

SECTION 14

MAIN LINE VALVE ASSEMBLIES

14-1 General

14-1.01 Scope

This section describes the requirements for furnishing and installing Main Line Valve Assemblies, 2 inch and larger, as an appurtenance to treated water mains. These requirements include the types of valves and materials to be used, methods and requirements for installation, and measurement for payment.

This section does not include valves smaller than 2 inch and valves that are an integral part of other major installations or assemblies, such as pumping and pressure reducing stations, and in-plant valves at treatment plants. This section does not include shut-off valves associated with air release, blowoff, fire hydrant, and service assemblies. If required, items such as these have been shown on the plans and have been described elsewhere in these specifications.

14-1.02 Description of Work

Work under this section shall include, but not be limited to, excavation (regardless of surface and subsurface conditions), installing the valve, completing joints including corrosive protection, placing anchor blocks and tie-downs, placing and compacting backfill, placing the valve box along with a lid and extensions, forming and pouring the concrete valve box pad, placing stone slope protection, installing and testing the locating wire, installing a valve operator extension shaft, restoring the surface area around the valve assembly, and installing a post and guide marker.

14-1.03 Location

Valve assemblies shall be installed at the locations shown on the plans. Valves located at tees, wyes, and crosses shall have flanged connections to the fittings. Location shown on the plans for in-line valves (valves located between branch connections) are approximate and intended for general location only. Final stationing of in-line valves shall be determined by the District Engineer.

14-1.04 Design

Each valve shall be designed to meet the requirements of this section and the requirements listed for each specific type of main line valve assembly.

Valves shall be designed to withstand the working pressures shown on the plans, or to a design working pressure of 150 psi, whichever is greater. Valves designed for the working pressures greater than those contained in the standards and specifications referred to herein, shall meet those same design requirements and testing procedures after they have been upgraded to meet the higher design working pressures.

14-1.05 Submittals

Submittals supplied by the Contractor shall include: catalog data for the valves and valve box, lid, and extensions; valve operating torque data or calculations (if required); and catalog data or

shop drawings for the valve operator extension shaft. The Contractor's attention is directed to Submittals in the Special Conditions.

14-1.06 Inspection

The Contractor shall make all valves and valve boxes available for inspection by the District Engineer prior to installation. The Contractor shall assist in the inspection by providing men and equipment necessary to move valves to an area and position where the valves can be operated and inspected. Each phase of work shall pass inspection by the District Engineer before commencing work on the next phase. The phases shall consist of, but not be limited to, valve installation, completion of joints, applying corrosion protection, installing valve box riser and locating wire, backfilling, raising the valve box to final grade, testing the locating wire, and surface restoration. After installation is complete, the valve will be inspected for proper operation and water tightness.

14-2 Materials

14-2.01 General

Materials furnished for Main Line Valve Assemblies shall include, but not be limited to, the various size and types of valves and all gaskets, bolts, and other hardware necessary for completion of the joints, locating wire, valve boxes with lids and extensions, concrete for anchor blocks and valve box pads, stone slope protection, valve operator extension shafts, posts and guide markers, and materials used for restoration of the area around the assemblies.

14-2.02 Valves

Valves supplied under this section shall be either resilient seat gate valves (RSGV) or rubber-seated butterfly valves (BFV), conforming in all respects to these specifications.

The type and manufacture of valves selected within the allowable size and torque ranges shall be used throughout the work, except where specific types of valves are shown on the plans or in the Special Conditions of this Contract.

Types of valves used in pipeline appurtenances, such as air release and service assemblies, pressure reducing and pumping stations, in-plant uses, and other "special function" valves shall be as shown on the plans and as designated elsewhere in these specifications.

Valves supplied under this section shall be suitable for buried service and shall have a non-rising stem furnished with a 2" (nominal size) operating nut, unless otherwise shown on the plans, or designated in these specifications. The operating nut shall be cast iron and measure 1 15/16" square at the top and 2" square at the base and 1 3/4" high.

