

SECTION 331040

VALVES AND APPURTENANCES

PART 1 - GENERAL

1.1 SCOPE

- A. The following specification is intended for use for the design, selection of materials, and installation of valves. All valves shall meet the requirements of the Florida Department of Environmental Protection (FDEP) permit.
- B. This specification provides the requirements for main lines four inch (4") in size and larger: gate, plug, butterfly, wet tapping and check valves for potable water, reclaimed water, force mains, and air release valves for installation for the project.
- C. Furnish all labor, materials, equipment and incidentals required and provide all valves, and appurtenances complete with actuators and all accessories as shown on the Plans and as specified herein.

1.2 WORK INCLUDED

- A. The Contractor shall install, unless specified otherwise, the gate, plug, butterfly, wet tapping, check valves, and all other associated appurtenances for potable water, reclaimed water, force mains, and air release valves in accordance with the project's engineering Plans and Technical Specifications.
- B. The Contractor shall, unless specified otherwise, furnish all labor, materials, equipment, tools and all other associated appurtenances, necessary to do the work required under the contract to include but not limited to unloading, hauling and distributing all valves restraints, valve boxes and appurtenances.
- C. The Contractor shall also remove any surfacing as required; excavate the trenches and pits to the required dimensions; construct and maintain all bridges for traffic control; sheet, brace, and support the adjoining ground or structures; where necessary; handle all drainage or ground water; provide barricades, guards, and warning lights; install and test the valves, fittings and appurtenances; backfill and consolidate the trenches and pits; maintain all surfaces over the trench until surface restoration is completed; restore the surfaces unless otherwise stipulated; remove surplus excavated material; and clean the site of the work.
- D. The Contractor shall also furnish all labor, materials, equipment, tools,

and all other associated appurtenances required to rearrange conduits, ducts, pipes or other structures encountered in the installation of the valves.

1.3 COORDINATION OF WORK

The Contractor shall be responsible for the satisfactory coordination of the installation of the potable water, reclaimed water, and force main valves with other construction and activities in the area. Delays in work resulting from lack of such harmony shall not in any way be a cause for extra compensation by any of the parties.

1.4 REFERENCED STANDARDS (LATEST REVISION)

A. American Water Works Association (AWWA)

1. AWWA C111 - Rubber-Gasket Joints for Ductile-Iron and Pressure Pipe and Fittings.
2. AWWA C500 - Metal-Seated Gate Valves for Water Supply Service.
3. AWWA C502 - Dry-Barrel Fire Hydrants.
4. AWWA C504 - Rubber-Seated Butterfly Valves.
5. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service.
6. AWWA C515 - Reduced Wall, Resilient-Seated Gate Valves for Water Supply Service
7. AWWA C517 - Resilient-Seated Cast Iron Eccentric Plug Valves
8. AWWA C800 - Underground Service Lines and Fittings

B. American National Standards Institute (ANSI)

1. ANSI B16.1 - Cast Iron Pipe Flanges and Flanged Fittings.

C. ASTM International

1. ASTM A48 - Standard Specification for Gray Iron Castings.
2. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings
3. ASTM A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

4. ASTM A276 - Standard Specification for Stainless Steel Bars and Shapes.

5. ASTM A536 - Standard Specification for Ductile Iron Castings.

D. The Society for Protective Coatings (SSPC)

1. SSPC SP-6 - Joint Surface Standard Commercial Blast Cleaning

F. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.5 SUBMITTALS

A. The Contractor shall submit in writing documentation to justify approval of these materials by City prior to the start of the project, in accordance with Section 013000 Shop Drawings, Submittals and Samples.

B. The Contractor submittals shall include the statement that the submittals have been reviewed and the materials meet the contract specifications and/or standard details.

C. For materials that the Contractor is requesting deviations from this specification and/or the NPU Standard Details, the Contractor shall submit in writing a minimum of 60 days prior to construction, documentation to justify approval of these materials by the Engineer and City.

D. No fabrication shall take place until the final shop drawings are reviewed by the Engineer and City. Final approval is at the discretion of City.

