

SECTION 19

WATER PROJECT MATERIALS

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19.1 General

This section provides a description of the materials acceptable for the construction of water systems additions and improvements for the City of Monticello. Use of other materials which are not specified herein shall only be permitted with the written approval by the City and City Engineer.

19.2 Water Mains

A. General

The following materials are acceptable for water mains:

Ductile Iron Pipe (DIP)

B. Water Main Materials

1. Ductile Iron Pipe PR350/PR250

Water main piping shall be ductile iron. DI pipe shall conform to ANSI/AWWA C150/A21.50, Thickness Design of Ductile Iron Pipe and the National Sanitation Foundation Standard No. 61. The material and properties used shall conform to ANSI/AWWA C151/A21.51, Ductile Iron Centrifugally Cast in Metal Molds or Sand Lined Molds, for Water or Other Liquids. The joints, unless otherwise specified, shall be of the push-on type conforming to ANSI/AWWA C111/A21.11. The pipe shall be cement mortar lined, conforming to ANSI/AWWA C104/A21.4 and shall be coated outside with a bituminous coating. The gasketed joint system shall conform to ASTM D 3139. The rubber gaskets shall conform to ASTM F 477.

The pipe shall be pressure rated in accordance with recommendations of the ANSI/AWWA standards. Pressure Class shall be as follows:

**Pressure Class 350 (12" or smaller) and
Pressure Class 250 (14" or greater)**

2. Fabricator Qualifications

Firms regularly engaged in manufacture of water system products of types, materials and sizes required, whose products have been in satisfactory use in similar service for not less than five (5) years. Fabricator must have sufficient production capacity to produce required units without causing delay in work.

3. Lubricant

Lubricant shall be non-toxic and shall not support the growth of bacteria and shall have no deteriorating effects on the gasket or the pipe. It shall not impart a taste or odor to the water in a pipe that has been flushed in accordance with AWWA standard D 601. The lubricant containers shall be labeled with manufacturer's name.

4. Joints

- a. Push-on and Mechanical - Push-on and mechanical joints including all accessories shall conform to AWWA/ANSI Standard C151/A21.51. Bolts shall be high strength cast iron with tee head and hex nuts.
- b. Flanged - Flanged joints shall not be used for underground installations except within structures. Flange joints shall meet the requirements of AWWA/ANSI Standard C151/A21.51 or ANSI B.16. All flanged joints shall be rated for two hundred fifty (250) psi pressure and have ASA 125 lb. bolt pattern. Gaskets for flanged joints shall be cloth impregnated rubber one sixteenth (1/16) inch thick for sizes three (3) inches through eight (8) inches, and one eighth (1/8) inch thick for sizes ten (10) inches and larger. Bolt circle and bolt holes of flanges shall match those of Class 125 flanges per ANSI B16.1.
- c. Bell and Spigot - Bell and spigot joints shall conform to AWWA/ANSI Standard C151/A21.51.

Gasket dimensions shall be in accordance with ASTM F 477 and the manufacturers standard design dimensions and tolerances. The gasket shall be made of such size and shape as to provide an adequate compressive force against the spigot and socket after assembly to affect a positive seal under all combinations of joint and gasket tolerances. The trade name or trademark, size, mold number, gasket manufacturer's mark, and year of manufacture shall be molded in the rubber on the back of the gaskets.

Gaskets shall be vulcanized natural or vulcanized synthetic rubber. No reclaimed rubber shall be used. When too hardness's of rubber are included in a gasket, the soft and hard portions shall be integrally molded and joined in a strong vulcanized bond. They shall be free of porous areas, foreign material and visible defects.

5. Fittings

Fittings shall be ductile iron with mechanical joints, glands and gaskets to properly fit the DI pipe.

The radius of curvature of all bends, tees and other ductile iron fittings shall comply with ANSI/AWWA C110/A21.10 (standard) or ANSI/AWWA C153/A21.53 (compact). Iron fittings shall be as manufactured by DICOA,

Clow, U.S. Pipe or approved equal. Fittings shall have distinctly cast upon them the pressure rating and letters "DI" or "DUCTILE".

6. Tracer Wire

The Contractor shall provide a continuous wire buried in the pipeline trench directly above the water main to facilitate main location. Tracer wire shall be a 12 or 10 AWG Solid extra-high-strength copper-clad steel conductor (EHS-CCS) insulated with a 45 mil minimum, high-density, high molecular weight polyethylene (HDPE) insulation, and rated for direct burial use at 30 volts. EHS-CCS conductor must be a 21% conductivity for locating purposes. HDPE insulation shall be RoHS compliant and utilize virgin grade material. Insulation color shall meet the APWA color code standard for identification of buried utilities. Tracer wire materials shall comply with ASTM B-3, B170, D1248, D1238, and B869. The tracer wire shall also include 2 pound anodes soldered to the tracer wire every 500 feet.

