SECTION 15112

potable water BACKFLOW assembly

# GENERAL

## DESCRIPTION

### This section includes materials, installation, and testing of backflow preventer assemblies and double detector check assemblies. Assemblies shall be installed at the locations as shown on the Drawings or as established in the field by the DISTRICT. The DISTRICT will perform the initial test of the completed assembly to certify the installation. Future maintenance and annual certification of the assembly shall be the responsibility of the Customer.

## REFERENCE STANDARDS

### The publications listed below form part of this specification to the extent referenced and are referred to in the text by the basic designation only. Reference shall be made to the latest edition of said standards unless otherwise called for.

#### AWWA C511 – Reduced Pressure Principal Backflow Prevention Assembly

#### ANSI B16.1 – Cast Iron Pipe Flanges and Flanged Fittings Classes 25, 125, and 250

#### ASTM A536 – Standard Specification for Ductile Iron Castings

#### ASTM B584 – Standard Specification for Copper Alloy Sand Castings for General Applications

#### ASTM B61 – Standard Specification for Steam or Valve Bronze Castings

#### ASTM B62 – Standard Specification for Composition Bronze or Ounce Metal Castings

#### ASTM A307 – Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength

#### ASTM A563 – Standard Specification for Carbon and Alloy Steel Nuts

## RELATED WORK SPECIFIED ELSEWHERE

### DISTRICT Standard Drawings.

### Section 02223 - Trenching, Backfilling, and Compacting

### Section 03310 - Cast-In-Place Sitework Concrete

### Section 09800 – Painting and Coating

### Section 15000 - General Piping Systems and Appurtenances

### Section 15044 - Hydrostatic Testing and Flushing of Pressure Piping

### Section 15100 - Valves

## SUBMITTALS

### Submit shop drawings in accordance with Standard Specification Section 01300.

### Submit manufacturer's catalog data, descriptive literature, and assembly drawings. Show dimensions, materials of construction by specification reference and grade, linings, and coatings.

### Submit manufacturer's certificate of compliance with AWWA C511 for reduced pressure principle backflow preventers.

## MASONRY RETAINING WALLS

### If the assembly is located within a cut slope or embankment fill, a masonry retaining wall shall be constructed on three sides around the assembly. Submit a detailed design for the concrete foundation and retaining wall. The face of wall shall be a minimum of one foot beyond the dimensional values of the concrete pad to be poured for the assembly as shown on the Standard Drawings. Use tan colored slump block and grout each cell solid. The concrete pad to be poured around the assembly shall extend to the face of the three walls and also to the adjacent sidewalk or curb.

## PRIVATE PUMPING FACILITIES

### The addition of a backflow prevention assembly to any given size water service assembly will reduce the available water service pressure. A larger size water service and backflow prevention assembly may be required to provide adequate water service pressure. The DISTRICT will not provide pumping facilities to increase water service pressure. Private pumping facilities shall be independent and located downstream of backflow prevention assemblies.

# MATERIALS

## MANUFACTURERS

### Provide backflow prevention assemblies of the described type that are on the "List of Approved Backflow Prevention Assemblies" as issued by the State of California, Department of Health Services. A copy of the list is available from the DISTRICT's Engineering Department.

## BACKFLOW PREVENTERS

### **General:** Backflow preventers shall be the same size as and never smaller than the upstream water service assembly. Where normal minimum water service pressure is less than 80 psi; the DISTRICT may require the next larger assembly size.

### Backflow preventers of the reduced pressure principle type shall conform to AWWA C511 with a minimum rated working pressure of 175 psi for operation on cold water pipelines. Provide two independently acting check valves, an automatic pressure differential relief valve located between the check valves, two resilient seated shutoff valves, and four resilient seated test cocks so that a test of each check valve can be made. Check valves and the differential relief valve shall be constructed for servicing without removing the assembly from the line. Backflow preventers, 2 inches and smaller, shall be bronze conforming to ASTM B61 or B62. Backflow preventers, larger than 2 inches, shall have ductile iron bodies and covers conforming to ASTM A 536 Grade 65 45 12. All internal working parts and relief valve shall be bronze conforming to ASTM B 584 with stainless steel trim.

### Backflow preventers, 2 inches and smaller, shall be of the conventional in line design for installation in a horizontal position with the relief valve discharging vertically down. Resilient seated shutoff valves and test cocks shall be full ported, bronze ball valves. Backflow preventers shall be selected from the Approved Materials List.

### Backflow preventers, 2 1/2 inches through 10 inches, shall be of the conventional in line design for installation in a horizontal position. Shutoff valves shall be resilient seated gate valves with outside stem and yoke. Test cocks shall be full ported, bronze ball valves. Provide adjustable pipe supports to augment the installation to prevent flange damage. Backflow preventers shall be selected from the Approved Materials List.