PART 2 - PRODUCTS

2.1 GENERAL

A. The materials used in this work shall be all new and conform to the requirements for class, kind, size and material as specified below.

B. All valves furnished shall be of the type, kind, size, and class indicated for each line segment as shown on the engineering plans and/or designated in the Contract Documents. All valves and appurtenances shall have the name of the maker and the working pressure for which they are designed cast in raised letters upon some appropriate part of the body. All valves shall be suitable for throttling service and/or frequent operation as well as service involving long periods of inactivity.

2.2 VALVE BOXES

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- A. All gate, butterfly and plug valves shall be provided with extension shafts, operating nuts and valve boxes as follows:
1. Extension shafts shall be Type 304 stainless steel and the operating nut shall be two inches (2") square. Shafts shall be designed to provide a factor of safety of not less than four (4). Operating nuts shall be pinned to the shafts.
 2. Top of the operating nut shall be located two inches (2") below the rim of the valve box.
 3. Valve boxes shall be as manufactured by Tyler Union, Russco, Opelika Foundry, Star Pipe, and SIP Industries, and shall be a heavy pattern cast iron, three-piece, telescoping type box with dome base suitable for installation on the buried valves. Inside diameter shall be at least four and one-half inches (4-1/2). Barrel length shall be adapted to the depth of cover, with a lap of at least six inches (6") when in the most extended position.
 4. Covers shall be cast iron with integrally-cast with the word "WATER" "SEWER" or "RECLAIMED", as appropriate for the service. Aluminum or plastic are not acceptable. A means of lateral support for the valve extension shafts shall be provided in the top portion of the valve box.
- B. The upper section of each box shall have a top flange with sufficient bearing area to prevent settling. The bottom of the lower section shall enclose the stuffing box and operating nut of the valve and shall be oval. All fasteners shall be Type 304 stainless steel.

2.3 GATE VALVES

- A. The operating pressure for all sizes shall be a minimum of 150 psi gage or of the adjacent piping whichever is greater. Buried valves with diameters of two inches (2") to twelve inches (12") shall be installed vertically on horizontal pipelines without gearing, bypasses, rollers, or tracks.
- B. All gate valves in applications shall be provided with a fully enclosed, permanently lubricated actuator of the traveling nut or worm gear design. The actuator shall be connected to the valve shaft by means of a key and keyway connection. All actuators shall have adjustable, mechanical stop limits in accordance with AWWA C-504. All valve actuators shall be capable of withstanding 450 ft-lbs. of input torque against the open or closed stops without damage.
- C. Gate valves shall be used on all potable and reclaimed water mains for

all sizes. Gate valves sixteen inches (16") and larger shall be side actuated.

- D. Hydrant gate valves shall be used when a hydrant tee is used for the installation of a hydrant.
- E. Valves three inches (3") through 36" shall be non-rising stem type and manufactured in accordance with AWWA C509 and as specified herein. Cut-in gate valves shall be resilient full seat and capable of handling working pressures up +250 psi. The cut-in valve shall be capable of installation and placing into operation in active potable and reclaimed water mains and active force mains without spillage or stopping the flow by isolating the inserting valve during installation.
- F. Insert Valves, Ductile Iron 250 psig, shall be a Resilient Wedge Gate Valve including ductile iron body, bonnet and wedge shall provide a strength and a pressure rating that meets or exceeds the requirements of AWWA C-515. The insert valves shall be designed for use in potable water, raw water, reclaimed water, sewage, irrigation and backflow control systems. The design shall allow the valve to be installed into an existing pressurized pipeline while maintaining constant pressure and service as usual. The resilient wedge shall seat on the valve body and not the pipe to obtain the optimum seating and flow control results. The resilient wedge shall be totally independent of the carrier pipe. The resilient wedge shall not come into contact with the carrier pipe or depend on the carrier pipe to create a seal.
- G. All interior and exterior ferrous surfaces of the valve, including the disc, shall be coated with fusion bonded epoxy, NSF 61 certified when in contact with potable water. The epoxy shall be fusion bonded and have a nominal thickness of eight (8) mils and be in accordance with AWWA C550.
- H. All exposed bolts, nuts, fasteners, and washers shall be Type 316 stainless steel and all buried bolts, nuts, fasteners, and washers shall be 316 Stainless Steel. Mechanical joints bolts shall not protrude more than one-half inch (1/2") through the nut after joints are assembled. Accessories for the mechanical joint consisting of the gasket, gland and fasteners shall be furnished and packaged separately from the valves. Each package shall be labeled in such a manner as to provide for proper identification and number of units per package or bundle.
- I. All stainless-steel fastener threads shall be coated with an anti-seize compound.
- J. Valves shall be Mueller, Clow/Kennedy, American, or an approved