7. Polyethylene Encasement

- a. In some cases, due to soil conditions or as required by the City, polyethylene encasement may be necessary. In such cases, Cross-Laminated Polyethylene encasement materials shall be used for ductile iron pipe, fittings, valves, and fire hydrants. Cross-Laminated Polyethylene tube material shall conform to AWWA C105 with a thickness of 6.5 mils.
- b. The minimum tube size for each pipe diameter shall be as follows:

Nominal Pipe Diameter (Inches)	Polyethylene Flat Tube Width (Inches)	
	Bell & Spigot Joints	Mechanical Joints
6	17	20
8	21	24
10	25	27
12	29	30
16	37	37
20	45	45
24	53	53

- c. Adhesive tape for repairs and circumferential joints shall be a general-purpose adhesive tape two (2) inches wide and approximately twelve (12) mils thick and shall conform to AWWA C209 with a polyethylene backing and a butyl rubber adhesive.

19.3 Gate Valves and Appurtenances

A. Gate Valves (3" - 16")

All gate valves shall be of the resilient wedge type by Waterous Company, St.

Paul, Minnesota. In addition, all buried gate valves shall have non-rising stems with a two (2) inch nut for operating with a tee handle wrench and shall be provided with valve boxes for the proper depth of bury.

All gate valves shall conform to the latest revision of AWWA Standard C-509 covering resilient seated gate valves.

All gate valves shall be non-rising stem, opening counterclockwise by turning the stem, and provided with a two (2) inch square operating nut or handwheel (dependent upon application) with the word "OPEN" and an arrow cast in the metal to indicate direction to open.

The wedge shall be of ductile iron completely encapsulated with urethane rubber. The urethane sealing rubber shall permanently bond to the cast iron wedge to meet ASTM tests for rubber metal bond ASTM D429.

Stems for non-rising stem assemblies shall be cast bronze with integral collars in full compliance with AWWA. OS & Y stems shall be on bronze stock. The non-rising stem stuffing box shall be on the O-Ring seal type with two (2) rings located above the thrust collar; the two (2) rings shall be replaceable with the valve fully open and subjected to full rated working pressure.

There shall be two (2) low torque thrust bearings located above and below the stem collar. The stem nut shall be independent of the wedge and shall be made of solid bronze. There shall be a smooth unobstructed waterway free of all pockets, cavities, and depressions in the seat area.

The body and bonnet shall be coated with fusion bonded epoxy both interior and exterior. Each valve shall have maker's name, pressure rating and year in which manufactured cast on the body. Prior to shipment from factory, each valve shall be tested by hydrostatic pressure equal to requirement of both AWWA and 500 PSI ULFM requirements.

B. Valve Boxes

Valve boxes shall be of cast iron, complete with pavement rings, as applicable, and covers. Cast iron boxes shall be of extension type with screw adjustment and with flared base. The minimum thickness of metal shall be 3/16". The word WATER shall be cast in the cover. Boxes shall be installed over each outside gate valve unless otherwise shown on the drawings. The boxes shall be of such length as will be adapted, without full extension, to the depth of cover required over the pipe at the valve location. A keynut extension shall be installed if the valve nut is greater than four (4) feet in depth.

C. Valve Stem Extensions

Extension rods less than six (6) feet in length shall be made of at least Schedule 80 steel pipe. Extension rods six (6) feet in length or more shall be made of solid steel pipe. All steel shall be of the highest quality capable of operating the valve under severe conditions without permanent distortion. The operating nut connector shall fit the operating nut closely, shall provide four (4) faces to the

operating nut, shall be made of the same type of steel as the extension rod, shall be of welded manufacture, and shall be welded to the extension rod. An extension centering disc shall be located on the stem extension close to the top. An operating nut of the same steel as the extension rod and of the same size and shape as the valve's operating nut shall be placed on the end of the stem extension. The operating nut on the stem extension shall be of welded manufacture and welded to the extension rod. The entire unit shall be painted immediately after manufacture and shall be free of rust or other defects.

19.4 Fire Hydrants and Flushing Hydrants

A. Fire Hydrants

1. The fire hydrants shall be five and one quarter (5¼) inch (main valve opening) with six (6) inch auxiliary valve and connection pipe with break-off flange and coupling assembly. The fire hydrants shall have two (2) 2½" hose nozzles and one (1) 4½" pumper nozzle threaded to meet the requirements of the local Fire Department. Nozzle caps shall be equipped with chains.

