

SAN ANTONIO WATER COMPANY MATERIALS

SECTION I “CONTROL OF MATERIALS”

1.01 SAMPLES AND TESTS

At the option of the Company, the source of supply of each of the materials shall be approved before the delivery is started and before such material is used in the work.

All tests of materials furnished by the Contractor shall be made in accordance with the commonly recognized standards of national technical organizations and such special methods and tests as are prescribed in these Specifications.

The Contractor shall furnish the Company a certified copy of all requested factory and mill test reports. Any materials shipped by the Contractor from a factory or mill prior to having satisfactorily passed such testing and inspection by a representative of the Company, shall not be incorporated in the work unless the Company has notified the Contractor verbally and/or in writing that such testing and inspection will not be required.

The Contractor shall furnish and deliver to the laboratory such samples of materials as are requested by the Agency without charge. No material shall be used until it has been approved by the Agency and/or Inspector. Samples will be secured and tested whenever necessary to determine the quality of the material. All testing expenses are to be paid by the Contractor.

1.02 DEFECTIVE MATERIALS

All materials not conforming to these Specifications shall be considered defective, and all such materials whether in place or not, shall be rejected and shall be removed immediately from the site of the work unless otherwise permitted by the Agency. No rejected material, the defects of which have been subsequently corrected, shall be used until approved in writing by the Agency.

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SECTION II "PORTLAND CEMENT CONCRETE REINFORCING"

2.01 GENERAL AND CLASSES

All Portland Cement Concrete shall conform to the provisions of Section 201 of the Standard Specifications for Public Works Construction, latest edition, except as herein modified. The cement aggregate content for the various classes of concrete shall be as specified in Subsection 201-1.1.2 of the aforementioned Standards.

2.02 CEMENT

Portland Cement, including Portland Cement used in pre-cast products, shall be Type II or Type V, conforming to ASTM C150.

2.03 PORTLAND CEMENT

Portland Cement Concrete shall be composed of Portland Cement, fine aggregate, coarse aggregate, and water proportioned and mixed to produce a smooth dense workable mixture. It can be of the ready-mix variety as produced by any reliable ready-mix concrete firm.

2.04 REINFORCING STEEL

Reinforcing steel shall be deformed bars from new billet stock or intermediate grade conforming to the requirements of the latest revision of ASTM A15 and A305, and shall be of the required sizes and shapes and placed where shown on the Drawings or prescribed by the Company. The reinforcement shall be so secured in portion that it will not be displaced during the depositing of concrete. All reinforcing steel shall be completely encased in concrete. Wire mesh shall conform to ASTM A185. All bars shall be bent cold and at the time of concrete placement. They shall be free from rust, scale, oil, or any other coating which would reduce or destroy the bond between concrete and steel.

2.05 PRECAST CONCRETE VAULT STRUCTURES

Pre-cast concrete vaults shall be of the style and dimensions as indicated on the Drawings. They shall be made of the class of concrete as specified in Subsection 201-1.1.2 of the Standard Specifications for Public Works Construction. All mortar joints in pre-cast concrete vault sections shall be made watertight. All pre-cast sectional vaults shall be provided with cast-iron frames and covers as specified or shown on the Drawings, and shall be built up so that the cover is flush with the surrounding surface unless otherwise

specified on the Drawings or by the Inspector in the field. The Contractor shall be responsible for placing cover at the proper elevation where paving is to be installed and he shall make all necessary adjustments so that the cover meets these requirements.

2.06 AGGREGATE FOR USE IN CONCRETE

All aggregates for use in concrete shall conform to the requirements as set forth in the Standard Specifications for Public Works Construction, Subsection 200-1. Aggregates shall be of such character that it will be possible to produce workable concrete within the limits of slump and water content in Subsections 201-1.1.2 and 201-1.3.3 of the Standard Specifications for Public Works Construction, latest edition.

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SECTION III “POLYETHYLENE ENCASEMENT FOR DUCTILE IRON PIPE”

1. North Town Company
2. U.S. Pipe
3. Approved equal

3.01 GENERAL

Polyethylene encasement shall be used on all ductile iron pipe and cast iron fittings as required by the Company.

3.02 TYPE

All polyethylene encasement for ductile iron pipe and cast iron fittings shall conform to ANSI 21.5/AWWA C-105.

