

Special Provision to Special Specification 7016

WATER AND SANITARY SEWER SYSTEMS



Special Specification 7016 "WATER AND SANITARY SEWER SYSTEMS," is amended with respect to the clauses cited below. No other clauses or requirements of this Item are waived or changed.

Section 3.2 **Materials** is supplemented by the following:

- 13.1.1. **Bar Wrapped Steel Cylinder Concrete (SCCP) Pressure Pipe.** The following specifications cover the requirements for bar wrapped steel cylinder concrete pipe (SCCP) pressure pipe materials and installation for potable water use and apply to SCCP pipe sizes 20 in. through 60 in. indiameter.
- 13.1.2. **QUALITY ASSURANCE:** Manufacturer must have a minimum of ten years successful experience in designing and manufacturing SCCP of the type specified. The entire pipeline will be the product of one manufacturer. The manufacturer must have a minimum of ten years successful experience in designing and manufacturing pipe joints of similar design, pipe diameter, and pressure class as those specified. All SCCP pipe must be coded to provide positive identification and to prevent accidental damage to or interruption of the water facilities. Pipe must conform to American National Standards Institute/National Sanitation Foundation (ANSI/NSF) Standard 61 "Drinking Water System Components - Health Effects" and be certified by an organization accredited by ANSI. Such compliance will be evidenced by an affidavit from the manufacturer or vendor. If the pipe does not presently conform to this standard, information from the manufacturer regarding action being taken to comply with this standard must be submitted.
- 13.1.3. **SUBMITTALS:** The Contractor will be responsible for furnishing all necessary shop drawings, certificates, etc. for review and acceptance to the Engineer. A certification from the manufacturer must be furnished to the Engineer attesting compliance with appropriate ASTM Standards and ANSI/NSF Standard 61. Such compliance will be evidenced by an affidavit from the manufacturer or vendor. If the pipe does not presently conform to this standard, information from the manufacturer regarding action being taken to comply with this standard must be submitted. Failure to provide this information may result in rejection of pipeline material.
- Submit documentation on pipe products, fittings, and related materials as required by the Contract Documents or the Engineer. Review all submittals before submission. Submit documents in a timely manner so as not to delay the project. Allow sufficient time for the Engineer's review and resubmission, if necessary. Include certifications from the manufacturer that the product complies with the appropriate ASTM standards.
- If requested, copies of results of factory hydrostatic tests must be provided.
- 13.1.4. **STANDARDS:** Bar Wrapped Steel Cylinder Concrete Pipe must comply with the applicable requirements of the following:
- ANSI/NSF 61 Drinking Water System Components - Health Effects
 - AWWA C-303 Standard for Concrete Pressure Pipe, Bar-Wrapped, Steel-Cylinder Type

- AWWA M-9 Manual; Concrete Pressure Pipe
- ASTM A-570 Standard Specification for Steel, Sheet and Strip, Carbon, Hot Rolled, Structural Quality
- ASTM C-144 Specification for Aggregate for Masonry Mortar
- ASTM C-150 Specification for Portland Cement
- ASTM D-698 Test for Moisture-Density Relations of Soils

13.1.5. DELIVERY AND STORAGE: Pipe 42-in. and larger in diameter must be studded and end-capped when transported. Studs will remain in pipe until backfilling is completed. Upon delivery of the pipe, notify the Engineer so that an inspection may be performed. Inspection will not relieve the Contractor of responsibility of providing pipe which meets the Contract requirements. Other handling and storage requirements must be in accordance with the manufacturer's recommendations.

After shipment to the job site and before installation, the pipe may be reinspected by the Engineer for cracks, delaminations, spalls or defects. In addition, the coating may be "sounded" using a ball peen hammer with a head weight of not more than one pound, over its entire exterior surface at the spacing of approximately one foot both circumferentially and longitudinally to locate any hollow or drummy areas which would indicate a delamination or void.

13.1.6. PIPE MATERIALS: Pipe, bends, and specials will be designed, manufactured, and tested in accordance with the applicable requirements of AWWA C-303 and AWWA M-9. Pipe and fittings must be clearly marked with the pressure class and piece number to permit easy identification in the field.