## DOUBLE DETECTOR CHECKS

### **General:** Detector checks shall be sized according to the demands of the fire protection system. Provide single check detector checks for Class 1 and 2 fire protection systems. Provide double check detector checks for Class 3 and 4 fire protection systems. Provide reduced pressure detector checks for Class 5 and greater fire protection systems.

### Double check detector checks shall conform to AWWA C510 with a minimum rated working pressure of 175 psi for operation on cold water pipelines. Provide two independently acting, spring loaded check valves; two resilient seated gate valves with outside stem and yoke; four, full ported, bronze ball valve test cocks; and a low flow by pass line with registration meter and a double check valve assembly in series. Assemble the by pass meter and double check valves to the main line assembly as an integral unit. The meter shall be a totalizing type with registration in cubic feet. Main check valves shall be constructed for servicing without removing the assembly from the line. Construct main line valve bodies and covers of ductile iron conforming to ASTM A 536 Grade 65 45 12 with bronze trim conforming to ASTM B 584 Alloy C83600. Construct by pass line components of bronze or brass.

#### Double check detector checks, 4 inches through 8 inches, may be of the compact design ("N" series) for inlet flow in a vertical up direction and outlet flow in a vertical down direction. Provide valve setters with the appropriate end connections to augment the installation. Double check detector checks shall be selected from the Approved Materials List.

#### In lieu of the compact design, double check detector checks, 4 inches through 10 inches, may be of the conventional in line design for installation in a horizontal position. Provide adjustable pipe supports to augment the installation. Double check detector checks shall be selected from the Approved Materials List.

### Reduced pressure detector checks, 4 inches through 10 inches, shall be similar to backflow preventers of the reduced pressure type described in paragraph 2.02, B. Provide a by pass line with registration meter and a bronze reduced pressure backflow preventer assembly in series. The by pass reduced pressure backflow preventer shall operate identically to the main line assembly and open to detect initial flow. The meter shall be a totalizing type with registration in cubic feet. Reduced pressure detector checks shall be of the conventional in line design for installation in a horizontal position. Provide adjustable pipe supports to augment the installation to prevent flange damage. Detector checks shall be selected from the Approved Material List.

### Where required by the fire department, provide an exposed inlet connection on the downstream side of the detector check. Replace the ductile iron bend with a ductile iron flanged tee. Install a flange with a 4 inch threaded outlet on the run. Thread a 4 inch brass nipple into the flange and install a swing check valve and a two way, 90 degree, angle inlet connection. The 4 inch swing check valve shall be of brass construction with spring loaded check and have threaded ends. The inlet connection shall be a two way, 90 degree angle outlet of cast brass construction with 4 inch by 2 1/2 inch size. Provide either single or double clapper style as specified by the fire department and pin lug swivels. Cast on the top of the connection the words "AUTO SPKR" or "STANDPIPE" as directed by the fire department. Provide brass plug with chain for each inlet swivel. The swing check valve and inlet connection shall be as shown on the Approved Materials List.

## LINING AND COATING OF ASSEMBLIES

### Coat interior and exterior ferrous surfaces of the backflow preventers and detector checks with fusion bonded epoxy per Specification Section 09800. Do not coat bronze, rubber, or stainless steel items.

## VALVE END CONNECTIONS

### Valves, 2 inches and smaller, shall have screwed ends. Valves, 2 1/2 inches and larger, shall have flanged ends.

### Screwed ends shall conform to ANSI B1.20.1,NPT.

### Fanged ends shall conform to ANSI B16.1, Class 125.

## PACKING, O RINGS, AND GASKETS

### Unless otherwise stated; packing, O rings, and gaskets shall be one of the following non asbestos materials.

#### Teflon.

#### Kevlar aramid fiber.

#### Acrylic or aramid fiber bound by nitrile. Provide Garlock I' Bluegard," Klinger "Klingersil C4400," or DISTRICT approved equal.

#### Buna N (Nitrile).

## BOLTS, NUTS AND GASKETS FOR FLANGES

### Bolts, nuts and gaskets shall be in accordance with Section 15000.

## VALVE SETTERS

### Provide valve setters to augment the installation of the compact design ("N" series) detector checks. Valve setters shall be constructed with integral support arms between the elbows to transfer thrust downstream. Construct valve setters of ductile iron conforming to ASTM A 536 Grade 65 45 12. Coat interior and exterior surfaces of the ductile iron with fusion bonded epoxy per Standard Specification Section 09902. End connections shall be a combination of flanged ends and mechanical joints as shown on the Standard Drawings. Flanged ends shall conform to ANS B16.1 Class 125. Valve setters shall be Cla Val Model VS, Febco Model 611, or DISTRICT approved equal.

