

DIVISION V

POTABLE WATER SYSTEMS

SECTION 50 - POTABLE WATER SYSTEM MATERIALS

50.1 GENERAL

These specifications cover the pipe, fittings, and accessory items used for potable water systems.

Pipe used in water distribution systems shall be either polyvinyl chloride (PVC) or ductile iron pipe (DIP).

CONTRACTOR shall be responsible for all materials furnished and storage of same, until the date of formal COUNTY acceptance. CONTRACTOR shall replace at his expense all materials found to be defective or damaged in handling or storage. CONTRACTOR shall, if requested by COUNTY, furnish certificates, affidavits of compliance, test reports, or samples for check analysis for any of the materials specified herein. All pipe delivered to project site for installation is subject to random testing for compliance with the designated specifications.

50.2 PIPE INSPECTION AND TESTING

Requirements specified in Division III shall apply.

50.3 PVC PIPE

50.3.1 PVC PIPE

All PVC pipe of nominal diameter four through twelve inches shall be manufactured in accordance with AWWA standard C900, latest edition. The PVC pipe shall have a minimum working pressure rating of 150 psi and shall have a dimension ratio (DR) of 18. Pipe shall be the same O.D. as ductile iron pipe.

All PVC pipe of nominal diameter 14 through 24 inches shall be manufactured in accordance with AWWA standard C905, latest edition. The PVC pipe shall have a minimum working pressure rating of 165 psi and shall have a dimension ratio (DR) of 25. Pipe shall be the same O.D. as ductile iron pipe.

All PVC pipe shall be solid blue in color. White pipe is strictly prohibited.

50.3.2 JOINTS

PVC pipe shall have integral bell push on type joints conforming to ASTM D3139.

50.3.3 FITTINGS

Fittings used with PVC pipe shall conform to requirements of this Division.

50.4 DUCTILE IRON PIPE AND FITTINGS

50.4.1 DUCTILE IRON PIPE

All ductile iron pipe of nominal diameter 4 through 54 inches shall conform to ANSI/AWWA A21.51/C151. A minimum Pressure Class 350 pipe shall be supplied for all sizes of pipe unless a higher class pipe is specifically called out in the DRAWINGS or required by COUNTY.

50.4.2 FITTINGS

*Polk County Utilities Division
Shepherd Road Water Main Extension
Technical Standards and Specifications*

All fittings shall be compact, mechanically restrained joint ductile iron or gray iron conforming to ANSI/AWWA A21.53/C153, 350 psi minimum pressure rating.

50.4.3 JOINTS

Joints for ductile iron pipe and fittings shall be push-on, restrained joint-type. Acceptable joint types shall be Flex-Ring, Field Flex-Ring, Lok-Ring joints, and Fast-Grip gaskets. Joints shall conform to ANSI/AWWA A21.11/C111, unless otherwise called for on the DRAWINGS. Where called for on the DRAWINGS, flanged joints shall be provided. Flanged joints shall conform to ANSI Standard B16.1-125 LB. See Division III for additional restraining requirements.

50.4.4 COATINGS AND LININGS

Where ductile iron pipe and fittings are to be below ground or installed in a casing pipe the coating shall be coated with a minimum 1.0 mil thick, dry, coal tar epoxy, in accordance with ANSI/AWWA A21.51/C151. Where ductile iron pipe and fittings are to be installed above ground, pipe, fittings and valves shall be thoroughly cleaned and given one field coat (minimum 1.5 mils dry thickness) of rust inhibitor primer. Intermediate and finished field coats of Alkyd shall also be applied by CONTRACTOR (minimum 1.5 mils dry thickness each coat). Primer and field coats shall be compatible and shall be applied in accordance with the manufacturers recommendations. Final field coat color shall be blue.

All ductile iron pipe and fittings shall have an interior protective lining of cement-mortar with a seal coat of asphaltic material in accordance with ANSI/AWWA A21.4/C104.

50.4.5 POLYETHYLENE ENCASEMENT

Pipe shall be polyethylene encased (8 mil) where shown on the DRAWINGS and/or where required by COUNTY in accordance with ANSI/AWWA A21.51/C105.

50.5 SERVICE PIPE, STOPS, FITTINGS, AND SERVICE SADDLES

50.5.1 SERVICE PIPE

All service lines shall be 1", 1-1/2" or 2" Endopure ENDOT polyethylene tubing conforming to specifications in AWWA C800 and AWWA C901. Services lines shall be solid blue in color. White or black service lines are strictly prohibited.