Valves larger than 2" shall be furnished with mechanical, push on or flanged joints, which are compatible with the adjacent pipe or fitting, all as shown on the plans. 2-inch valves shall be furnished with Female Iron Pipe (FIP) threads.

All valves shall be marked in raised letters on the outside of the body with the manufacturer's name or mark, the year the valve casting was made, the nominal size of the valve, and the valve's pressure rating.

Torque applied to the operating nut for seating or unseating the valve shall not exceed 100 foot-pounds when the maximum operating pressure expected at the point of valve use is applied across the valve disc.

The Contractor shall provide, except as otherwise provided herein, the type of valve given in the following table for the various sizes and working pressures shown on the plans:

SIZE AND TYPE OF VALVES REQUIRED (1) (2)

Valve Size (in)	Working Pressure at Point of Application (psi)						
	Up to 50	50 to 75	75 to 100	100 to 125	125 to 150	150 to 175	175 to 200
2	RSGV	RSGV	RSGV	RSGV	RSGV	RSGV	RSGV
4	RSGV	RSGV	RSGV	RSGV	RSGV	RSGV	RSGV
6	RSGV	RSGV	RSGV	RSGV	RSGV	RSGV	BFV
8	RSGV	RSGV	RSGV	RSGV	RSGV	RSGV	BFV
10	RSGV	RSGV	RSGV	RSGV	BFV	BFV	BFV
12	RSGV	RSGV	RSGV	BFV	BFV	BFV	BFV
14	RSGV	RSGV	BFV	BFV	BFV	BFV	BFV
16 and larger (3)	BFV	BFV	BFV	BFV	BFV	BFV	BFV

RSGV = Resilient Seat Gate Valve
 BFV = Butterfly Valve

- (1) Resilient seat gate valves, up to 16-inch nominal size, may be substituted for butterfly valves in areas where the working pressure exceeds those listed in the table, provided the Contractor submits for approval certified test data from an independent laboratory, indicating that the torque required to seat and unseat the valve at the working pressure shown on the plans will not exceed the maximum torque allowed under this specification.
- (2) Butterfly valves may not be substituted for resilient seat gate valves in the table.
- (3) Valves larger than 16-inch nominal size shall be butterfly valves. The seating and unseating operating torques shall not exceed the maximum allowed herein given the maximum working pressure as shown on the plans and a maximum velocity of 16 feet per second. The Contractor shall submit for approval, manufacturer's torque calculations using the method found in Appendix A of AWWA C504, or certified test data from an independent testing laboratory.

14-2.02-A Resilient Seat Gate Valves (RSGV)

Resilient Seat Gate Valves shall conform to AWWA C509 and these specifications. These valves shall have a minimum pressure rating of 200 psi, and limited to sizes 2 inch through 16 inch.

The valve body, bonnet, and disc shall be cast of ductile iron. All ferrous metal interior wetted surfaces, including inside surfaces of the disc, shall be shop coated with epoxy or fusion epoxy, conforming to AWWA C550 to a minimum thickness of 6 mils.

All ferrous parts on the outside of the valve shall be primed and shop painted with two coats of asphalt varnish conforming to Federal Specification TT-V-51c, or coated with 3 mils of epoxy conforming to AWWA C550.

Valves shall have non-rising stems (NRS) fitted with a 2" (nominal size) wrench nut and shall be suitable for buried service. Open stem and yoke (OS&Y) valves shall not be allowed unless specified on the plans.

The stem, stem nut, gland, and bushings shall be made of grade B, C, D, or E bronze.

Valve stems shall be sealed using O-rings. Stuffing boxes shall not be allowed.

Valve end configurations shall be as shown on the plans or as specified herein. Flanges shall conform to AWWA C110. Mechanical joints shall conform to AWWA C111.

Resilient seat gate valves shall be as manufactured by Clow, Kennedy, Mueller, Waterous, US Pipe, or approved equal.