(A) Polyethylene shall be minimum of 8 mills thick

(B) Color shall be natural (Class A)

(C) Polyethylene encasement may be installed by method A, B, or C as described in ANSI 21.5/AWWA C-105

(D) Tape shall be PVC, two inches wide minimum, adhesive backed, with a minimum thickness of 10 mills.

3.03 SCOPE

Rips, punctures or other damage to the polyethylene encasement shall be repaired with adhesive tape or with a short length of polyethylene, which shall be wrapped around the pipe and secured in place with tape.

(A) A sealed encasement shall be maintained on the pipe with the polyethylene.

1. The polyethylene shall be taped to existing lines and to the ends of other overlap sections.
2. Sections of polyethylene shall overlap each other by one foot.

(B) When polyethylene is used, the bedding and backfill shall be controlled so the polyethylene is not torn or damaged.

1. Sand backfill may be required to a depth of six inches above the top of pipe if suitable native backfill material is not sufficient or as deemed necessary by the Agency's Inspector.

(C) Polyethylene encasement shall also be used at these additional buried locations;

1. Valves and fittings with flanged or mechanical joints
2. Bolted fittings, i.e. couplings
3. Tie-rods, and service connections

Approved manufacturers:

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SECTION IV “DUCTILE IRON PIPE AND STEEL PIPE, POLYVINYL CHLORIDE (PVC)”

4.01 DUCTILE IRON WATER PIPE

Unless otherwise shown on the Drawings or specified herein, ductile iron pipe shall conform to AWWA Standard C-151 (ANSI A21.51). Thickness class shall conform to AWWA Standard C-150/A21.50 or latest revision thereof. Except where mechanical joints or flanged joints are shown on the Drawings, joints shall be of the push-on rubber gasket type, and where shown on the Drawings. Joints shall be in accordance with AWWA Standards C111 (ANSI A21.11). Restraint joint fittings shall be used when shown on the Drawings and shall be in accordance with AWWA Standard C110 (ANSI A21.10). Fittings shall be “TR-Flex” as manufactured by U.S. Pipe, or equal. Restraint push-on joints for pipe and fittings shall be rated for a water working pressure of not less than 250 psi.

(A) LINING AND COATING - All pipe and fittings shall be mortar lined in accordance with the requirements of AWWA Standard C104 (ANSI A21.4). All buried pipe and fittings shall be coated with bituminous outside coating in accordance with AWWA Standard C-151 (ANSI A21.51) for pipe and AWWA Standard C110 (ANSI A21.10) for fittings.

Approved types:

1. Pacific States
2. U.S. Pipe
3. American Ductile

4.02 STEEL PIPE

Steel pipe and fittings shall be manufactured in accordance with AWWA C-200 except as further noted in these specifications. Thickness of steel plate shall be as determined by the formula specified in AWWA C-200 but not less than 10-gauge nominal. the pipe shall be rated for 150 pound per square inch working pressure.

a. Pipe – Pipe shall consist of the following component parts: a welded sheet steel or plate steel cylinder with joints formed integrally with the steel cylinder or with steel joints rings welded to the ends; a dense cement-mortar lining; a dense-cement mortar coated exterior or a tape coating system, as specified; a self centering bell and spigot joint with a circular pre-formed rubber gasket, so designed that the joint will be watertight

under all conditions of service or welded lap joints, or plain end as required.

b. Steel for cylinders – The steel for cylinders shall be hot-rolled low carbon steel sheets conforming to ASTM A283, Class B or C or A570, Class C. The minimum acceptable yield strength of the steel shall be 33,000 psi. Design stress shall not exceed 15,000 psi in any case. Type II cement shall be used for all mortar linings and coatings.

c. Interior of Pipe – Where indicated on plans, steel pipe and fittings shall be cement mortar lined and cement mortar coated (coating required for pipes below grade) in accordance with the requirements of “*Cement Mortar Protective Lining and Coating for Steel Water Pipe - 4 inch and Larger - Shop Applied*” (AWWA C205).

d. Exterior of Pipe – The exterior of pipe shall either be a prefabricated, cold-applied tape coating system in accordance with AWWA C214 or cement mortar coating in accordance with AWWA C205.