50.5.2 STOPS

Corporation stops shall be 1", 1-1/2" or 2" brass, equipped with connections compatible with the polyethylene tubing and threaded in accordance with specifications in AWWA C800 and AWWA C901 (non-corp cock threaded). Curb stops shall be sized to match the meter size and conform to the specifications in AWWA C800 and AWWA C901.

50.5.3 FITTINGS

Fittings shall be brass, cast and machined in accordance with specifications in AWWA C800 and AWWA C901, with compatible polyethylene tubing connections.

50.5.4 SERVICE SADDLES

A service saddle shall be used for all service line taps. Service saddles shall be stainless steel, double strap, fusion epoxy or nylon coated ductile iron, anchored by a minimum four (4) stainless steel bolt pattern on a ductile iron saddle body. Service saddles for PVC pipe shall have the double strap sized exactly to the pipe outside diameter. Sealing gaskets shall be BUNA-N rubber and straps shall be corrosion resistant alloy steel.

50.5.5 WATER METER BOXES

CONTRACTOR shall furnish and install box assemblies and appurtenances as shown in the DRAWINGS to grade. CONTRACTOR shall plug or cap ends of pipes and fittings in meter box

*Polk County Utilities Division
Shepherd Road Water Main Extension
Technical Standards and Specifications*

assembly for testing purposes and to prevent dust, dirt, debris, and rodents from entering water service lines. Meter boxes shall be located approximately two feet within the right-of-way or utility easement. During the warranty period, CONTRACTOR shall be responsible for adjusting boxes to grade in the event a lot is regraded and meter box must be adjusted accordingly. COUNTY shall furnish meter after COUNTY acceptance of system.

The meter assembly shall include a cast iron meter yolk (Mueller H-5030P), expansion handwheel (Mueller H-14234), 180-degree turn check lock wing meter stop (Mueller H-14273), dual check valve (Mueller H-14248-A or H-14247-A), and meter box. The meter box shall be of PVC material and have cast iron reader lid, Mueller Easy-Setter box assembly or equal.

END OF SECTION



SECTION 51 - POTABLE WATER SYSTEM INSTALLATION

51.1 GENERAL

Pipe shall be installed in accordance with the manufacturer's specifications and instructions for the type of pipe used and applicable AWWA standards, such as C600 and C603, unless otherwise stated in these specifications.

51.2 PIPE HANDLING

All types of pipe shall be handled in such manner as will prevent damage to the pipe or coating. Accidental damage to pipe or coating shall be repaired to the satisfaction of COUNTY or be removed from the job. When not being handled, the pipe shall be supported on timber cradles or on properly prepared ground, graded to eliminate all rock points and to provide uniform support along the full length. When being transported, the pipe shall be supported at all times in a manner which will not permit distortion or damage to the lining or coating. Any unit of pipe that, in the opinion of COUNTY, is damaged beyond repair by CONTRACTOR shall be removed from the site of the work and replaced with another unit.

Joint gaskets shall be stored in clean, dark dry location until immediately before use.

Dirt or other foreign material shall be prevented from entering the pipe or pipe joint during handling or laying operations and any pipe or fitting that has been installed with dirt or foreign material in it shall be removed, cleaned and relaid. At times when pipe laying is not in progress, the open ends of the pipe shall be closed by a watertight plug or by other means approved by COUNTY to ensure absolute cleanliness inside the pipe.

51.3 SEPARATION OF WASTEWATER SYSTEMS AND POTABLE WATER SYSTEMS AND RECLAIMED WATER SYSTEMS

Requirements in Division III shall apply.

51.4 TRENCH PREPARATION AND PIPE BEDDING

51.4.1 TRENCH PREPARATION AND PIPE BEDDING

Requirements in Division III shall apply. Also refer to DRAWINGS.

51.4.2 PIPE PREPARATION AND HANDLING

All pipe and fittings shall be inspected prior to lowering into trench to ensure no cracked, broken, or otherwise defective materials are being used. CONTRACTOR shall clean ends of pipe thoroughly and remove foreign matter and dirt from inside of pipe and keep clean during and after laying.

CONTRACTOR shall use proper implements, tools, and facilities for the safe and proper protection of WORK. CONTRACTOR shall lower pipe into the trench in such a manner as to avoid any physical damage to the pipe and shall remove all damaged pipe from the job site. Care shall be taken to not drop or dump pipe into trenches under any circumstances.

