

STANDARD SPECIFICATIONS

SECTION 15100

MANUAL VALVES

**PART 1 - GENERAL**

A. Description

This section includes materials, testing, and installation of manually operated valves.

Manual valves to be supplied and installed per AWWA C 507, and C 509, unless noted otherwise below.

B. Related Work Specified Elsewhere

All related work specified elsewhere, or in other codes or standards, will be as last revised, unless a specific date of issuance is called out in opposition to later revision date(s).

Other sections of the technical specifications, not referenced below, shall also apply to the extent required for proper performance of this work.

- 1. Trenching, Backfilling, and Compacting: 02223
- 2. Concrete: 03300
- 3. Painting and Coating: 09900
- 4. Hydrostatic Testing of Pressure Pipelines: 15042
- 5. Ductile-Iron Pipe and Fittings: 15056
- 6. Domestic and Recycled Water Facilities Identification. 15151

C. Approved Manufacturers and Models

- 1. Gate Valves - Aboveground Smaller Than 3 Inch  
Crane 438  
Stockham 103
- 2. Gate Valves - 3 Inch and Larger  
Mueller, Series A-2380  
Clow, List 14  
M&H / Kennedy, AWWA C-509 & C-550
- 3. Butterfly Valves  
BIF  
Pratt Groundhog  
Dezurik Figure 670

- 4. Resilient - Seated Gate Valves: 4 Inch through 12 Inch
  - Clow RW F2630
  - American Flow Control Series 500
  - M & H / Kennedy
  - American AVK Co.
  - Mueller series A-2360

- 5. Valve Boxes
  - Brooks Products No. 3RT
  - Eisel Enterprises Inc., #10-VB
  - South Bay Foundry - 1208

D. Reference Standards

Valves shall conform, as applicable, with the latest editions of the following codes and standards.

|            |   |
|------------|---|
| AWWA C500  | Gate Valves   |
| AWWA C504  | Rubber-Seated Butterfly Valves                              |
| AWWA C509  | Resilient Seated Gate Valves                                |
| ASTM B62   | Composition Brass or Ounce Metal Castings                   |
|            | Ductile Iron Castings for Valves                            |
|            | Ductile Iron Pipe Flanges                                   |
| ASTM D 429 | Tests for Rubber Property - Adhesion<br>to Rigid Substrates |

E. Flanged End

All valves connecting to mains shall be flanged on at least one side and bolted to the fitting on the main.

F. Single Type of Valve

The developer shall choose an approved valve and then use only that valve throughout the development.

G. Detector Check and Backflow Prevention Assembly

- 1. Isolation valves on a detector check or backflow prevention assembly are to be part of an integral unit, furnished and assembled by the manufacturer of the device.

H. Butterfly Valves

Butterfly valves shall only be used on lines 14 inches and larger or as specifically shown on the plans.

I. Resilient Wedge Gate Valves

Resilient gate wedge valves shall be used on all pressure class 150 lines 4 inch through 12 inch.

J. Field Hydrostatic Test

All valves 16-inch and larger shall be field hydrostatically tested to the valves working pressure in the presence of the District inspector. Each side of the valve shall be tested independently.

**PART 2 - MATERIALS**A. General

1. Valves shall be installed complete with operating handwheels or levers, extension stems, worm gear operators, operating nuts, and wrenches required for operation.
2. Valves shall have the name of the manufacturer and the size of the valve cast or molded onto the valve body or bonnet or shown on a permanently attached plate.
3. Valve body and trim casting shall be of domestic origin.
4. Bolts for all valves shall be 316 stainless steel.

B. Valve Operators

1. Provide lever or wrench operators having adjustable, "position indicator" for exposed valves smaller than 6 inches.
2. Provide 2-inch AWWA operating nuts for buried and submerged valves.
3. Provide gear operators on butterfly valves 6 inches and larger. Gear operators for valves 8 inches through 20 inches shall be of the worm and gear, or of the traveling nut type. Gear operations for valves 24-inches and larger shall be of the worm and gear type.
4. Gear operators shall be enclosed, suitable for running in oil with seals provided on shafts to prevent entry of dirt and water into the operator. Gear operators for valves located above ground or in vaults and structures shall have handwheels. Minimum handwheel diameter shall be 12 inches. The operator shall contain a dial indicating the position of the valve disc or plug. Gear operators for buried or submerged valves shall have 2-inch square AWWA operating nuts.
5. For buried or submerged service, provide watertight shaft seals and watertight valve and actuator cover gaskets.