e. Bell and Spigot Joints – Bell and spigot joints shall be made with rubber gaskets restrained or confined to an annular space in such manner that movement of the pipe or hydrostatic pressure cannot displace the gasket. Spigot and bell ends shall be formed by cold rolling or swaging or hot die and mandrel process. The deformation of the gasket in the joints of the installed pipe shall not exceed 45 percent nor less than 20 percent of the stretched gasket diameter.

f. Welded Field Joints – Welded field joints shall meet the requirement of AWWA C206.

g. Flange Joints – Flanged joints shall meet the requirement of AWWA C207. Steel slip-on and welding-neck flanges for flanged joints, where required, shall be 150 pound forged steel flanged conforming to ANSI B16.5, or they may be steel plate ring flanges conforming to AWWA C207, Class D with hubs omitted. Blind flanges shall also conform to the foregoing. Flanges shall be flat faced, suitable for use with full-face gaskets. Faces of flanges shall have a serrated finish of approximately 32 serration's per inch and approximately 1/64 inch deep. Serration's may be either spiral or concentric. Slip-on flanges conforming to ANSI B16.5 may be faced prior to welding to the pipe or fitting to which they are

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attached, provided that care is exercised in the welding process to prevent warping of the flanges. Final machining of the contact faces of slip-on flanges conforming to AWWA C207 shall be performed after the flange has been welded to the pipe. Flanges shall be attached to the pipe and fittings and installation of the pipe and fittings shall be such that the boltholes straddle the vertical axis of the pipe.

Flange gaskets shall be ring types. Thickness shall be 1/16 for pipe 18-inches and smaller, and 1/8-inch for larger pipe. Flange assembly bolts shall be standard hexagon head machine bolts with heavy hot pressed hexagon nuts. Threads shall conform to ANSI B1.1, coarse thread series, Class 2 fit. Bolt length shall be such that after the joints are made up, the bolts shall protrude through the nut, but not more than 1/2 inch. Flanges on steel pipe shall be welded to the pipe in accordance with AWWA C207.

Approved Manufacturer:

1. Johns-Manville Style 60S
2. Granite
3. Or equal

h. Diameters – Diameters shown for steel pipe and larger than 12-inches indicate required inside diameter after lining. Steel pipe 12-inches in diameter and smaller shall be standard mill diameters.

i. Special Fittings

1) Wherever pipeline has a bend exceeding the allowable deflection, a special fitting is required. The special fitting shall be fabricated in accordance with this Section. Specials shall extend a minimum distance back from the last weld equal to 1/2 the diameter of the pipe, but not less than 12 inches. The Contractor shall furnish and install specially fabricated specials and bends for closures, curves, bends, reducers, and connections to valves. The specials and bends shall have a minimum design equal to the adjoining pipe. Steel plates used in the fabrication shall conform to ASTM A283, Grade B or C, and shall not be stressed more than 13,500 psi at the design pressure. Fittings shall conform to applicable sections of AWWA C208 and C206. The minimum wall thickness of all specials shall be 0.1875 inches unless otherwise noted.

2) All piping specials shall have a minimum wall thickness of the largest class pipe, which it joins. Wire reinforcement, either Spiral Wire

Reinforcement or Wire Fabric Reinforcement shall conform to either ASTM A82 or A185. Fabric shall be sufficiently lapped to secure the full strength of the mesh.

3) Ends of fittings shall be compatible with the pipe to which they connect.

j. Testing – Testing of fittings shall be dye penetrant method. All testing shall be certified by the manufacturer and shall be stamped with legible identification.

k. Bends – Unless otherwise indicated, bends shall have minim centerline radius of 2-1/3 times its diameter. The maximum deflection at a metered girth seam shall be 22-1/2 degrees.

l. Outlets – Collars wrappers on outlets shall have a minimum thickness determined by the following:

$$T = \frac{P \times D_p \times D_o}{36,000 \times W}$$

Whereas,

T=Thickness of collar or wrapper in inches

P=Design pressure in pounds per square inch

Dp=Inside diameter of pipe cylinder, in inches

Do=Diameter of opening (major axis in ellipse), in inches

W=Width of collar or wrapper in inches

The width of the collars or wrappers shall be not less than 1/3 or more than 1/2 the inside diameter of the outlet, measured on the surface of the cylinder. Where specifically called for in lieu of collars or wrappers, crotch plates may be used on outlets larger than 12 inches in diameter. The design of crotch plates shall be based on AWWA Manual No. 11.

m. Long Radius Curves – Horizontal and vertical long radius curves may be formed of straight pipe by taking small angular deflections at the bell and spigot joints, not exceeding the published allowable deflections.

n. Rubber Gaskets – The gaskets for joints shall be circular, free from imperfections, dense, and consist of first grade natural rubber or synthetic rubber, or a suitable combination of both. Baskets shall conform to the following physical requirements when tested in accordance with Federal Test Methods Standard No. 601.

