

SECTION 2

WATER MAIN CONSTRUCTION

VALVES AND FIRE HYDRANTS FOR WATER DISTRIBUTION

1. SCOPE: This section shall include the furnishing of all types of valves and fire hydrants and all other incidentals required for the construction of a complete water system as shown on the drawings and as specified herein. Unless otherwise noted, the materials listed below are acceptable to the District for use in water distribution systems. Should the Contractor desire to use other materials not listed in these specifications, written permission must be obtained from the District.

All material shall be free from defects impairing strength and durability and be of the best commercial quality for the purposes specified. It shall have structural properties sufficient to safely sustain or withstand strains and stresses to which it is normally subjected and be true to detail.

Valves supplied shall be of the designations and description indicated on the plans or described herein.

2. SUBMITTALS: The Engineer shall submit to the District three (3) copies of all submittal data for review and/or approval. Submittals shall include at a minimum: (1) The manufacturer's name, (2) type of material, (3) ASTM, ANSI, AWWA or other quality standard, and (4) pressure class. If the materials do not meet the quality standards specified, the submittals will be rejected and other materials submitted as specified. The Contractor must obtain approval of all valves and fire hydrants prior to commencing construction.

3. DELIVERY, STORAGE AND HANDLING OF VALVES AND HYDRANTS: Units shall be delivered, handled and maintained in a manner to avoid damage to the valves. The materials shall be stored in an open area on high, well-drained land not subject to flooding, mud or other means of contamination. Hydrants and valves should be stored so as not to allow water, debris, or other material to collect inside thus allowing contamination.

4. GATE VALVES: Gate valves shall conform with AWWA C-509 or C-515, latest revision covering resilient seated gate valves and be approved by ULFM. The wedge shall be of cast iron completely encapsulated with rubber. The sealing rubber shall be permanently bonded to the cast iron wedge to meet ASTM tests for rubber metal bond ASTM D429. All gate valves shall have bronze stems. All gate valves shall be manufactured by Mueller, M & H, or American Darling only.

Valves for buried use shall be NRS with 2-inch square operating nut. Valves for aboveground use shall be OS&Y design with handwheel. Valves shall be manufactured with "O" Ring stem seals.

All valves 24" and larger shall be equipped with gearing and approved packing.

Valve ends shall be of the size and type required for connections to the type service line used, i.e. valves with AC pipe bells shall not be adapted to PVC pipe. Standard connections shall be as follows:

Ductile Iron Pipe - Bolted Mechanical Joint

PVC Pipe - Bolted Mechanical Joint

D.I. Hydrant Leg - Bolted Mechanical Joint

Pressure ratings for the valves shall be as follows:

SIZE	WORKING PRESSURE	HYDROSTATIC TEST PRESSURE (SHELL)
2"-12"	200 psi	400 psi
14"-24"	150 psi	300 psi

5. **BUTTERFLY VALVES:** Butterfly valves shall conform with AWWA C-504, latest revision. All valves for buried service shall have cast iron bodies with integrally cast mechanical joint ends conforming with AWWA C-111, latest revision. Valves for aboveground use shall be short bodied with flanges conforming with ANSI B16.1, latest revision.

The valve discs shall be designed to rotate 90 degrees from full open to tight shut position and shall have adjustable mechanical stops to govern the rotation of the disc. The valve shall have Buna-N or Buna-S valve seats with bronze or stainless steel seating rings. The stuffing boxes shall be integrally cast with the valve body. The shaft bearings shall be of the self-lubricating sleeve type with thrust bearings to keep the valve disc centered.

Butterfly valves shall be pressure class 200 unless otherwise noted on the plan or scheduled in the bid items.

6. **SWING CHECK VALVES:**

A. **Valves Size 2 ½ Inch to 12 Inch:** Swing check valves shall conform with AWWA C-508 latest revisions. Unless specified and approved by the District, all check valves shall be produced with a cast iron body and cover. Valves shall be supplied with outside lever and weights or lever and springs as specified by the District. Valves shall be coated internally and externally with epoxy conforming with AWWA C550. The swing disc shall be internally weighted or spring loaded and constructed of composition or bronze with rubber seats. Valves shall be rated at 175 Lb. service water pressure or 200 Lb. WOG. 3” and larger swing check valves shall have flanged ends.

Valves shall be designed for uninterrupted continuous service with minimal maintenance and industry leading reliability.