equal.

- K. Valve body shall be ASTM A536 ductile iron with fusion bonded epoxy coating.
- L. Valves shall be provided with a minimum of two O-ring stem seals.
- M. Bonnet and gland bolts and nuts shall be either ASTM A 126, Class B. All ferrous surface inside and out shall have a fusion-bonded epoxy coating. The hot-dip process in accordance with ASTM A153 is not acceptable. Allen-wrench type bonnet and gland fastening shall not be acceptable and will be rejected.
- N. Wedges shall be constructed of ASTM A536 ductile iron and totally encapsulated in vulcanized EPDM (ethylene propylene diene monomer).
- O. The word "OPEN" and an arrow indicating direction to open shall be cast on each valve body or operator.
- P. Operating nut for all gate valves shall be two inches (2") square.
- Q. Extension stems shall be fabricated from Type 304 solid stainless steel. Stems shall not be smaller in diameter than the valve stem. Equip stem with wrench nut. Ensure all stem connections are pinned.
- R. Thrust collars and stems shall be integrally cast (not pinned on) and shall feature brass valve stems.
- S. Buried valves shall have mechanical joint ends compliant with AWWA C111 unless otherwise noted on the Plans.

2.4 ECCENTRIC PLUG VALVES

- A. All valves shall be eccentric full port plug valves manufactured by Val-Matic, Pratt or Milliken, or approved equal unless otherwise approved by the City.
- B. Plug valves shall be tested in accordance with AWWA C504 Section 5. Each valve shall be performance tested in accordance with AWWA C504 Section 5.2 and shall be given a leakage test and hydrostatic test as described in AWWA C504 Paragraphs 5.3 and 5.4. The leakage test shall be applied to the face of the plug tending to unseat the valve. The Manufacturer shall furnish certified copies of reports covering proof of design testing as described in AWWA C504.
- C. Plug valves shall be of the tight closing, resilient faced, non-lubricating

variety and shall be of eccentric design such that the valve's pressure member (plug) rises off the body seat contact area immediately upon shaft rotation during the opening movement. Valve pressure ratings shall be as follows and shall be established by hydrostatic tests as specified by ANSI B16.1-1967. Valves shall be drip-tight in both directions (bi-directional) at rated pressure of 175 psi through twelve-inch (12") diameter, and 150 psi for fourteen-inch (14") diameter and above. The valve shall be provided with a two inch (2") square operating nut for all buried applications.

- D. Lift station plug valves shall be one-fourth (1/4) turn with operator nut and are required on the above ground piping assembly.
- E. The valve body shall be constructed of cast iron ASTM A126, Class B. Body ends shall be mechanical joint to meet the requirements of AWWA C111/ANSI A21.11 or single gasket push-on type.
- F. The valve plug shall be constructed of cast iron or ductile iron and shall have a conical seating surface that is eccentrically offset from the center of the plug shafts. The plug and shafts shall be integral. The entire plug face shall be totally encapsulated with Buna N (Nitrile) rubber in all valve sizes. The rubber to metal bond must withstand 75 lbs. pull under test procedure ASTM D-429-73, Method B. When the plug is in full-open position, plug geometry and body waterway contours must provide a passageway that allows flow capacity equal to 100% of the adjacent pipe area.
- G. Valve seat mating surface shall be constructed of a welded-in overlay of not less than 90% nickel or be a one piece 304 stainless steel ring. Seat ring contour must be precision machined.
- H. A mechanical "brake" shall be supplied on all valves and shall be capable of "locking" the valve in any intermediate position between full-open and full-closed.
- I. Valves shall have multiple V-type packing and packing glands and shall be capable of being field adjusted or repacked without the bonnet or plug being removed from the valve with the valve under the full rated pressure. Valves shall have a port position indicator.
- J. For corrosion protection, the interior ferrous surfaces of all plug valves shall have a two (2) part epoxy internal coating to a minimum of 20 mils thickness.
- K. Valve shaft seals shall be adjustable and comply with AWWA C507 Section 10, and with AWWA C507 Section 11.