Tensile Strength, Natural Rubber 2,700 psi

Tensile Strength, Synthetic Rubber 2,300 psi

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Elongation at Rupture, Minimum 4.75%
Specific Gravity 1.15 to 1.25
Compression Set Test, Maximum 15%
Shore Durometer, Type A 50 –60
Tensile Strength After Aging,
Minimum of Original 80%

3. Vinyltech

o. Markings – The following shall be clearly stenciled on each pipe section:

Class.
Internal diameter in inches.
Name of manufacturer.
Date of manufacture.

p. Drawings – Prior to the manufacture of any pipe, the Contractor shall submit for approval detailed drawings of the pipe layout, including the required pull at each pipe joint which may be necessary to construct the pipeline in accordance with the drawings.

q. Protection of Buried Couplings – Buried couplings and adjacent portions of buried steel pipe not having the pipe manufacturer's cement mortar coating, shall be protected against corrosion by the mortar and diaper method. The diaper shall be made of Tytar or other suitable fabric with porosity low enough to prevent the loss of cement from the grout. The fabric shall be hemmed on each edge, with a steel wire or strap contained within each hem. The hemmed diaper fabric shall be of length and width as recommended by the diaper manufacturer for the intended application.

Approved Manufacturer's:

1. Mar-Mac Manufacturing Co.
2. or approved equal

4.03 PVC WATER PIPE

PVC shall be made from all new rigid unplasticized polyvinyl chloride. PVC pipe shall be Class 150 unless otherwise noted on the drawings and shall conform to the requirements of AWWA C900 "Standard for Polyvinyl Chloride (PVC) Pressure Pipe, 4-inch through 12" for water". PVC Pipe shall be furnished in cast-iron pipe equivalent **outside diameters with rubber gasketed couplings.**

Approved pipe:

1. J-M Pipe (Johns-Manville)
2. PW Pipe (Pacific Western)

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SECTION V “CAST IRON FITTINGS”

5.01 GENERAL

All cast iron fittings shall comply with the latest revision of AWWA Standard C110, “Cast Iron Fittings, 3 inches through 48 inches for Water and Other Liquids”. All fittings will be made in the United States of America, no substitutions will be allowed unless pre-approved by Agency.

Unless otherwise specified, the inside coating for fittings shall be cement lined as thick as practicable, and conform to all appropriate requirements for seal-coat in the latest revision of AWWA Standard C104.

The exterior surfaces shall be coated with a bituminous material in conformance with AWWA Standard C110. The coating shall be free from blisters and holes, shall adhere to the metal surface at all temperatures encountered in the field, shall be smooth, and shall not become sticky when exposed to the sun. The coating shall be checked by the manufacturer with a suitable electrical holiday detector.

If specified in the Bidding Documents, each fitting shall be tested to 1-1/2 times the working pressure for a duration of ten seconds. Suitable controls and recording devices shall be provided so that the test pressure and duration may be adequately ascertained. Any fitting that does not withstand the test pressure shall be rejected. The Contractor may be required to notify the Agency in advance of the date, time, and place of inspection and testing of the fittings in order that the Agency may be represented at the tests. When specified in the Bidding Documents, a certification of compliance to these Specifications shall be filed with the Agency.

(A) STANDARD CAST IRON FITTINGS -

Standard bell and spigot cast iron pipe fittings shall conform to the requirements of the “American National Standard for Ductile-Iron and Gray-Iron Fittings, 3 inch thorough 48 inch for Water and Other Liquids” (AWWA C110). Standard flanged cast iron fittings shall conform to the requirements of the “American Standard for Cast Iron Pipe Flanges and Flanged Fittings” (ANSI B16.1), Class 125.