Only pipe with the industry standard inside diameter for bar wrapped steel cylinder concrete pipe will be acceptable. Any other nonstandard dimensions submitted or proposed will not be considered. Bar Wrapped Steel Cylinder Concrete Pipe must be furnished in a nominal laying length of 32 ft.

The pipe must be designed for 150 psi internal pressure, with a 100 psi surge and a depth of cover as shown on the plans, plus H-20 loading. Unit weight of fill will be 130 pcf, with bedding coefficient 0.090, and a soil reaction modulus of 700.

13.1.7. PROVISIONS FOR THRUST: Thrusts at bends, tees, plugs, or other fittings must be resisted by restrained joints. Thrust blocking or anchors must be used to restrain thrust at bends, fittings, etc. adjacent to casings pipe and where indicated.

Restrained joints must be used for a sufficient distance from each side of the bend, tee, plug, or other fitting to resist thrust which will be developed at the design pressure of the pipe for the purpose of thrust restraint, design pressure must be 1.5 times pressure class (working pressure).

Restrained joints must consist of welded joints or harnessed joints. Harnessed joints must be clamp or snap ring type in accordance with AWWA Manual M-9. Clamp type joint restraint will be used where indicated.

The length of pipe with welded joints to resist thrust forces will be determined by the pipe manufacturer in accordance with AWWA Manual M-9. Accomplish welding by laying a filler rod between the steel bell of one (1) section and the steel spigot. When the joint weld is completed, pour the exterior joint with mortar as specified in the following, Article 13.2.8.

13.1.8. JOINTS: The pipe must be assembled and joined in accordance with the manufacturer's instructions for the type of joint used.

All portions of the joints must be thoroughly cleaned before the sections of pipe are put together. Lubricate the gasket and the inside surface of the bell with an approved lubricant (flax soap) which will facilitate the telescoping of the joint. The position of the rubber gasket must be checked with a feeler gauge at each joint before the joints are filled with mortar or grout. If the gasket has "fish-mouthed" or sheared, the pipe section must be removed and re-laid with a new gasket.

No "blocking up" of pipe or joints will be permitted, and if the pipe is not uniformly supported or the joint not made up properly, remove the joint and properly prepare the trench.

Cement Mortar: Will be used for pouring joints and must consist of one (1) part Portland Cement to two (2) parts clean, fine, sharp silica sand, mixed with water. Exterior joint mortar must be mixed to the consistency of thick cream. Interior joint mortar must be mixed with as little water as possible so that the mortar is very stiff, but workable. Cement must be ASTM C-150, Type II or Type III with the modification that the cement must contain no more than five (5) percent tricalcium aluminate. Sand must conform to ASTM C-144. Cement mortar used for patching will be mixed as per cement mortar for inside joints.

Interior Cement Mortar Joint: The inside joint recess of pipe sized 20-in. and larger must be filled immediately before placing the pipe together by buttering the bell end with mortar. After the joint is engaged, the mortar must be finished off smooth by hand trowel.

Exterior Cement Mortar Joint: After the spigot has been telescoped into the bell, the joint checked and found satisfactory, a wrapper (diaper) must be secured around the pipe. The joint wrapper will be fiberglass reinforced or a closed-cell polyethylene foam wrapper such as Dow Chemical Company's "Ethafoam", or equal.

For pipes 36-in. and larger, the width of the wrapper must be 9 in. For 20-in. through 30-in. the wrapper will be 7 in. The minimum thickness must be one-half inch and the length must encircle the pipe leaving enough opening between ends to allow the mortar to be poured inside the wrapper into the joint. The wrapper will be hemmed at each edge to allow threading with a steel strap to securely fasten the wrapper by means of a stretcher and sealer.

Fill the joint with mortar from one side in one (1) continuous operation until the grout has flowed entirely around the pipe. During the filling process, the joint must be consolidated and rodded or agitated to eliminate voids. Any joint showing shrinkage or excessive cracking will be cleaned and remade.