All fire hydrants shall be arranged for operation with operating nut of size and shape which is the same as that of the existing fire hydrants, or as specified by the local Fire Department. Pumper nozzle shall have a nominal setting of between eighteen (18) and twenty-four (24) inches above the curb or centerline of road and if necessary, the Contractor shall furnish extensions. Hydrant color shall be per the Owner's request.

2. Hydrants shall have six (6) inch mechanical joint inlets and auxiliary gate valves shall be mechanical joint. The valve should be a minimum of two (2) feet from the hydrant. In no case shall the valve be directly bolted the hydrant flange.
3. The hydrants shall be a "Super-Centurion" by Mueller.
4. All pipe, fittings, and valves shall conform to the applicable specifications included in these Standard Specifications. Connecting pipe and gate valves shall be six (6) inch size.

19.5 Service Connections

A. Service Saddles

Shall be single strap type of all stainless construction with confined "O" ring seal and AWWA thread outlet. Service saddles shall be of a design which will accurately fit pipe (O.D.) to provide a positive seal between main and saddle at the rated working pressure of the main.

The service saddle shall be marked to indicate size of main (O.D.) and outlet size on body and strap. Service saddle shall be Ford Style 101B for service lines up to one (1) inch in size, and 202B for service lines over one (1) inch in size; or

approved equal.

B. Corporation Stops

Shall be brass, designed and manufactured in accordance with AWWA standard specifications C-800 and shall be individually inspected and tested for the leaks at the factory prior to shipment. Corporation stops shall be of a design which will permit use with drilling machines of current design.

Corporation stops shall be ball type furnished with AWWA inlet thread and pack joint outlet for ETS pipe as manufactured by Ford Meter Box Co., Mueller Co. or approved equal.

C. Copper Service Pipe

All copper pipe ("K") service line for water distribution shall conform to all applicable requirements in the latest revision of ASTM and AWWA standards for Copper Tube Size (SDR-9). Per City Ordinance 167, only copper pipe may be used for service lines.

D. Metered Service Installations

1. Metered Connections

a. Metter Setters

Meter setters shall be used for services which are one and one half (1½) inches or larger.

Meter setters shall be copper tube with integral inlet and outlet pack joints for service line. Meter inlet valve shall be brass of the inverted key, angle ball valve type, with "O" ring seal, smooth contour and unobstructed waterway on inlet. It shall have padlock wings, lock cap and seal wire hole. Setter shall be braced between inlet and outlet risers with a structural brass member which shall have a hole at the bottom to accept a one half (½) inch steel, brace pipe. Saddle nuts shall be provided for supporting meter. All setters shall be set and maintained in a vertical position.

Setters for meters shall be manufactured by A.Y. McDonald Mfg. Company or as approved by the City and City Engineer.

b. Meter Yokes

Yokes shall be used when the service line is less than one and one half (1½) inches. For one (1) inch yokes, a Ford Model Y501 yoke shall be used. For three quarter (¾) inch yokes, a Ford Model Y-502 yoke shall be used.

2. Service Meter Enclosures

a. Enclosures for Meters

Meter enclosures for meter yokes shall be a minimum of twenty (20) inches in inner diameter. Enclosures shall be manufactured from PVC or PE and shall be of a ribbed type construction. Nominal wall thickness shall be not less than two (2) inches. Enclosures shall include two (2) 2½" wide slots at the bottom to accommodate service tubing.

b. Covers for Enclosures

Covers shall be cast iron, Wabash Double Lid Covers, four (4) inches deep with an eleven and one half (11½) inches diameter lid opening. Lid to have lifter worm lock with standard pentagon bolt. The words "WATER METER" shall be cast in the top of the lid. Covers shall be similar to Ford Meter Box Company, Model No. W3.

19.6 Tapping Sleeve

The tapping sleeve body shall be fabricated from 18-8 type 304 premium grade stainless steel to minimize corrosion. The body shall be of the full circumference band configuration. The tapping sleeves shall be designed for a water working pressure of one hundred fifty (150) pounds and shall be provided with the necessary test plugs for pressure testing. Dimensions shall be such that the tapping sleeves are installed so as to properly fit the O.D. of the existing pipes. All material shall be in accordance with AWWA Specifications.

Flanges shall be standard AWWA C207 Class D ANSI 150 lb. drilling with epoxy coated finish. Flange shall be recessed to accept tapping valve.

Bolts and nuts shall be 18-8 type 304 stainless steel with heavy hex nuts and 18-8 type 304 L stainless steel stud bolts. Nuts shall be Teflon coated to prevent galling. Washers shall be plastic lubricating type.

Bridge plate shall be 18-8 type 304 and bonded to the gasket to assure even distribution of gasket pressure.

Tapping sleeves shall be as manufactured by Rockwell International, or approved equal.