## ADJUSTABLE PIPE SUPPORTS

### Provide adjustable pipe support of welded steel construction with fusion bonded epoxy coating. Locate the pipe supports under flanges or valve bodies as shown. Provide 2 inch galvanized steel pipe, cut to length, and place between the collar and base. Provide Material Resources "Standon Pipe Support Model S 89," or DISTRICT approved equal.

## GUARD POSTS

### Provide guard posts around the assembly when directed by the DISTRICT to protect the installation.

# EXECUTION

## INSPECTION BEFORE INSTALLATION

### Operate the shutoff valves and test cocks on the assemblies from closed to fully open, then close again before installing. Check for broken, cracked, or missing parts; malfunctioning stems; and faulty operation.

## INSTALLATION

### See Standard Specification Section 02223 for earthwork requirements. Use imported sand in the pipe base and pipe zone.

### Install piping and riser section per the instructions contained in the appropriate Standard Specification for the material used.

### Piping from the main to the backflow prevention assembly shall be placed level or on a continuous upward grade to avoid pocketing air. No outlets will be allowed in the piping between the main and the assembly. Trench backfilling shall not commence until the DISTRICT has inspected this section of piping and is satisfied with the installation.

### Install backflow prevention assemblies in a horizontal position, aboveground, and at the dimensions shown on the Standard Drawings. Locate the assemblies where shown or as established in the field by the DISTRICT. The DISTRICT shall be the final authority as to location, installation, size, and type of backflow prevention assembly required.

### Clean threaded joints by wire brushing or swabbing. Apply only Teflon tape to pipe threads before installing screwed valves. Joints shall be watertight.

### Clean bolts, nuts and flange faces by wire brushing before installing flanged assemblies. Inspect gasket seating surfaces, gasket, each stud or bolt, nut, and washer. Replace any damaged item. Coat bolt shafts with waterproof gear grease or primer for wax tape coating prior to insertion in flange bolt holes. Do not apply grease or primer to threads. Lubricate threads of bolts and nuts with oil or graphite prior to installation. Assemble all bolts and nuts in a progressive diametrically opposite sequence, and torque with a calibrated torque wrench. All clamping torque shall be applied to the nuts only.

### If flanges leak under pressure testing, loosen or remove the nuts and bolts, reset or replace the gasket, reinstall or retighten the bolts and nuts, and retest the joints. Joints shall be watertight. Replace galled, cracked, or distorted bolts and nuts.

### After testing, coat exposed surfaces of bolts and nuts to be buried with waterproof gear grease or primer for wax tape coating.

## INSTALLING POLYETHYLENE ENCASEMENT

### Wrap ferrous pipe risers including base bends and valve setters with polyethylene material. Complete the wrap prior to placing concrete anchor blocks or concrete trust blocks on base bends or valve setters. Repair polyethylene material damaged during construction.

## PLACING CONCRETE

### Place concrete anchor blocks around the elbow of the pipe riser or valve setter. Where a thrust block is required, place concrete against the base bends and undisturbed ground. Place concrete back to back between the base bends. Allow concrete to set and be hard enough to be self supporting. Place and compact trench backfill up to the subgrade of the concrete pad on grade. Pour a concrete pad on grade around the pipe risers. Concrete shall be Class C per Standard Specification Section 03310.

## SETTING GUARD POSTS

### Position guard posts to protect the backflow prevention assembly. Locate posts as directed by the DISTRICT and in accordance with the DISTRICT Standard Drawings.

## PAINTING AND COATING

### Paint aboveground surfaces of the pipe risers, elbows or bends, and adjustable pipe supports per Specification Section 09800. Color of finish coat shall be OSHA Blue for potable water and purple for recycled water. Do not paint backflow prevention assemblies.

### Paint above ground surfaces of the guard posts per Specification Section 09800. Color of finish coat shall be per the Approved Materials List.

## PRESSURE TESTING and flushing

### Test backflow prevention assemblies at the same time that the connecting pipelines are pressure tested. See Standard Specification Section 15044 for pressure testing and flushing requirements.

## INITIAL TESTING

### Upon completion of the installation and inspection by the DISTRICT, an initial test will be performed by certified personnel of the DISTRICT's Backflow Department. The initial test will be conducted to certify the adequacy and operational compliance of the assembly with both state and DISTRICT regulations. Backflow prevention assemblies will not be placed into service until the DISTRICT has tested and certified the installation.

END OF SECTION