Provide totally enclosed operators designed for buried or submerged service.

6. Traveling nut and worm and gear operators shall be of the totally enclosed design so proportioned as to permit operation of the valve under full operating head with a maximum pull of 80 pounds on the handwheel or crank. Provide stop limiting devices in the operators in the open and closed positions. Operators shall be of the self-locking type to prevent the disc or plug from creeping. Design operator components between the input and the stop-limiting devices to withstand without damage a pull of 200 pounds for handwheel or chainwheel operators and an input torque of 300 foot-pounds for operating nuts when operating against the stops.

7. Operators on buried valves shall produce the required torque on the operating nut with a maximum input of 150 foot-pounds.
8. Valve operators, handwheels, or levers shall open by turning counterclockwise.

C. Painting and Coating

1. Coat metal valves (except bronze and stainless-steel valves) located above ground or in vaults and structures in accordance with Section 09900. Apply the specified prime coat at the place of manufacture. Apply finish coat in field. Finish coat shall match the color of the adjacent piping. Coat handwheels the same as the valves.
2. Coat buried metal valves at the place of manufacture per Section 09900.
3. Valves 4 inches and larger shall be coated on their interior metal surfaces excluding seating areas and bronze and stainless-steel pieces in accordance with AWWA C550 and these specifications. Sandblast surfaces in accordance with SSPC SP-5. Remove all protuberances which may produce pinholes in the lining. Round all sharp edges to be coated. Remove any contaminants which may prevent bonding of the lining. Coat the interior ferrous surfaces using one of the following methods:
  - a. Apply powdered thermosetting epoxy (Scotchkote 134 or equal) per the manufacturer's application recommendations to a thickness of 8 to 10 mils.
  - b. Apply two coats of catalytically setting epoxy (Keysite 750, Gilpon, or equal) to a dry-film thickness of 8 to 10 mils total. Follow the paint manufacturer's application recommendations including minimum and maximum drying time between the required coats.

All valve coatings shall be factory applied. Coating applied by the valve distributor will not be permitted. Touch up and repair of valve coatings shall be only done by authorized factory distributors.

D. Valves

Aboveground Ball Valves 3 Inches and Smaller

1. Aboveground threaded end ball valves, 1/4 inch through 3 inches, for water service shall be full bore port ball type having a minimum working pressure of 200 psi WOG. Valves shall have plastic coated lever operators.
2. Materials of construction shall be as described below:

| <u>Component</u> | <u>Material</u>          | <u>Specification</u>                                 |
|------------------|--------------------------|--|
| Body             | Bronze                   | ASTM B 62  |
| Ball             | Bronze                   | ASTM B 62  |
| Seat, Seals      | Teflon                   |  |
| Stem             | Bronze or Copper silicon | ASTM b 62, B 99 (Alloy 651), B 584 B 371 (Alloy 694) |

3. Stem material shall have a minimum tensile strength of 60,000 psi and a minimum yield strength of 30,000 psi.

E. Gate Valves 3 Inches and Larger

1. Valves shall conform to AWWA C500 and the following.
2. Gate valves shall be designed for a working pressure of 150 psi or 250 psi as required.
3. Valves shall be ductile iron bodied, solid bronze internal working parts, parallel faced, bottom wedging double-discs, non-rising stem opening to the left, O-Ring seals, and a 2-inch-square operating nut.
4. Materials of construction shall be as described below:

| <u>Component</u>            | <u>Material</u>           | <u>Specification</u> |
|-----------------------------|---------------------------|----------------------|
| Body, Bonnet                | Cast Iron or Ductile Iron | --                   |
| Operating Nut, Stuffing Box |                           |                      |
| Bonnet Bolts                | Stainless Steel           | Type 316             |
| Stuffing Box Bolts          | Stainless Steel           | Type 316             |
| Interior Parts, Discs       | Bronze                    | ASTM B 62            |
| O-Rings                     | Synthetic rubber          | ASTM D2000           |

5. Gate valve stems shall be of low zinc content (2%), having a minimum tensile strength of 70,000 psi, a yield strength of 40,000 psi, and 12% elongation in 2 inches. The stem is to be visibly marked so that it meets this requirement.
6. Gate valves shall be furnished with ends as specified on plans or by the District.