- L. Manual valves shall have lever or gear actuators and tee wrenches, extension stems, floor stands, etc. as indicated on the plans. All valves 6 inches (6") and larger shall be equipped with gear actuators. All gearing shall be enclosed in a semi-steel housing and be suitable for running in a lubricant with seals provided on all shafts to prevent entry of dirt and water into the actuator. All actuator shafts shall be supported on permanently lubricated bronze bearings. Actuators shall clearly indicate valve position and an adjustable stop shall be provided to set closing torque. All adjustable stops shall be provided to set closing torque. All exposed nuts, bolts, and washers shall be stainless steel zinc or cadmium plated. Valve packing adjustment shall be accessible without disassembly of the actuator.
- M. Valves and gear actuators for submerged service shall have seals on all shafts and gaskets on the valve and actuator covers to prevent entry of water. Actuator mounting brackets for buried or submerged service shall be totally enclosed and shall have gasket seals. All exposed nuts, bolts, springs and washers shall be stainless steel.
- N. Three-way plug valves shall be non-lubricated gear oriented. Valve bodies shall be ASTM A-126 Class and be semi-steel with 125 lb. ANSI standard flanges. Plugs shall be resilient faced. Three-way valves shall be three-way, three (3) port 270-degree turn.
- O. Plug valves installed such that actuators are six feet (6') or more above the floor shall have chain wheels.
- P. Where shown on the plans, plug valves shall be installed with extended shafts and actuators. Actuators for extended shafts shall be mounted on floor stands where indicated on the plans or shall be removable handwheels where floor stands are not called for. Six inches (6") sleeves shall be provided for extended shafts in all floors; where necessary covers shall be provided. Shafts shall be of adequate strength to operate the valve and shall be 304 stainless steel. Floor stands and covers, where called for shall be cast iron. Floor stands shall be equipped with valve position indicators. Where shown on the plans, plug valves shall be furnished with extended bonnets.
- Q. All buried plug valves shall have a remote position indicator in the valve box showing position of the valve. A stainless-steel centering and I.D. plate shall be provided showing direction of opening and number of turns to open for each valve.

2.5 CHECK VALVES

- A. All check valve bodies shall be cast iron per ASTM A126 Class B, having integral (not wafer) flanges.
- B. The seat shall be centrifugally cast bronze with an O-ring seal and be locked in place with stainless-steel lock screws and be field replaceable, without the use of special tools.
- C. The shaft shall be single and continuous stainless-steel, extending on one side of the body with a lever and weight.
- D. The air cushion cylinder, when specifically required, shall be constructed of corrosion-resistant material and the piston shall be totally enclosed within the cylinder and not open at one end. The air cushion cylinder assembly shall be externally attached to either or both sides of the valve body and will permit adjustability to cushion the closure of the valve. Cushioning shall be by air trapped in the cushion cylinder, which shall be fitted with a one-way adjustable control check valve to cushion disc contact to the seat at the shut-off point. The bottom cylinder head shall be swivel mounted and not rigid to follow the change of force angles as the lever raises or lowers to open or close the check valve. Valve shall prevent backflow on normal pump shut-off or power failure, at zero velocity, and be watertight.
- E. The disc shall be cast iron utilizing a double clevis hinge connected to a ductile iron disc arm. The disc arm assembly shall be suspended from a stainless-steel shaft, which passes through a seal retainer on both sides of the valve body.
- F. Valve exterior to be painted with Red Oxide Phenolic Primer Paint as accepted by the FDA for use in contact with Potable Water. Materials shall be certified to the following ASTM specifications:
 - 1. Body, cover & disc - Cast Iron - ASTM A126, Class B
 - 2. Disc Arm - Ductile Iron - ASTM A536
 - 3. Seat - Aluminum Bronze or Stainless Steel - ASTM B148, ASTM A276
 - 4. Disc Seat - Buna-N or metal
 - 5. Cushion cylinder - Corrosion-resistant Commercial material
- G. For corrosion protection, the interior ferrous surfaces of all check valves used in sewage applications shall be coated with a factory applied, two-part epoxy coating to a minimum of 20 mils thick.
- H. Check valves must be American, Mueller, Clow/Kennedy, Milliken, Val-Matic, Pratt, or an approved equal.

