINGS: Flexible couplings shall be either split type or sleeve type.

- a. Split couplings shall be used with interior piping and, when specified, with exterior piping.
 1. Couplings shall be mechanical type for radius groove piping. Couplings shall mechanically engage and lock grooved pipe ends in a positive couple and

allow for deflection, contraction and expansion.

2. Couplings shall consist of ASTM A47, Grade 32510 iron housing clamps in 2 or more parts, a chlorinated butyl composition sealing gasket with a "C" shaped cross-section and internal sealing lips projecting diagonally inward, and 2 or more oval track head bolts with hexagonal nuts conforming to ASTM A 183 to assemble clamps.
- b. Victaulic type couplings may be used in lieu of flanged joints for non-buried applications only.
 1. Pipes shall be radius grooved as specified for use with couplings.
 2. Flanged adapter connections shall be Victaulic Vic Flange Style 741 or approved equal.
 - c. Sleeve couplings used with buried piping shall be Dresser Style 38 or Style 40, or approved equal, with high strength low alloy steel bolts and nuts. Steel shall meet AWWA Standard C111. Couplings shall be furnished with pipe stop removed and gaskets of a composition suitable for exposure to domestic sewage.
 - d. Where indicated on the Drawings, restrained flexible couplings shall consist of a flexible coupling, ductile iron spool pieces with tie rods and flange clamps in accordance with the Contract Documents, to provide thrust restraint at the joint.

1019-12 DIAPHRAGM SEALS: Diaphragm seals shall be installed on pressure gage or pressure switch connections where specified.

- a. Seal shall be thread attached to piping and pressure sensing devices. Seals shall be 316 stainless steel, with neoprene sleeve and ethylene glycol and water fill. Seals shall be 2-inch size and shall be mounted with a 2-inch isolation ball valve on the pipeline side and have a ¾ inch flushing ball valve on the opposite side. Seals shall be Red Valve series 42 (horizontal mount), series 742 (vertical mount), or approved equal. The pressure sensing device(s) shall be factory mounted.
- b. Full circle sensing seals that insert between adjacent pipe flanges, such as Red Valve Company Series 40 Flanged Sensor or approved equal, may be used in lieu of seal specified above. The pressure sensing device shall be factory installed on the seal.

1019-13 UNIONS: Unions for pipe less than 2 ½-inch shall be galvanized malleable iron, 150-lb class. Unions for 2 ½-inch or larger pipe shall be flange pattern, galvanized, 125-lb class. Unions shall be gasketed.

1019-14 MECHANICAL WALL SEALS: Seals shall consist of an adjustable modular bolted, synthetic rubber and plastic sealing element. Sealing element shall be Thunderline Corporation Link-Seal or approved equal. Hardware shall be for corrosive service. Sleeves for use with seals shall be Schedule 40 steel pipe with waterstop approximately 2 inch wide and ¼ inch thick welded around periphery of pipe and galvanized.

1019-15 HOSE END FAUCETS: Faucets for potable water shall be Zurn Model Z-1385, or approved equal, with removable key.

1019-16 PRESSURE GAGES: Each pressure gage shall be direct mounted, fiberglass reinforced polypropylene case, glycerine filled, with a 4 ½-inch diameter dial with a clear acrylic window, ⅜

inch shut-off valve, and a bronze pressure snubber. Provide diaphragm seals between shut-off valve and pressure gage on lines with non-nuclear matter in suspension or solution. Gages shall be weatherproofed. Face dial shall be white finished aluminum with black graduations and figures and shall be dual scale (psi and ft of H₂O).

Each suction or discharge line shall have H.O. Trerice Company Series 450, or approved equal, gages of minimum sizes as follows with changes required by pump shutoff head shown on pump station data table for each installation:

<u>Pump</u>	<u>Suction</u>	<u>Discharge</u>
Centrifugal	-15 (-35) to 15 (35) psi (ft)	0 to 60 (138) psi (ft)
Submersible	NA	0 to 60 (138) psi (ft)

1019-17 REDUCED PRESSURE BACKFLOW PREVENTERS: Reduced pressure principle backflow preventers shall be listed by the University of Southern California – Foundation for Cross Connection Control and Hydraulic Research (USC-FCCCHR) as having met the requirements of ASSE 1013 and ANSI/AWWA C511. A Watts Model 909 QTS backflow preventer or approved equal shall be provided on potable water supply to pump station, and shall have a strainer and ball type isolation valve.