(B) SHORT BODY CAST IRON FITTINGS - (Push-on fittings or flange x push-on for PVC

only). Short body cast iron fittings shall conform to the requirements of the “American National Standard for Ductile Iron Fittings, 3 inch through 16 inch, for Water and Other Liquids” (AWWA C153). Fittings shall have a wall thickness of not less than that of the pipe with which they are used.

Approved manufacturers:

1. Tyler
2. Union Foundry
3. U.S. Pipe

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SECTION VI "TYPES OF JOINTS"

6.01 TYPE

The joints shall be as specified on the Drawings and detailed therein.

6.02 FITTINGS FOR DUCTILE IRON

Fittings shall be cast iron (gray or ductile) in accordance to the applicable requirements of AWWA Standard C110 (ANSI A21.10). The ends of the fittings shall be push-on, rubber gasketed type, mechanical or flanged joints, as required or shown on the Drawings. Restraint joint fittings shall be used when shown on the Drawings and shall be in accordance with AWWA Standard C110 (ANSI A21.10). Fittings shall be "TR-Flex" as manufactured by U.S. Pipe, or equal. Restraint push-on joints for pipe and fittings shall be rated for a water working pressure of not less than 350 psi.

6.03 FLANGES

Unless otherwise indicated on the Drawings, all cast iron fittings with flanged ends shall comply with the latest version of ANSI B16.1, "Cast Iron Pipe Flanges and Flanged Fittings, Class 125".

The gasket surface shall have a serrated finish of approximately sixteen serrations per inch, approximately 1/32 inch deep, with serrations in either a concentric or spiral pattern. In addition, all flanges shall meet the following tolerances:

Bolt circle drilling	(plus or minus)	1/16 inch
Bolt hole spacing	(plus or minus)	1/32 inch
Eccentricity of bolt circle and facing		1/32 inch
(with respect to bore)		maximum

Approved manufacturers:

1. Tyler
2. Union Foundry

6.04 GASKET MATERIAL FOR FLANGES

Gaskets for flanged joints shall be made of asbestos composition sheet packing, graphitized on both sides, 1/16 inch in thickness. Gaskets shall be of a quality equal to Crane Company, Granite, Johns Manville 60 Asbestos, or Garlock 7071.

6.05 BOLTS AND STUDS FOR FLANGED FITTINGS

Bolts and studs shall be cadmium plated and shall conform to ASTM A307, Grade B, "Steel Machine Bolts and Nuts and Tap Holes", when a ring gasket is used and shall conform to either ASTM A261, "Heat Treated Carbon Steel Bolting Material", or ASTM A193, "Alloy Steel Bolting Material for High Temperature Service", when a full face gasket is used.

Bolts and nuts shall be heavy hexagon series, Nuts shall conform to ASTM A194, "Carbon and Alloy Steel Nuts for Bolts for High Pressure and High Temperature Service", either in Grade 1,2 or 2H. The fit shall be ANSI B1.1, "Unified Screw Threads", Class 2, except that Class 3 fit shall be used in holes tapped for studs. Threads may be made by either cutting or cold forming. Between 1/4 inch and 3/8 inch shall project through the nut when drawn tight.

6.06 COUPLINGS

Flex coupling, center and end rings shall be ductile iron and shall conform to ASTM A536 Grade 65-45-12. Gaskets shall be virgin SBR compounded for water and sewer service and conform to ASTM alloy steel for AWWA C-111-64 specifications.

Flex couplings are to be used as called out per plan on steel tie-ins only.

Approved manufacturers:

1. Romac 501 series only (no substitute)

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SECTION VII "RESILIENT WEDGE GATE VALVES"

7.01 GENERAL

All valves shall be new and of current manufacture. Valves shall only be installed where specifically called for on the construction plans approved by the Agency.

The laying lengths and the end flanges of flanged valves shall conform in dimensions and drilling to ANSI B16.1 for Cast Iron Flanges and Flanged Fittings. Flanges of valves designed for a working pressure of 175 psi or less shall be faced and drilled to a 125 pound American Standard Dimension. Flanges of all valves designed for a working pressure of greater than 175 psi shall be faced and drilled to a 260 pound American Standard Dimension.

Push-on joints shall conform to the requirements of ANSI/AWWA C111/A21.11.