51.4.3 TRENCH DEWATERING AND DRAINAGE CONTROL

Requirements in Division III shall apply. CONTRACTOR shall prevent water from entering the trench during excavation and pipe laying operations to the extent required to properly grade the bottom of the trench and allow for proper compaction of the backfill. Pipe shall not be laid in water.

51.4.4 SURVEY LINE AND GRADE

Pipe shall be laid to the liens and grades shown on the PLANS. CONTRACTOR shall provide

*Polk County Utilities Division
Shepherd Road Water Main Extension
Technical Standards and Specifications*

line and grade stakes at a 100 foot maximum spacing and at all line and/or grade change locations. CONTRACTOR shall provide temporary bench marks at maximum 1000 foot intervals. Minimum pipe depth shall be thirty (30) inches below the finished grade surface or thirty (30) inches below the elevation of the edge of pavement of the road surface whichever is greater.

51.4.5 PIPE LAYING IN TRENCH

CONTRACTOR shall prevent foreign material from entering the pipe while it is being placed in the trench. CONTRACTOR shall remove all foreign material from the pipe or joint ring before the next pipe is placed. If the pipe laying crew cannot put the pipe into the trench and in place without getting earth into the pipe, COUNTY may require that snugly-fitted, tightly-woven canvas bags be placed over each end before lowering the pipe. The bags shall be left in place until the connection is to be made to the adjacent pipe. During laying operations, CONTRACTOR shall keep debris, tools, clothing, or other materials out of the pipe.

51.4.6 LAYING PVC PIPE

All PVC pipe shall be installed in accordance with standards set forth in the UNI-BELL "Handbook of PVC pipe design and construction" unless such standards conflict with this MANUAL in which case this MANUAL shall apply.

51.4.7 LAYING DUCTILE IRON PIPE

All ductile iron pipe shall be installed in accordance with AWWA C600 unless such standards conflicts with this MANUAL in which case this MANUAL shall apply. CONTRACTOR shall cut pipe only as necessary to comply with alignment shown on the PLANS. Flame cutting of pipe shall not be allowed.

CONTRACTOR shall provide special tools and devices, such as special jacks, chokers, and similar items required for proper installation. Lubricant for the pipe gaskets shall be furnished by the pipe manufacturer, and no substitutes shall be permitted under any circumstances.

The pipe shall be polyethylene encased (8 mil) where shown on the DRAWINGS in accordance with ANSI/AWWA A21.51/C105.

51.4.8 LAYING OF PIPES ON CURVES

Long radius curves, either horizontal or vertical, may be laid with standard pipe by deflections at the joints. Maximum deflections at pipe joints and laying radius for the various pipe lengths shall be as recommended by the pipe manufacturer.

51.4.9 PIPE RESTRAINING

Requirements specified in Division III shall apply.

51.4.10 BEDDING AND BACKFILL FOR PIPES

Requirements specified in Division III shall apply.

51.5 HYDROSTATIC TESTS

Requirements specified in Division III shall apply.

51.6 FINAL CLEANING

Requirements specified in Division III shall apply

51.7 DISINFECTION OF WATER MAINS

Requirements specified in Division III shall apply.

51.8 NOTIFICATION AND CONNECTION TO EXISTING MAINS

Requirements specified in Division III shall apply.



51.9 SERVICE PIPING AND CONNECTION

Service piping and connection shall be installed as indicated in the DRAWINGS. The location of all service lines shall be as shown on the DRAWINGS and shall be either single or dual service. On curbed streets the exact location for each installed service shall be marked by etching or cutting a "W" in the concrete curb. Where no curb exists, locations shall be adequately marked by a method approved by COUNTY.

51.10 LOCATION AND IDENTIFICATION

All water mains shall be installed with a continuous, insulated 14 gauge copper wire attached directly to the water main for location purposes. Wire insulation shall be solid blue in color. See DRAWINGS for wire location and installation notes. The wire shall be installed through valve boxes, valve pits, manholes, air release valve structures, etc. and provide sufficient excess such that a loop in the wire can be raised to ground level. An energy source shall be attached to the wire to energize the wire to facilitate location of the wire and pipe using a metal detector. Prior to formal COUNTY acceptance, CONTRACTOR shall demonstrate to INSPECTOR that the wire is continuous and unbroken through the complete run of the pipe by energizing and locating the entire run of pipe with INSPECTOR present.