1019-18 DIAPHRAGM AND FLAP CHECK VALVES: These valves are for use on wet well end of valve pit drain piping. Diaphragm check valves shall be Red Valve Series TF-2 or approved equal. Compression bands for attaching valves shall be stainless steel. Flap valves shall be Clow Figure No. F-3016 or approved equal.

1019-19 OPERATORS AND ACTUATORS:

a. Manual Operators:

1. General:

- i. For AWWA valves, operator force not to exceed the requirements of the applicable valve standard. For non-AWWA valves, operator force not to exceed applicable industry standard or 80 pounds, whichever is less, under any operating condition, including initial breakaway. Provide gear reduction operator when force exceeds requirements.
- ii. Operator self-locking type or equipped with self-locking device.
- iii. A position indicator shall be provided on all above ground valves.
- iv. Worm and gear operators one-piece design worm-gears of gear bronze material. Worm hardened alloy steel with thread ground and polished. Traveling nut type operator's threaded steel reach rods with internally threaded bronze or ductile iron nut.

2. Exposed Operator:

- i. Galvanized and painted handwheels.
- ii. Cranks on gear type operators.

- iii. Chain wheel operator with tiebacks, extension stem, floor stands, and other accessories to permit operation from normal operation level.
- iv. Valve handles to take a padlock, and wheels a chain and padlock

3. Buried Operator:

- i. Buried service operators on valves larger than 2-1/2 inches shall have a 2-inch AWWA operating nut.
- ii. Buried operators on valves 2-inches and smaller shall have cross handle for operation by forked key.
- iii. Where the depth of the valve is such that its centerline is more than 3 feet below grade, furnish an operating extension stem with 2-inch operating nut to bring the operating nut to a point 6 inches below the surface of the ground and/or box cover. Extension stem shall be pinned to the operating nut; set screws are not acceptable.
- iv. Enclose moving parts of valve and operator in housing to prevent contact with the soil.
- v. Design buried service operators for quarter-turn valves to withstand 450 foot-pounds of input torque at the FULLY OPEN or FULLY CLOSED positions, grease packed and gasketed to withstand a submersion in water to 10 psi.

b. Electric Motor Actuators (20-inch and larger, unless specified otherwise):

- 1. Electric Motor Actuators shall be provided for each plug valve at the specified pump stations.
 - i. The actuators will comply with the latest version of AWWA C542.
 - ii. The actuators will be sized to 1 -1/2 times required operating torque. Motor stall torque not to exceed torque capacity of valve.
 - iii. Controls integral with the actuator and fully equipped as specified in AWWA C542.

2. Actuator Operation – General

- i. Suitable for full 90-degree rotation of quarter-turn valves.
- ii. Provide manual override option.
- iii. Open/close indication.

- iv. Operate from FULL CLOSED to FULL OPEN positions or the reverse in 30 seconds.
3. Modulating (M) Service:
- i. Size motors for continuous duty.
 - ii. Feedback potentiometer, or equivalent, and integral electronic positioner/comparator circuit to maintain valve position.
 - iii. HAND-OFF-AUTO (Local-Off-Remote) Selector Switch, pad lockable in each position:
 - A. Integral OPEN-STOP-CLOSE momentary pushbuttons with seal-in circuits to control valve in HAND (Local) position.
 - B. 4 to 20 mA dc input signal to control valve in AUTO (Remote) position.
 - C. Auxiliary contact that closes in AUTO (Remote) position.
 - D. Valve shall open upon loss of signal, unless otherwise indicated.
 - iv. Ac motor with solid state reversing starter or dc motor with solid state reversing controller, and built-in overload protection. Controller capable of 600 starts per hour.
4. Actuator Power Supply:
- i. 480 volts, three-phase, or 240 volts, three-phase, as indicated on the drawings.
 - ii. Control power transformer, 120-volt secondary.
 - iii. Externally operable power disconnect switch.
5. Enclosure:
- i. As defined in NEMA 250, Type 7.
 - ii. Contain 120-volt space heaters, if required to prevent condensation.
6. Limit Switch:
- i. Single-pole, double-throw (SPDT) type, field adjustable, with contacts rated for 5 amps at 120 volts ac.
 - ii. Each valve actuator to have a minimum of two auxiliary transfer contacts at end position, one for valve FULL OPEN and one for valve FULL CLOSED.
 - iii. Housed in actuator control enclosure.
7. Manufacturer and Product: Flowserve Limatorque; Model LY or approved equal.