- 13.1.9. **FITTINGS AND SPECIALS PIECES:** The manufacturer must furnish all fittings and special pieces required for closures, bends, branches, manholes, air valves, blow-offs, and connections to main line valves and other fittings shown on the contract drawings or as set out in the specifications. All openings in the pipe for fittings, manholes, taps, blow-offs, etc., must have the interior and exterior surfaces of the steel lined and coated with mortar. The type of fittings and details covering the design of fittings and special pieces will be furnished by the manufacturer and subject to the approval of the Engineer. The fittings and special pieces must comply in all respect with the requirements of AWWA Specifications with modifications as herein set forth.

Installation of fittings and special pieces for connection to existing SCCP will require cutting, removing and disposal of sections existing SCCP and existing steel casing as shown on the plans.

- 13.1.10. **ENDS:** The ends of pipe, fittings, and specials will be prepared for rubber O-rings Gasket Joints unless otherwise shown on the plans. They must also conform to the applicable portions of Joints Rings, and Rubber Gaskets, of AWWA Standard C-303, latest revision.

Flanged ends will be provided for valve installation and any other connection shown on the plans. Flanges must be AWWA Standard Steel Ring Type Class D, of the size indicated, made from steel of equal or greater strength than the steel cylinder. Dimensions, bolt hole spacing, number and size must conform to AWWA C-207. The flanges must be flat faced and connected to the plain end of sections of fittings by two fillet welds as shown in AWWA C-207, Figure 1.

- 13.1.11. **CURVES, BENDS, AND CLOSURE PIECES:** Horizontal and vertical long radius curves will be formed by bevel adapters or by straight pipe in which the joints are beveled. Beveled pipe must not exceed a degree angular deflection at any joint. Deflections may be made with standard straight pipe provided that the maximum deflection per joint does not exceed the pipe manufacturer's recommended joint deflections for the particular size and type of pipe being installed. Pipe sections of shorter than nominal standard lengths may be furnished to reduce the deflection at joints and for closure sections.

- 13.1.12. **OUTLETS:** The Contractor will furnish all labor, equipment, and material necessary to construct 1-in. outlets complete as shown on the plans.
- A 1-in. outlet must be provided on both sides of all butterfly valves. The outlet must consist of a 1-1/2 in. steel half coupling, 1-1/2"x1/4" nylon busing, and a 1-1/4" x1" bronze busing for cast iron or steel core pipe and must come equipped with 1-in. brass plugs.
- The 1-in. top outlet must be installed on each side of the butterfly valve and approximately 3 to 5 ft. from the centerline of the valve unless otherwise indicated. A 1-in. corporation stop must be installed in the top outlet and 1-in. copper tubing installed from the corporation stop to the valve. Inside the manhole a 1-in. bronze gate valve must be installed on the tubing. The open end of the gate valve must be equipped with a 1-in. brass plug. Copper pipe connections are to be flared mechanical connections. Sweated copper connections will not be acceptable.
- After all testing, filling and disinfecting are completed a brass plug will be inserted in the gate valve in such a manner as to provide a positive water tight seal.
- 13.1.13. **CORROSION PROTECTION:** All flanges, bolts, nuts, and other exposed metal surfaces underground must be coated with Texaco, Koppers, or equal rust proof compound.
- When specified, standard protection for Bar Wrapped Steel Cylinder Concrete Pipe will be 30 mils polyethylene encasement and must be installed in accordance with AWWA C-105. The encasement will consist of three 10 mil polyethylene wraps installed one inside the other properly fastened to produce the 30 mil total coverage. An 8 mil wrap must not be allowed to produce the required 30 mils. Valves and tees, crosses, junctions, or openings must be wrapped or cut in accordance with AWWA C-105. The polyethylene foam padding glued to the pipe wall at the pipe center of gravity must be closed-cell polyethylene foam wrapper padding, such as DOW Chemical Company's "Ethafom" or equal with a minimum thickness of one-half inch.
- 13.1.14. **PATCHING:** Excessive field-patching of lining or coating will not be permitted. Patching of lining or coating will be allowed where area to be repaired does not exceed 100 square inches and has no dimension greater than 12 in. In general, there must not be more than one patch on either the lining or the coating on any one joint of pipe. Whenever necessary to patch the pipe, make patch with cement mortar as previously specified for interior joints.
- 13.1.15. **FLUSHING AND DESINFECTATION FOR SCCP WATER LINES:** Disinfect the piping system in accordance with article 10 of this Specification and as detailed in AWWA C-651.
- 13.1.16. **PRESSURE TEST FOR SCCP WATER LINES:**
- 13.2.16.1. Pressure test for SCCP must be conducted in accordance with AWWA C600. Submit a detailed test procedure and method, for Engineer's review at least ten working days before testing.
- 13.2.16.2. All pipe lines will be tested by subjecting each section to a pressure of at least 150psi.
- 13.2.16.3. The test may be made before or after backfilling. However, if mechanical compaction is to be used in the backfilling operations as spelled out in AWWA C600, the test must not be made until the backfilling is completed and compacted. All connections, blow offs and valves will be tested with the main as far as is practicable.
- 13.2.16.4. The test section must be slowly filled with potable water, and all air must be vented from the line. The rate of filling must be acceptable to the engineer, with at least 24 hr. notice required before tests are scheduled. While the test section is under test pressure. A visual inspection for leaks must be made along pipe line, and all visible leaks repaired. The test pressure must not begin until pipe has been filled with water for at least 24 hr. to allow for absorption in the cement mortar lining.