All PVC water mains shall be blue in color. All lettering shall appear legibly on the pipe and shall run the entire length of the pipe. Lettering shall read as is acceptable for the intended use. All ductile iron force mains shall be marked with a continuous stripe located within the top 90 degrees of the pipe. Said stripe shall be a minimum 2 inches in width and shall be blue in color. Backfill shall not be placed for 30 minutes following paint application.

A 3" wide plastic or aluminum foil warning/identification tape shall be installed no deeper than 12" below finished grade directly above the pipe. A message shall be stamped continuously along the run of the tape stating "CAUTION WATER MAIN BURIED BELOW" or equivalent statement. The tape shall be silver with blue lettering or blue with black lettering.

END OF SECTION

SECTION 52 - POTABLE WATER SYSTEM VALVES, HYDRANTS AND ACCESSORIES

52.1 GENERAL

All valves and appurtenances shall be products of well established firms who are fully experienced and qualified in the manufacture of the particular equipment to be furnished. The equipment shall be designed, constructed and installed in accordance with the best practices and methods and shall comply with these SPECIFICATIONS as applicable.

52.2 RESILIENT SEAT GATE VALVES

52.2.1 GENERAL

All gate valves ten (10) inches and smaller shall be resilient seat gate valves. Such valves shall be resilient seated, manufactured to meet or exceed the requirements of AWWA C509, latest revision, and in accordance with the following SPECIFICATIONS. Valves shall have an unobstructed waterway equal to or greater than the full nominal diameter of the valve.

52.2.2 MATERIAL

The valve body, bonnet, and bonnet cover shall be cast iron ASTM A126, Class B. All ferrous surface inside and outside shall have a fusion-bonded epoxy coating. A 2" wrench nut shall be provided for operating the valve. All valves are to be tested in strict accordance with AWWA C509.

52.2.3 MISCELLANEOUS REQUIREMENTS

The valves shall be non-rising stem with the stem made of cast, forged, or rolled bronze as specified in AWWA C509. Two stem seals shall be provided and shall be of the o-ring type. The stem nut must be independent of the gate.

The resilient sealing mechanism shall provide zero leakage at the water working pressure when installed with the line flow in either direction.

52.3 BUTTERFLY VALVES

52.3.1 GENERAL

All shut-off valves twelve (12) inches and larger shall be Butterfly valves. Butterfly valves and operators shall conform to the AWWA Standard Specifications for Rubber Seated Butterfly Valves, Designation C504, except as hereinafter specified. Valves, except as specified hereinafter, shall be Class 150A or B.

52.3.2 MATERIAL

The valve body shall be constructed of close grain cast iron per ASTM A126, Class B or equivalent material. All retaining segments and adjusting devices shall be of corrosion resistant material. Valve seats shall be a natural rubber or synthetic rubber compound. Valve seats 30 inches and larger shall be field adjustable and replaceable without dismounting operator disc or shaft and without removing the valve from the line. All retaining segments and adjusting devices shall be of corrosion resistant material. Valves 24 inches and smaller shall have bonded or mechanically restrained seats as outlined in AWWA C504.

52.3.3 FACE TO FACE DIMENSION

The face-to-face dimensions of valves shall be in accordance with above mentioned AWWA Specification for short-body valve.

52.3.4 VALVE SHAFT

The valve shaft shall be turned, ground, and polished constructed of 18-8 stainless steel and

*Polk County Utilities Division
Shepherd Road Water Main Extension
Technical Standards and Specifications*

designed for both torsional and shearing stresses when the valve is operated under its greatest dynamic or seating torque. Shaft shall be of either a one piece unit extending full size through the valve disc and valve bearing or it may be of a stub shaft design.

52.3.5 VALVE OPERATOR

In general, the butterfly valve operators shall conform to the requirements of AWWA Standard Specifications for Rubber Seated Butterfly Valves, Designation C504, insofar as applicable.

52.4 VALVE INSTALLATION

All valves shall be inspected upon delivery in the field to ensure proper working order before installation. They shall be set and jointed to the pipe in the manner as set forth in the AWWA Standards for the type of connection ends furnished. All valves and appurtenances shall be installed true to alignment and rigidly supported. Any damage to the above items shall be repaired to the satisfaction of COUNTY before they are installed.

Valves shall be installed in a vertical position and be provided with a standard valve box so arranged that no shock will be transmitted to the valve. The box shall be vertically centered over the operating nut, and the cast iron box cover shall be set flush with the road bed or finished surface.