G. Tapping Valves

1. Tapping valves shall conform with all requirements for gate valves 3 inches and larger and the additional requirements listed herein.
2. All valve ends shall be flanged. The flange on one end shall have slotted bolt holes to fit all standard tapping machines.
3. Seat rings shall be oversized to permit the use of full-size cutters.
4. Resilient wedge valves may be used as tapping valves. Provided that the disk fully retracts to produce a full port opening.

H. Butterfly Valves

1. Butterfly valves shall be short body, conforming to AWWA C504, Class 150. Minimum working differential pressure across the valve disc shall be 150 psi unless specified otherwise on the drawing.

2. Butterfly valves shall be furnished and installed with the type of ends as shown on the plans and as herein specified. Wafer style valves will not be permitted.
3. Each valve body shall be tested under a test pressure equal to twice its design water working pressure.
4. Valves shall be bubble tight at rated pressures and shall be satisfactory for throttling service and frequent operation after long periods of inactivity. Valve discs shall rotate 90 degrees from the full-open position to the tight-shut position.
5. Valve ends shall be as shown on the drawings; flanged ends shall be Class 125, ANSI B16.1.
6. Valve shafts shall be Type 316 stainless steel or carbon steel with Type 316 stainless-steel journals and static seals. Valve shafts shall be dual stub shafts or a one-piece shaft extending completely through the valve disc.
7. Materials of construction shall be as described below:

| <u>Component</u>                           | <u>Material</u>                      | <u>Specification</u> |
|--|--------------------------------------|----------------------|
| Body                                       | Cast Iron or Ductile Iron            |                      |
| Exposed Body Capscrews, and Bolts and Nuts | Stainless Steel                      | Type 316             |
| Discs                                      | Cast Iron Ductile Iron, or Ni-Resist |                      |

8. The rubber seat shall be an integral part of the valve body. Rubber seats fastened to the disc by any means shall not be permitted.

I. Resilient-Seated Wedge Gate Valves

1. Valves shall conform to AWWA C509 and the requirements listed herein.
2. All valves shall be bubble tight at 200 psi working pressure.
3. Valves shall have non-rising low zinc stems, opening by turning left and provided with 2-inch-square operating nut. Outside stem and yolk valves shall be used on backflow device shutoff valves.
4. Each valve shall have a smooth unobstructed waterway free from any sediment pockets.
5. Stuffing boxes shall by O-ring seal type with two rings located in stem.
6. Low friction torque reduction thrust bearings shall be located both above and below the stem collar.
7. Materials shall be as described below:

| <u>Component</u>                          | <u>Material</u>              | <u>Specification</u>  |
|---|------------------------------|-----------------------|
| Body, Operating Nut<br>Bonnet, Seal Plate | Cast Iron of<br>Ductile Iron | ASTM A 126<br>Class B |
| Gate                                      | Cast Iron<br>Ductile Iron    | Type 316              |
| Bonnet and Seal<br>Bolts                  | Stainless Steel              | Type 316              |
| O-Rings                                   | Synthetic Rubber             | ASTM D2000            |

8. All internal working parts (excluding gate) shall be all bronze containing not more than 2 percent aluminum or more than 7 percent zinc. Valve stems shall be cast or forged from bronze having a tensile strength of not less than 60,000 psi, a yield point of not less than 30,000 psi, and an elongation of not less than 10 percent in 2 inches.
9. All gates shall be encapsulated in Buna-S rubber or nitrile elastomer.

J. Bolts and Nuts for Flanged Valves

Bolts and nuts for flanged valves shall be Type 316 stainless steel in accordance with Section 15056.