B. Valves Size 2" and Smaller: Small swing check valves shall have bronze body with female NPT ends. Valves shall be designed for uninterrupted continuous service with minimal maintenance and industry leading reliability.

Valves for use in aboveground installations shall be flanged with side spring and lever or when positioned horizontally weight and lever may be used. Valves for underground service shall have mechanical joint ends with an internally weighted swing disc.

7. VALVE BOXES: Valve boxes shall be of close-grained gray cast iron. The valve boxes shall be the two piece screw type and the cover or cap shall have cast on the upper surface in raised letter the word "Water". Valve boxes shall be made with an integral base which measures 8 ¾" in diameter by 9" high. The base will cover only the stuffing box of the valve 10" and smaller. Valve boxes shall be painted with a coat of protective bituminous paint before being shipped from the factory.

8. CONCRETE VALVE MARKERS: Concrete marker poles shall be installed for all valves, air release valves, and buried blow-off assemblies which shall indicate the direction to the valve. Markers shall be in the style and numbers as determined by the District. Markers shall indicate "MV" for main line valves, "ARV" for air relief valves, and "BO" for blowoffs. Where concrete curbing is installed along roadways, the Contractor shall engrave the above referenced abbreviations into the concrete curbing to allow for future reference of the valves, air release valves, and buried blow-off assemblies.

9. CONCRETE VALVE PROTECTOR RINGS: Concrete protector rings shall be installed as specified around all valve boxes to protect the valve box and for future identification purposes. The concrete protector rings shall have #3 rebar reinforcement on 14" and 23" diameters measured from the center of the valve box hole. The rings shall measure 27" in diameter with a maximum height of 4".

The valve box hole shall measure a minimum of 9" in diameter. The concrete protector rings shall be installed so as to allow the valve box to be installed at the bottom of the protector ring which prevents the valve box from receiving damage if the protector ring is moved accidentally.

10. FIRE HYDRANTS: Fire hydrants shall conform with the AWWA C-502 latest revision, and shall meet UL 246 and FM approval. All fire hydrants shall be rated for working pressure of at least 200 p.s.i. and shall be tested by the factory at least 400 p.s.i. testing pressure. All fire hydrants shall confirm to the following design standards.

A. Fire hydrants shall be of the dry barrel compression type, with a 4 ½" valve opening designed to close against line pressure. All operating parts shall be bronze. The maximum operating torque to open or close the hydrant shall not exceed 20 ft. lbs. at 50 p.s.i..

B. Hydrants shall have a minimum of 36" below grade and shall stand approximately 30" above surface elevation. The distance from the bury line cast on the barrel to the center line of the nozzles shall be 18 inches.

C. Hydrant barrels (upper and lower) and shoe shall be cast of gray and/or ductile iron meeting ASTM A226, Class b. All barrels shall have flanges utilizing a flat rubber gasket ASTM A2000, for the seal or an O-ring.

D. Hydrants shall be furnished with a sealed oil or grease reservoir located in the bonnet, so that all threaded and bearing surfaces are automatically lubricated. Teflon washers shall be used for ease of operation.

E. Hydrants shall be furnished with a breakaway feature that will break cleanly upon impact. This shall consist of a two part, double notched breakable flange with a plated steel or a stainless steel stem coupling. Stem coupling design shall include pinned connectors rather than threaded.

F. The seat ring shall be bronze and be threaded into a bronze drain ring located between the lower barrel and shoe forming an all bronze drainway with a minimum of two drain valve openings. The main valve shall have rubber, ASTM D 2000, minimum 1 inch thick.

G. All hydrants will be cast marked on the outside such that visible identification can be made as to type and design.

H. Hose and pumper nozzles shall be threaded or leaded-in nozzles with caps and chains supplied.

I. Operating nut shall be 1-1/2" pent. and shall open counter-clockwise.

J. Maximum pressure loss allowable thru the 4 1/2" pumper nozzle shall be not greater than 1000 GPM at 5.5 p.s.i. or 7.9 p.s.i. at 1500 gpm flow based on 5 foot bury with a 6 inch diameter inlet.

K. All suppliers of hydrants shall include: A) A detailed drawing to include a parts list indicating the material construction and applicable ASTM standards for each part or item, B.) Flow data for the proposed hydrant, and C.) Operating torque.

L. Fire hydrants shall have a 4 1/2" main valve opening and shall be Mueller "Super Centurion 250" catalog number A-421, M & H 129, or American Darling "AFC Mark 73, 4 1/2" only. All fire hydrants shall be "open left" type only.