After installation, all valves shall be subjected to the field test for piping as outlined in Section 51 of these specifications. Should any defects in materials or workmanship appear during these tests, CONTRACTOR shall correct such defects to the satisfaction of COUNTY.

Flanged joints shall be made with hot dipped galvanized bolts, nuts and washers. Mechanical joints shall be made with mild corrosion resistant alloy steel bolts and nuts. All exposed bolts shall be painted the same color as the pipe. All buried bolts and nuts shall be heavily coated with two (2) coats of bituminous paint.

52.5 VALVE BOXES

All buried valves shall have cast-iron three piece valve boxes. Valve boxes shall be provided with suitable heavy bonnets and shall extend to such elevation at or slightly above the finished grade surface as directed by COUNTY. The barrel shall be two-piece, sliding type, having 5-1/4-inch shaft. The upper section shall have a flange at the bottom having sufficient bearing area to prevent settling and shall be complete with cast iron covers. Covers shall have "WATER" cast into the top for all water mains. The actuating nuts for deeper valves shall be extended to come up to 4 foot depth below finished grade.

Care shall be taken while constructing valve boxes to ensure that valve stems are vertical and the cast iron box has been placed over the stem with base bearing on compacted fill and top flush with final grade. Boxes shall have sufficient bracing to maintain alignment during backfilling. CONTRACTOR shall remove any sand or undesirable fill from valve box prior to final inspection.

52.6 AIR AND VACUUM RELEASE VALVES

The air and vacuum release valves for use in water mains shall be installed as shown on the DRAWINGS. The body and base of the valve shall be made from high strength light-weight non-corroding fiberglass reinforced nylon, and all operating parts shall be made from engineered corrosion resistant plastic materials. The rolling resilient seal shall provide smooth positive opening, closing, and leak free sealing over the fluctuation of pressure differentials. The valve shall be designed to allow larger than normal automatic orifice providing efficient air release and minimize potential debris build up and clogging. The working pressure shall be 200 psi and shall have a 2-inch threaded connection. The air and vacuum release valve shall be model APCO – 200A or approved equal. The connection to the system shall be as shown on the DRAWINGS.

52.7 FIRE HYDRANTS

52.7.1 MATERIAL

Fire hydrants shall have 5 1/4 inch valve opening and shall comply with AWWA Standard C502 for fire hydrants for water works service, unless in conflict with MANUAL in which case this manual shall apply. Each hydrant shall have 6-inch mechanical joint ends with harnessing lugs (dog-ears") and shall open by turning to the left (counterclockwise). Fire hydrant shall be of ample length for 3-1/2 foot depth of bury. It shall be provided with two 2-1/2-inch hose nozzles and one 4-1/2-inch pumper nozzle, all having National Standard hose threads. Nozzles shall have caps attached by chains. Operating nuts shall be AWWA Standard (pentagonal, measuring 1-1/2-inch point to flat). Fire hydrants shall be equipped with "O-Ring" packing.

52.7.2 PAINTING

All iron parts of the hydrant both inside and outside shall be painted, in accordance with AWWA C-501. All inside surfaces and the outside surfaces below the ground line shall be coated with asphalt varnish. They shall be covered with two coats, the first having dried thoroughly before the second is applied.

The outside of the hydrant above the finished ground line and hydrant concrete pad shall be thoroughly cleaned to remove all dirt, dust, and debris then painted with two coats of epoxy paint of a durable composition. The epoxy paint applied to the hydrant exterior shall be "international orange" in color.

52.7.3 CONSTRUCTION DETAILS

Hydrants shall be plumb and shall be set so that the lowest hose connection is, at least, eighteen (18) inches above the surrounding finished grade. All hydrants shall be inspected in the field upon deliver to the job to ensure proper operation before installation. The resetting of existing hydrants and moving and reconnecting of existing hydrants shall be handled in a manner similar to a new installation. Hydrant shall be constructed in accordance with the DRAWINGS.

52.7.4 LOCATION

Fire hydrants shall be located in the general location as shown on the DRAWINGS. Final field location of all hydrants shall be as approved by COUNTY. All hydrants shall be located no less than five (5) and no more than ten (10) feet from the edge of pavement of the adjacent roadway and no less than five (5) feet from any physical feature which may obstruct access or view of any hydrant unless otherwise approved by COUNTY.

END OF SECTION