14-2.02-B Butterfly Valves (BFV)

Butterfly valves shall conform to AWWA C504 and these specifications, and shall be suitable for buried service. These valves shall have a minimum pressure rating of Class 150-B.

The valve body and disc shall be either cast iron, alloy cast iron, or ductile iron. All interior ferrous surfaces, including the disc and seat bearing surfaces, shall be coated with a minimum of 6 mil epoxy per AWWA C550. Surfaces used to seal against the rubber valve seat shall be either treated with Ni-Chrome, or constructed of type 304, 18-8 stainless steel; or may be otherwise treated for corrosion resistance as approved by the District Engineer. All ferrous parts on the outside of the valve shall be primed and shop painted with two coats of asphalt varnish conforming to Federal Specifications TT-V-51C, or coated with 3 mils of epoxy conforming to AWWA C550. The valve seat shall be rubber, clamped or vulcanized to either the disc or the valve body. Metal to metal seals are not acceptable. Valve sizes 30 inch and larger shall have rubber seats designed for removal and replacement at the site of installation.

Valve shafts shall be constructed of type 304, 18-8 stainless steel. Shafts shall be either one-piece or stub-shaft type. The pins or dowels securing the disc to the shaft shall also be type 304, 18-8 stainless steel. Shaft seals shall be either O-ring or V-type packing. V-type packing shall be self-adjusting and suitable for both pressure and vacuum service. Seals shall be replaceable without removing the valve shaft.

All valves in buried service shall be furnished with a geared or traveling nut type manual actuator fitted with a standard 2" operating nut. The actuator shall be 90% grease packed and totally sealed. The actuator shall conform to AWWA C504.

Valve end configurations shall be as shown on the plans or as specified herein. Flanges shall conform to ANSI B16.0 Class 125. Mechanical joints shall conform to AWWA C111. Laying lengths for flanged-end valves shall be the short body style. Wafer-type valves shall not be allowed except when specifically shown on the plans or designated elsewhere in these specifications.

Butterfly valves shall be as manufactured by Pratt, Clow, Mueller, Keystone, M & H, or approved equal.

14-2.03 Valve Box, Lid and Extensions

Valve boxes shall be reinforced concrete with rattle proof cast iron lids marked "WATER". Extensions shall be precast concrete or 8" PVC Pipe, smooth wall with a standard dimension ratio (SDR) of not less than 35, and with ends cut square. Valve boxes and lids shall be Christy G5 Traffic box with a G5C lid.

14-2.04 Locating Wire

Locating wire shall be bare No. 8 gauge, single strand soft drawn copper.

Connectors shall be brass split-bolt connectors or other type of mechanically tightened joint connector approved by the District Engineer. Wire nuts or twisted joints shall not be used.

14-2.05 Concrete

Concrete used for valve anchor blocks shall be 2,000 psi and concrete used for valve box pads shall be 3,000 psi, all conforming to concrete as described elsewhere in these specifications.

14-2.06 Stone Slope Protection

Stone slope protection shall meet all the requirements for No. 3 backing rock as designated in CALTRANS Section 72.

14-2.07 Replacement Pavement

Replacement pavement shall be asphaltic concrete pavement conforming to CALTRANS, Section 39, and meeting the aggregate grading requirement for 1/2" maximum, medium gradation, and using grade AR-4000 paving asphalt conforming to CALTRANS, Section 92.

14-2.08 Valve Operator Extension Shaft

Valve operator extension shafts shall conform to the details as shown on the plans or approved equal. After fabrication, extensions shall be prepared, primed, and painted with two coats of asphalt varnish or coal-tar enamel; black in color.

14-2.09 Guide Markers

Guide markers and posts shall conform to the plans and to CALTRANS, Section 82. Posts shall be metal and target plates shall be Type-M.

14-3 Installation

14-3.01 General

Main Line Valve Assemblies shall be installed in accordance with the manufacturer's recommendations. Valves shall be laid in sequence with adjacent pipe and fittings. Pipe ends shall be cut where required to create a tight, flush fit against the valve shoulder.