2.6 BUTTERFLY VALVES

- A. Rubber-Seated Butterfly Valves shall only be used in specifically approved applications and with written City approval.

- B. This section addresses class 150 rubber-seated butterfly valves, three inches (3") through 72 inches. All products furnished shall be in conformance with the latest revision of American National Standards Institute and American Water Works Association C-504 Standard (ANSI/AWWA C504). All coatings in contact with potable water shall be certified to meet NSF 61. Valves shall be Class 150 of the short-body type with a 150 psig bi-directional shut-off rating. Valve shall be in the same alignment as a horizontal pipe and shall be for buried service, unless otherwise specified. Valve shall be configured with a horizontal valve shaft and a vertical actuator shaft with standard two inches (2") AWWA operating nut. The actuator shall be side mounted.
- C. The valve body shall be of cast iron conforming to ASTM Specification A-126, Class B with flat faced flanged valve body ends in accordance with ANSI B16.1, Class 125. All valves shall conform to AWWA C-504, Table 2 of Section 3.1 Valve Bodies, laying lengths for flanged valves and minimum body shell thickness for all body types and AWWA C-509. The valve design shall be of such design that the disc will seat at 90-degrees with the pipe axis and the disc will not flutter or vibrate when operated in a throttled position.
- D. The valves disc shall be of Cast Iron A-48, class 40 Cast Iron A-126, class B or Ductile Iron ASTM A-536, grade 65-45-12 with a disc design to provide 360-degree uninterrupted seating. The valve seat shall be natural or synthetic rubber resilient seating applied integrally to the body or disc. For valves 24 inches or larger, the rubber seat shall be capable of mechanical adjustment in the field and shall be field replaceable. Special tools required for seat adjustment and replacement shall be furnished with the valve and the seat respectively. Mechanical adjustment or attachment of the seat and seat ring shall not include welding.
- E. Valve shafts shall be type 304 stainless steel conforming to ASTM A-276 and shall have a diameter equal to or greater than that shown for Class 150B in Table 3 of AWWA C504. Shafts shall conform to the requirements of Section 3.3, Valves Shaft of AWWA C504 for one piece or stub shaft types. Connection between the shaft and disc shall be dowel or taper pins, which are mechanically secured. The valve assembly shall be furnished with a factory-set, non-adjustable disc shaft thrust bearing that ensures the valve disc is centered within the valve body seat at all times. Valve shaft bearings shall be permanent, self-lubricated bearings providing continuous, low-friction maintenance-free operation. Shaft bearing shall be contained in integral hubs of the valve body. Valve shaft seal shall consist of O-ring, V-type, or U-cup type packing where the shaft projects through the valve body for the actuator connection.