Each valve shall be tested under a test pressure equal to twice its design water working pressure.

The Contractor is to make a choice of an approved valve and then use it throughout the total project.

7.02 RESILIENT WEDGE GATE VALVES

Resilient wedge gate valves shall conform to the latest revision of AWWA C509, "Standard for Resilient Wedge Gate Valves for Ordinary Water Works Service". Resilient wedge gate valves shall be designed for a water working pressure of 200 psi and shall be iron bodied, non-rising stem opening to the left, and provided with two o-ring stem seals and a two inch square operating nut. All interior parts of gate valves, except the gate, shall be constructed of bronze conforming to the requirements of ASTM B62. All ferrous parts of the valve, inside only except the gate, shall be coated with fusion-bonded epoxy in accordance with the latest revision of AWWA C-550. The gate shall be fully encapsulated in molded rubber conforming to the requirements of ASTM D2000. The manufacturer's name or symbol, the size of the valve, the year of manufacturer, and the working water pressure shall be cast in the bonnet or body of the valve. Each valve shall be tested to twice the working pressure. Valves shall be furnished with ends as specified on the plans or by the Inspector.

The interior of all valves shall be fusion-bonded epoxy-coated to a thickness of 6-8 mils of epoxy.

Approved types:

- 1.** Mueller
- 2.** American AVK
- 3.** Clow
- 4.** M & H

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SECTION VIII “BUTTERFLY VALVES”

8.01 GENERAL

Butterfly valves shall be furnished and installed by the Contractor at the location and in accordance with the type of ends as shown on the Plans and as herein specified.

All butterfly valves shall be tight closing, with rubber seats, which are recess mounted and securely fastened to the valve body or fastened to the disc. Valves shall be bubble tight at rated pressures and shall be satisfactory for applications involving valve operation after long periods of inactivity. Valve discs shall rotate 90 degrees from the full open position to the tightly shut position. Valves shall meet the full structural requirements of the applicable classes of latest revision of AWWA C504. The manufacturer shall have manufactured tight closing rubber seated butterfly valves for a period of at least five years.

Valve bodies shall be constructed of cast iron ASTM A126, Class B. Flange drilling shall be in accordance with ANSI B16.1 Standard for cast iron flanges. Two trunnions for shaft bearings shall be integral with each valve body. Body thickness shall be strictly in accordance with the latest revision of AWWA 504. The interior of the valve body shall be fusion-bonded epoxy-coated with 8-10 mils of epoxy or factory applied thermosetting epoxy.

Shafts of all valves shall be turned, ground, and polished. Valve shafts shall be constructed of 18-8, Type 304 stainless steel or high tensile strength carbon steel, provided the shaft is sealed from the line contents and shall be a one piece unit extending full size through the valve disc and valve bearings.

Valves shall be fitted with sleeve type bearings. Bearings shall be corrosion resistant and self-lubricating. Bearing load shall not exceed 2,500 psi.

Valve operators shall be designed to hold the valve in any intermediate position between fully opened and fully closed without creeping or fluttering. Valve operators shall be of the enclosed gear or screwed rod type manufactured specifically for buried service operation. Orientation of actuator shall be on left side of valve when viewed through valve from the flanged

end. Valves shall open with a counterclockwise or left rotation of the operator nut. All butterfly valves shall have the minimum shutoff pressure rating of 150 psi.

Approved types:

- 1.** Henry Pratt Company
- 5.** Mueller
- 6.** M&H

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SECTION IX “WATER HYDRANTS AND MISCELLANEOUS VALVES”

9.01 WATER HYDRANTS

Water hydrants shall conform to the latest revisions of AWWA C502. Fire hydrants shall have one 2-1/2 inch hose nozzle and one 4-inch steamer nozzle and a 6-inch minimum size valve opening. Hydrants shall be furnished with street level “break-away” feature. Nozzles shall have National Standard fire threads. The bury shall have a 6 inch mechanical joint connection for ductile iron pipe, unless otherwise noted. The hydrants shall be furnished with epoxy-lined shoes and an o-ring type stuffing box. The operating and cap nut shall be the standard 1-1/2 inch pentagon shape, with operation counterclockwise or left-hand opening. The hydrants shall be furnished complete with an adequate bury whose depth shall be determined by field conditions.