14-3.02 Storage and Handling

Materials for Main Line Valve assemblies shall be stored and handled in their original containers, which shall not be unpackaged until 24 hours prior to installation, except for inspection. Valves shall be maintained free from dirt and foreign matter. Valves and their containers shall be stored on wooden pallets. Valves and valve boxes shall not be strung out on the job more than 3 days prior to installation.

14-3.03 Excavation and Backfill

Excavation and backfill operations shall conform to all the requirements for Water Main Pipe Trench Excavation and Backfilling, as described elsewhere in these specifications.

14-3.04 Corrosion Protection

All joints included in the Main Line Valve Assembly having bolts, glands, setscrews, or other metal fasteners shall be protected from corrosion after assembly. These joints shall be wrapped with polyethylene film, all as described for corrosion protection for Water Main joints.

14-3.05 Anchor Blocks

Main Line Valve Assemblies that require anchor blocks shall be shown on the plans and shall conform to the details shown thereon. Tie down bars, straps and other fasteners shall be painted to protect against corrosion. Concrete shall not be placed around bells, flanges, and bolts. If contact with concrete is unavoidable, these areas shall be protected with a double wrap of 6-mil polyethylene film to allow for disassembly and repair of the valve. No structural load or pressure shall be applied to the valve for a minimum of 3 days after installation of the anchor block.

14-3.06 Valve Box Installation

All buried main line valves shall be furnished with a valve box including a lid, extensions and locating wire, all as shown on the plans and described in these specifications. The box and extensions shall be centered over the valve operating nut and perpendicular to the valve centerline. The box and extension shall be placed so as not to transmit any shock or stress to the valve or adjacent pipe.

Valve boxes placed outside the traveled way and road shoulder areas shall be raised slightly above the ground surface. A concrete pad conforming to the plans shall be formed with wood or other suitable materials to the full depth of the pad, and the concrete poured around the box. The concrete shall be finished in a workmanlike manner and so as to eliminate any sharp corners. All forms shall be removed after concrete has cured. All adjacent slopes shall be covered with a stone slope protection as directed by the District Engineer.

Valve boxes placed within the traveled way shall be placed flush with the road surface. In paved areas, the valve location shall be referenced and the box removed. Once paving operations are complete, the pavement over the valve shall be cut to the proper dimensions and removed. A sufficient amount of aggregate shall also be removed to allow for the pouring of a concrete pad and to expose the box extension. The valve box shall be rigidly supported in its proper position and the concrete pad poured up to the bottom side of the surrounding pavement. After the concrete has cured sufficiently, the supports may be removed and the paving replaced. If the paving is asphaltic concrete, a tack coat shall be applied and the hot mix shall be properly compacted.

14-3.07 Valve Operator Extension Shaft

A valve operator extension shaft conforming to the plans and these specifications shall be installed for any valves with their operating nut 36 inches or more below the top of the valve box.

14-3.08 Locating Wire

The locating wire from the water main shall be extended into the valve box, all as shown on the plans and as described for Water Mains elsewhere in these specifications.

14-3.09 Surface Restoration and Final Cleanup

After backfill and compaction is complete, the surface over the valve assembly and all other surfaces disturbed by this work shall be restored to an "equal to or better than" condition as it existed prior to the start of construction, all in conformance with Trench Restoration and Final Cleaning for Water Mains described elsewhere in these specifications. The Contractor shall also comply with all city, county, and state encroachment permit conditions.

14-4 Measurement and Payment

14-4.01 Measurement

Work performed under this section shall be measured as the number of the various sized Main Line Valve Assemblies that have been completely installed.

14-4.02 Payment

The contract price shall include full compensation for furnishing all labor, materials, tools, equipment, and incidentals for doing all the work necessary for the installation of Main Line Valve Assemblies, as shown on the plans, or as designated in these specifications. A description of the work is included at the head of this section. Any work associated herewith, but not included in other bid items, shall be deemed as included in the work described in this section.