All hydrants shall receive two (2) exterior shop coats of paint as specified by AWWA C-502. In addition, one finish exterior coat of paint may have to be applied after construction operations are complete. The correct color of each hydrant barrel shall be ordered from the manufacturer by the contractor to follow the most current color code system or as follows: 6" main

water lines indicate red in color, 8” main water lines indicate red in color, 10” main water lines indicate red in color, 12” main water lines indicate yellow in color, 16” main water lines indicate white in color, 24” main water lines indicate white in color. When the engineer may know the anticipated flow of the hydrant, all bonnets and caps shall be ordered from the manufacturer by the contractor to follow the most current color code system of the District.

The paint used shall comply with the following schedule:

MANUFACTURER	SHOP PRIMER	FINISH COAT
Tnemec	37-77	Tneme-Coat
Koppers	622	Glamortex
Pratt and Lambert	40.90	Vitralite Gloss

Steel and iron surfaces shall be prepared in conformance with SSPC requirements SP1-63 and SP2-63. The surface shall be tool cleaned, lightly sanded and spot primed before application of final field coat.

11. FROST-PROOF YARD HYDRANTS: Frost-proof hydrants shall have a pistol type handle which is designed to prevent pinching of hands and easily padlocking to the hydrant head. The hydrants shall have a solid brass rod through a brass packing nut that will not rust and cut into rubber O-Rings. They shall have solid brass links and connector. There shall be a pump rod that operates the valve below the frost line assuring free flow of water in freezing temperature. There shall be a one piece molded plunger which can be easily adjusted or replaced without removing the hydrant from the ground. The hydrant shall have a brass adapter for standard hose coupling which permits direct hose connection. The standard bury depth for a District approved hydrant shall be 3’. All frost-proof yard hydrants shall have a District approved reduced pressure principle assembly located adjacent to the hydrant in a District approved box.

12. AIR AND VACUUM RELEASE VALVES: Air and vacuum release valves shall have a cast iron body and cover. Float guides bushings and lever pin shall be stainless steel or bronze. The air release valves shall be designed to operate at a design pressure of not less than 150 psi. Inlet size shall be 2” NPT or approved. The valves shall be Apco model 55, Crispin model PL20, GA Industries, or approved equal. Pipe for release valves shall be PVC or brass only. All air and vacuum release valves shall be installed in a concrete manhole cone section with a minimum 1’ of 57 stone for drainage. An approved gate valve with a valve box, concrete protector wheel, and concrete marker pole shall be installed separately between the main water line and the air release valve.

13. TAPPING SLEEVES:

A. Stainless Steel 'Full Wrap' Type: All tapping sleeves are to be manufactured from stainless steel material only. Approved manufacturers are: Romac, Ford, Smith-Blair, or approved equal.

The tapping sleeve is to be installed in conjunction with a mating tapping valve from the same manufacturer. Outlet flange of sleeve to be counterbored per MSS SP-60 for true alignment of the tapping valve and tapping machine. Size of the outlet is to be available through equal opening of sleeve diameters up to 24".

Sizes 12" and smaller sleeves must be capable of working on Class ABCD Pipe diameters with sleeve. Sizes 14" and larger must be specified as to which class size is needed. MJ bolts and nuts are to conform to ANSI/AWWA C111.A21.11. No special tools other than a standard socket wrench is to be required for assembly of the sleeve to the main water line.

14. INSTALLATION: Valves and hydrants shall be installed in accordance with the manufacturer's recommendations and as specified in Section 6 of these specifications. Disinfection and pressure testing shall meet the requirements in Section 6. The District may require the contractor to install concrete behind all fittings, valves, and hydrants as recommended by the Engineer.

15. METHOD OF MEASUREMENT:

A. Valves: Valves will be counted by unit, complete in place and accepted, including valve boxes, concrete protector rings, and concrete marker poles set to proper grade.

B. Hydrants: Hydrants shall be measured by unit, complete in place and accepted. A hydrant unit shall consist of: (1) Hydrant (depth of bury as shown on plans); (2) varying length D.I. hydrant leg; (3) 2-3/4" Zinc threaded tie rods with zinc nuts and bolts from tee to gate valve and from last bell joint to hydrant (see detailed specifications). Valves and fittings for hydrant branches shall be measured separately as described herein.