Approved types:

1. Clow/Rich Model 810
2. American AVK
3. Jones

9.01.1 FIELD PAINTING

All hydrants shall be surface prepared to receive paint by scraping and wire brushing, and shall be painted with one (1) coat of surface primer and two (2) coats of finish paint. The paint shall be Chex-Rust Primer and Safety Yellow peed Tec 313-02 finish, as manufactured by Fuller Paint company; or 1069 Heavy Duty Rust Inhibitive Red Primer and 9348 Safety Yellow finish coat, as manufactured by Rust-Oleum, or approved equal paint system using compatible primer and finish supplied by one manufacturer.

9.02 WATER PRESSURE REDUCING VALVES

Water pressure reducing valves shall maintain a constant downstream pressure regardless of fluctuations in demand and shall also close tight when a pressure reversal occurs. The valve shall be hydraulically operated, pilot controlled, diaphragm type with cast iron body and stainless steel trim. The main valve shall have a single removable seat and a resilient disc. No external packing glands are permitted, and there shall be no pistons operating the main valve or any pilot controls. The valves shall have a pressure rating of not less than 150 psi, shall have 125lb or 250lb flanges, and shall have an adjustable downstream

pressure range with a downstream setting as required.

Approved valves:

1. Cla-Val #90

9.03 AIR RELEASE AND VACUUM VALVES

Valves shall be of the size shown and shall have flanged or screwed ends to match piping. Bodies shall be of high strength cast iron. The float, seat, and all moving parts shall be constructed of Type 18-8 stainless steel. Seat washers and gaskets shall be of material ensuring water tightness with a minimum of maintenance. Valves shall be designed for minimum 150-psi water-working pressure. Unless otherwise noted, valves shall be combination air release and vacuum valves.

Approved valves:

1. APCO/Bulletin 623, #143C (1”) #145C (2”)
2. Crispin
3. Golden-Anderson Valve Specialty Company
4. or approved equal

9.04 PRESSURE GAUGES

Unless otherwise shown, pressure gauges shall be plain case, bottom connection with bronze bourdon tube and bronze or stainless steel movement. Gauge accuracy shall be plus or minus 1 percent of full scale. Range shall be shown. Dial size shall be 4-1/2 inches. Gauges shall be liquid filled with glycerin or silicone.

Gauge protectors shall be provided. Protectors shall be flanged diaphragms having a stainless steel diaphragm and 1/2-inch connection.

Approved gauges:

1. Irrrometer

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SECTION X “SERVICE MATERIAL”

10.01 SERVICE SADDLES

For all services, one inch and smaller, one inch service saddles shall be used. One-inch size service saddles shall be of the single strap type for pipe sizes 4 inch through 8 inch. One-inch size service saddles shall be on the double-strap type for pipe sizes 12" and above. For services larger than one inch, all saddles shall be double strapped regardless of pipe diameter. Saddles used on all PVC pipe shall have bronze castings with solid stainless steel straps. Service saddles for steel and ductile iron pipe shall have castings manufactured with malleable iron with straps of carbon steel electrogalvanized with Dichromate Seal.

All other service saddle castings shall be bronze with bronze straps and all bronze nuts. Gaskets shall be of a self-sealing o-ring manufactured to resist acids, alkalis, water, natural gas, and oil.

Threads shall be iron pipe size.

Service saddles for ductile iron pipe and steel pipe shall be:

Approved saddles:

1. Smith Blair
2. Ford
3. or approved equal

10.02 CORPORATION STOPS

Corporation stops shall be manufactured of water works bronze alloy conforming to ASTM B62, "Composition Brass or Ounce Metal Castings". The Inlet fitting shall be a male corporation stop IPS thread when used with the saddle and the outlet connection shall be suited for galvanized pipe.

Approved corporation stops:

1. Ford
2. or approved equal

10.03 PIPE

Service lines for meters and air/vacs shall be galvanized and conform to the requirements of the "Specifications for Black and Hot-Dipped Zinc – Coated (Galvanized) Welded and Seamless Steel Pipe for Ordinary Uses" (ASTM Designation A120), and shall be standard weight unless otherwise shown. Fittings shall be of galvanized malleable iron, unless otherwise shown.