- F. The valve shall be provided with a fully enclosed, permanently lubricated actuator of the traveling nut or worm gear design. The actuator shall be connected to the valve shaft by means of a key and keyway connection. All actuators shall have adjustable, mechanical stop limits in accordance with AWWA C504 Section 3.8.2 and shall be capable of withstanding 450 ft-lbs. of input torque against the open or closed stops without damage.
- G. Valves for below ground applications shall have an AWWA wrench nut with a cast-in arrow indicating the direction of opening. For a smooth shaft, the wrench nut shall be fastened to the input shaft by means of a minimum five-sixteenths inch (5/16") diameter steel pin passing entirely through the shaft and the wrench nut; a key with keyway is acceptable. For a splined shaft, the wrench nut shall be formed to fit the splined shaft. The actuator shall be designed to produce the specified torque with a maximum input of 150 ft-lbs. applied to the wrench nut. For aboveground valves, a hand wheel will be used with a cast-in arrow indicating the direction of the opening. The hand wheel shall be fastened to the actuator input shaft to produce the specified torque with a maximum pull of 80 pounds of the hand wheel rim.
- H. All interior and exterior ferrous surfaces of the valve, including the disc, shall be coated with fusion bonded epoxy, NSF 61 certified for use in potable water. The epoxy shall have a nominal thickness of eight (8) mils and shall be in accordance with AWWA C550 latest revision.
- I. Acceptable butterfly valves are:
 - 1. Mueller
 - 2. Clow/Kennedy
 - 3. Val-Matic
 - 4. Milliken
 - 5. Approved Equal

2.7 POTABLE AND RECLAIMED WATER AIR RELEASE ASSEMBLIES

- A. Air release assemblies shall utilize a lockable brass corporation stop and a brass street elbow in accordance with the detail on the Construction Plans.
- B. Air release assemblies shall be housed in an Oldcastle Enclosure Solutions, Carson model 1419, or approved equal. Air release assembly enclosures shall have flush, solid, hinged covers with a bolt-down feature.

2.8 WASTEWATER AIR RELEASE VALVES

- A. Air release valves shall be two inches (2") in size. Wastewater air release valves shall be manufactured by A.R.I. Model D-025 reinforced nylon body combination air valve, or by H-Tech., Model 986 Combination ARV, 316 stainless steel. Valves must be ISO-9000 certified. No substitutions will be allowed.
- B. Valves shall be rated at 150 psi, and factory tested at 230 psi. Test results shall be supplied to NPU upon request.
- C. Valve Construction:
 - 1. The combination air valve shall be specifically designed to operate with liquids carrying solid particles and allow large quantities of air to escape out the orifice when the pipeline is being charged and close water-tight when liquid enters the valve. The combination valve shall also permit large quantities of air to re-enter through the orifice to prevent a vacuum from forming in the pipeline. The valve shall have a two-inch (2") male National Pipe Thread (NPT). inlet and a one and one-half inch (1-1/2") male Kamlok discharge. All valves shall be installed in accordance with Manufacturer's recommendations and shall have isolation valve connections for control.
 - 2. The A.R.I. valve shall be conical in shape, and consist of a reinforced nylon body, seal plug assembly, float and base. The valve design and operation shall not allow contact between the sewage or re-use water and the sealing mechanism by providing an air gap at the top of the valve. The seal plug assembly shall be attached to the body of the air release valve by a reinforced nylon clamping stem that slides in preformed grooves of the body. The body/base seal shall consist of a BUNA-N O-Ring Gasket and Type 316 stainless steel clamp which can be disassembled for easy maintenance.
 - 3. Air release valves shall also be furnished with a one-half inch (1/2") outlet drain plug.
 - 4. Materials:
 - a. Body Base: Reinforced nylon.
 - b. Float: Foamed Polypropylene.
 - c. Seat: EPDM.
 - d. Interior Components: Type 316 stainless steel.
 - e. Exterior Hardware: Type 316 stainless steel.
 - f. Coating/Color: Green Flushing Connection (sewer) or Pantone Purple Flushing Connection (reuse).
 - 5. Wherever possible, above grade air release valves for wastewater and

reuse water lines shall be designed and installed. Connection to the wastewater line, or reuse water line, shall be constructed as indicated on the plans.