K. Gaskets

Gaskets for flanged end valves shall be as described in Section 15056.

L. Valve Boxes for Buried Valves

1. Valve extension pipe material shall be 8-inch PVC SDR 35 pipe.
2. Design cast iron cap to rest within a frame on a cast-in-place concrete ring surrounding the valve extension pipe; size the tapered skirt of the cap for a close fit inside the upper sleeve portion of the valve box. Caps for the domestic water system shall be circular with the word "WATER" cast on the cap. Caps for the recycled water system shall be circular with "recycled" cast on the cap. Coat the cap and frame with asphalt or coat-tar paint.

M. Extension Stems for Buried Valve Operators

1. Where the depth of the valve is such that its centerline is more than 4 feet below grade, provide operating extension stems to bring the operating nut to a point 24 to 30-inches below the surface of the ground and/or box cover.
2. Extension stems shall be steel and shall be complete with 2-inch-square operating nut.
3. Valve stem extensions shall be of a solid design (no pinned couplings permitted) with guides.
4. Valve extensions shall conform with MNWD standard drawing W-8.

**PART 3 - EXECUTION****A. Joints**

1. Bolt holes of flanged valves shall straddle the horizontal and vertical centerlines of the pipe run to which the valves are attached. Clean flanges by wire brushing before installing flanged valves. Clean flange bolts and nuts by wire brushing, lubricate threads with oil and graphite, and tighten nuts uniformly and progressively. If flanges leak under pressure testing, loosen or remove the nuts and bolts, reseal or replace the gasket, reinstall or retighten the bolts and nuts, and retest the joints. Joints shall be watertight.
2. Clean threaded joints by wire brushing or swabbing. Apply Teflon joint compound to Teflon tape to pipe threads before installing threaded valves. Joints shall be watertight.
3. Rubber ring grooves of valves shall be inspected before installation by the contractor for ridges or holes that would interfere with the rubber ring. Interferences with the rubber ring shall be corrected to a satisfactory connection or the valves replaced, as required by the District. (All valves shall have the same rubber-ring groove profile as the groove of the pipe couplings furnished with the pipe.)

**B. Butterfly Valve Operators**

Butterfly valves shall be installed with the operators on the street centerline side of the pipeline.

**C. Exterior Protection**

1. All exposed flanges and other metal surfaces and all damaged coatings shall be coated after assembly with bituminous mastic per Section 09900. Coating of stainless steel flange bolts is not required.
2. Wrap buried valves with 8-mil polyethylene wrap per AWWA C105.

**D. Concrete Supports**

1. Valves shall be anchored in concrete as shown in MNWD standard drawing W-8.
2. Concrete supports will not be required under valves bolted to flanged fittings.
3. Until supports are poured, valves shall be temporarily supported by placing wooden skids underneath the valve so that the pipe is not subjected to the weight of the valve.
4. All concrete anchors and thrust blocks specified or required by the District representative are considered as part of the pipeline installation.

**E. Valve Boxes**

1. Valve boxes shall be firmly supported and shall be kept centered and plumb over the operating nut of the valve.
2. Beveled sections of pipe will not be allowed at the top of the valve extension pipe. The top cut shall be square and machine made.

3. During the construction of new tracts, the valve extension pipes for "key valves" shall extend well above the ground level to permit ease of location in case of emergency shutoffs.
4. The box cover shall be flush with the surface of the finished pavement or at any other level designated by the District representative.

F. Backfill

1. All backfill within 24 inches of a valve shall be clean, washed sand.
2. Backfill is to be placed and compacted in accordance with Section 02223.

G. Valve Leakage Testing

1. Test valves for leakage at the same time that the connecting pipelines are tested. See Section 15042 for pressure testing requirements.
2. Valves shall have a pressure rating higher than or equal to the test pressure.

H. Valve Location

The location of all valves shall be marked with a 2-inch "V" chiseled in the curb face perpendicular to the valve. The offset distance, in feet, from the curb face to the valve shall be chiseled next to the "V". Where a perpendicular offset is not possible, multiple tangential offsets will be required to allow triangulation of the valve location.

**END OF SECTION**