10.04 ANGLE METER STOPS

Angle meter stops shall be manufactured of water works bronze alloy conforming to ASTM B62, "Composition Brass or Ounce Metal Castings". The outlet fitting shall be a female IPS thread and the inlet connection shall be suited for polyethylene water service pipe. All angle meter stops shall have the ability to be locked in the closed position.

Approved angle meter stops:

1. Ford
2. Mueller

10.05 BRONZE GATE VALVES

Gate valves shall be manufactured of bronze conforming to ASTM B62, "Composition Brass or Ounce Metal Castings". It shall have a wheel type handle with a non-rising stem and inside screw bonnet. Both connections shall be manufactured with iron pipe size threads.

Approved bronze gate valves:

1. Stockham
3. or approved equal

10.06 CURB STOPS

Curb stops for 1 inch and smaller services shall be manufactured of bronze alloy conforming to ASTM B62, "Composition Brass or Ounce Metal Castings". The inlet and outlet shall be a female IPS thread. All curb stops shall have the ability to be locked in the closed position.

Approved type:

1. Jones

Curb stops for service connections larger than 1 inch shall be a ball type valve. Curb stops shall be manufactured of bronze alloy conforming to ASTM B62, "Composition Brass or Ounce Metal Castings". The stems shall be sealed with double o-rings manufactured with Buna-N rubber. The ball valve shall be seated in a Buna-N molded rubber seat. The inlet and outlet connections shall be female IPS threads. All curb stops shall be provided with a ball valve lock cap manufactured of bronze alloy conforming to ASTM B62.

Approved type:

1. Jones

10.07 METER COUPLINGS

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Meter couplings 3/4" and 1" shall be manufactured of bronze alloy conforming to ASTM B62, "Composition Brass or Ounce Metal Castings". The connections shall be male IPS thread on one side and the other side shall be a swivel meter-coupling nut with a washer.

Approved meter couplings:

1. Jones

10.08 DIELECTRIC UNIONS

Provide dielectric unions between ferrous and nonferrous piping and between piping of dissimilar metal. Materials shall be galvanically compatible with the piping to which it is attached and pressure ratings shall be suitable for system working pressures. Unions 2-inch and smaller shall be screwed or solder-joint types. Dielectric unions shall be as distributed by EPCO Sales Inc., of Cleveland, Ohio, Capitol Insulation Unions, or equal.

10.09 MISCELLANEOUS FITTINGS

All fittings such as tees, nipples, ells, etc. that are to be manufactured of a bronze alloy shall conform to ASTM B62 and ANSI 16.15. Threaded ends shall be male IPS or female IPS as required.

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SECTION XI “HOT TAP MATERIAL”

11.01 TAPPING SLEEVES

Tapping sleeves and flange shall be constructed of Type 304 stainless steel and be rated for a minimum 150 psi working pressure.

Outlet shall include 3/4-inch NPT brass or Type 304 stainless steel test plug with standard square head.

Outlet flange shall be recessed to accept standard tapping valves and conform to AWWA C207 Class D, ANSI 150lb drilling. Boltholes shall straddle pipe centerline.

All welds shall be fully passivated. Nuts and bolts shall be Type 304 stainless steel with NC threads. All bolt threads shall be coated for lubrication to prevent galling. Washers shall be lubricating plastic.

Body gasket shall be gridded virgin SBR (Styrene Nutedene Rubber) or GPR (General Purpose Rubber) compounded for water service.

Approved manufacturers:

1. Romac style “SST”
2. Ford style “FAST”
3. Smith Blair #663
4. JCM #432
5. or approved equal

11.02 TAPPING VALVES

All tapping valves shall conform to the latest revision of AWWA C-509. All valves shall have flanged inlets and be Class 125, ANSI B16.1. The outlet shall be of the type specified on the “Construction Plans”. Tapping valves, when used as specified above, must be compatible with the approved tapping sleeves as indicated in the “Materials Section”, Subsection 11.01, “Tapping Sleeves”.

Otherwise, the use of standard valves for “Hot Tapping” will be allowed and shall conform to the “Materials Section”, Subsection VII. All adapters for tapping machines shall be in accordance with the recommended manufacturers specifications for tapping valves/machines.

All approved types of valves shall be as indicated in the “Materials Section”, Subsection VII.