6. Underground installations of wastewater and reuse water pipelines shall require air release valves, connection to the lines shall be constructed as indicated on the plans.
7. Above Ground Enclosures:
 - a. All above grade air release valves shall be enclosed in a 16 inches wide X 13 inches deep X 32 inches high above ground enclosure. Enclosures shall consist of high quality, UV resistant molded high impact resistant polyethylene poly-plastic construction with stainless steel hardware and galvanized steel mounting stakes. All enclosures shall be equipped with a Pin Allen lock and key.
 - b. The word "SEWER" shall be embossed on the wastewater line enclosure, visible at roadside. A Pin Allen key shall be provided with each installation. Enclosures shall be supplied by Water Plus Corporation, Model #131632, Color: Standard Medium Green.
 - c. The word "REUSE" shall be embossed on the reuse line enclosure, visible at roadside. A Pin Allen key shall be provided with each installation. Enclosures shall be supplied by Water Plus Corporation, Model # 131632, Color: Gray.

2.9 TAPPING SLEEVES AND VALVES

- A. Gate (tapping) valves shall be used for all tapping sleeves. Tapping valves sixteen inches (16") and larger shall be side actuated and the Contractor shall notify the supplier of this fact to ensure that the tapping valve has the same bolt pattern as the tapping sleeve.
- B. Tapping sleeves shall be stainless steel, designated for working pressure not less than 200 psi. Armored end gaskets shall be provided for the full area of the sleeve flanges. Nuts and bolts shall be Type 304 stainless steel. Approved tapping sleeve manufacturers are as follows:
 1. Ford
 2. JCM – 432
 3. Cascade
 4. American
 5. TPS
 6. Or approved equal
- C. Tapping valves shall conform to the requirements specified above for

gate valves except that one end shall be flanged and one mechanical. Tapping valves shall be provided with an oversized opening to permit the use of full-size cutters. Approved tapping valve manufacturers are as follows:

1. American
2. Mueller
3. Clow/Kennedy
4. Or approved equal

2.10 SERVICE CONNECTION MATERIALS

A. SERVICE SADDLES

1. Service Saddles (Epoxy coated with double stainless-steel straps); approved manufacturers are as follows:
 - a. Smith-Blair
 - b. Mueller
 - c. Ford
 - d. JCM
 - e. TPS
 - f. Or approved equal
2. Service saddles or fittings shall be used with taps to all types of pipe. Gasket shall be cemented in place and confined in a retaining groove. Saddles shall be epoxy coated with double stainless-steel straps.
3. Tapping sleeves and valves shall be used for all taps.

B. WATER METERS

1. The City supplies and installs all water meters.
2. The location of all meters shall be clearly shown on the construction plans.

C. Corporation Stops for Service Connections (compression only) - Corporation stops shall meet the requirements of AWWA C800; ends AWWA thread x compression, CTS, approved manufacturers are as follows:

1. Ford
2. Mueller
3. Or approved equal

D. Water Service Tubing - Water service connection tubing shall be

polyethylene color coded blue for potable water service and purple for reclaimed water service. Refer to Section 331070, approved manufacturers are as follows:

1. Endot
2. Charter Plastics
3. Approved Equal

E. Polyethylene tubing shall meet the requirements of AWWA Standard C901. Polyethylene tubing shall be 3406 polyethylene. Refer to Section 331070.

F. Polyethylene Service Tube Stiffeners - A solid ring, stainless steel insert shall be installed with every compression connection made with polyethylene tubing.

2.11 Backflow Prevention Devices

A. Backflow prevention devices shall be reduced pressure principle assemblies and shall be USC approved.

B. Backflow prevention devices shall be compliant with NSF 61.

C. Refer to the Florida Cross Connection Control Manual, latest edition.

2.12 LINE STOPS

A. Temporary line stops shall be provided, installed, and removed where required to isolate sections of existing mains to allow installation of new fittings and valves.

B. Line stop sleeves shall be mechanical joint split cast-iron units rated for 150 psi working pressure. Fabricated steel sleeves are also allowed.

C. Line stops shall have ANSI B 165-1, 125 lb. outlet flanges. The Contractor shall determine the outside diameter of the existing main before ordering the sleeve.

D. Completion plugs used for line-stopping shall be manufactured from ASTM-36 grade material at a minimum. Completion plugs shall be designed with a groove for the placement of an O-Ring that will aid in the permanent sealing of the line-stop fitting to permit the recovery of the temporary valve used in the line-stop procedure.

E. Line-stopping completion plug on mains sixteen inches (16") and above will be designed with a reduced branch outlet.

- F. Minimum blind flange thickness of the cover plate shall comply with AWWA C-207. Nuts and bolts shall be Type 304 stainless steel.
- G. The temporary line-stopping valve shall be supplied for the duration of the line-stopping procedure.
- H. A service saddle to purge the pressure from the main once the line-stopping heads are in place shall be used. The service saddle will be utilized to re-pressurize the main allowing equal pressure on both sides of the line-stopping head in order to extract the head from the main. The Contractor shall check for any leaks in the modifications prior to the heads being extracted.

2.13 MECHANICAL SEALS

- A. Mechanical type seals shall consist of an adjustable modular bolted, synthetic rubber and plastic sealing element.

2.14 SURFACE PREPARATION AND SHOP COATINGS

- A. The interior ferrous metal surfaces, except finished or bearing surfaces, shall be blast cleaned and painted with two coats of an approved two-component epoxy coating specifically formulated for potable water use. The coating shall be NSF certified to Standard 61.
- B. Exterior ferrous metal surfaces of all buried valves and hydrants shall be blast cleaned in and given two shop coats of an approved two-component coal tar epoxy paint.

PART 3 – EXECUTION

3.1 INSPECTION AND PREPARATION

- A. During installation of all valves and appurtenances, verify that all items are clean, free of defects in material and workmanship and function properly.
- B. All valves shall be closed and kept closed until otherwise directed by the Engineer or the City.

3.2 INSTALLATION OF TAPPING SLEEVES AND VALVES

- A. The City shall be contacted 48 hours in advance, and their permission granted prior to tapping a "live" line. The required procedures and timetable shall be followed exactly.
- B. Installation shall be made under pressure and flow shall be maintained.

The diameters of the tap shall be not less than one-fourth inch (1/4") less than the inside diameter of the branch line.

- C. The entire operation shall be conducted by workers experienced in the installation of tapping sleeves and valves. The tapping machine shall be furnished by the Contractor.
- D. Determine the location of the line to be tapped to confirm that the proposed location will be satisfactory and that no interference will be encountered such as joints or fittings. No tap or sleeve will be made closer than three feet (3') from a pipe joint.
- E. Tapping sleeve and valve with boxes shall be set squarely centered on the line to be tapped. Adequate support shall be provided under the sleeve and valve during the tapping operation. Proper tamping of supporting pipe bedding material around and under the valve and sleeve is mandatory for buried installations.
- F. After completing the tap, the valve shall be flushed to ensure that the valve seat is clean. All proper regulatory procedures (including disinfection) shall be followed exactly.

3.3 FIELD TESTS AND ADJUSTMENTS

- A. Conduct a functional field test of each valve, including actuators and valve control equipment, in presence of Engineer to demonstrate that each part and all components together function correctly. All testing equipment required shall be furnished by the Contractor.

3.4 MANUFACTURER'S SERVICE

- A. Furnish the services of a qualified representative of the tapping equipment manufacturer to provide on-site instruction during wet tapping of the existing water mains indicated on the plans.
- B. Following installation of the valves, furnish the services of a qualified, factory-trained representative of the manufacturer of the respective valves, to check the installations before they are placed in operation, supervise initial operations and testing in the presence of the Engineer and City, instruct the City personnel in care and maintenance of the equipment, and make all necessary field adjustments. In the event of trouble with the equipment, the representative of the respective manufacturer shall revisit the site as often as necessary until all troubles are corrected and the installation is entirely satisfactory.

3.5 VALVE CAP COLOR CODING SCHEDULE

Valve caps shall be color coded as per the following:

Item	Color Code
Wastewater Cap	Green Pantone 341C
Potable Water Cap	Blue Pantone 287
Reclaimed Water Cap	Purple Pantone 522C
Fire Hydrant Cap	Rustoleum Safety Yellow

END OF SECTION