- 13.2.16.5. All valves and valve boxes must be properly located and installed and operable before testing. Bulkheads will be provided with sufficient number of outlets for filling and draining the line and for venting air.
- 13.2.16.6. Hydrostatic pressure and leakage test must conform to section 4 of AWWA C600. Furnish gauges, meters, pressure pumps, and other equipment needed to fill the line slowly and perform the required hydrostatic pressure leakage tests.
- 13.2.16.7. The owner will provide a source supply from the existing water distribution system for Contractor's use in filling the lines. For potable water, an air break must be maintained at all times between Owner's distribution system and the contractor's equipment to prevent cross-connection. The line will be slowly filled with water and specified test pressure must be maintained in the pipe for the entire test period by means of a pump furnished by contractor. Provide accurate means for measuring the quantity of water required to maintain this pressure. The amount of water required is a measure of the leakage.
- 13.2.16.8. Duration of pressure test must not be less than 2 hr. The leakage test will be separate test following the pressure test and must not be less than 4 hr. duration. All leaks evident at the surface must be repaired and leakage eliminated regardless of the total leakage as shown by test. Lines which fail to meet test must be repaired and retested as necessary until test requirements are complied with. Defective materials, pipes, valves and accessories must be removed and replaced.
- 13.2.17. LEAKAGE TEST FOR SCCP WATER LINES:
- 13.2.17.1. Leakage test must be made after pressure test has been satisfactorily completed and all backfilling and compaction is completed to top of trench. Contractor to furnish the necessary apparatus and assistance to conduct the test.
- 13.2.17.2. To pass the leakage test, the amount of leakage must be zero.
- 13.2.17.3. Should the test on any section of the pipeline show leakage greater than specified above, locate and repair the defective pipe, fittings, or joint until the leakage is within the specified allowance of 4 hour duration. All repairs and retest, if required, must be made without additional cost to the owner.
- 13.2.18. PIPE TRENCHING, INSTALLATION, AND BACKFILL. Except as noted, perform pipe trenching, Installation, and Backfill for SCCP in accordance with AWWA C-600 and Article 6 of this Specification.
- 13.2.19. PIPE ZONE EMBEDMENT. Unless otherwise specified, embed SCCP in Class II material as defined in Article 6. Native material or imported material meeting or exceeding Class II requirements may be used.
- 13.2.20. MARKING TAPE. Mark SCCP pressure water pipe by installing the appropriate marking tape for detection purposes concurrently. Provide a high visibility blue detectable tape consisting of a 5.0 mil inert polyethylene plastic material with the standard warning and identification for potable water imprinted on the tape. Provide a minimum width of 6 in. for all potable water lines and bury tape to a depth of 36 in., measured from finished grade. Use detecting tape manufactured by Empire, Lineguard, or approved equal.
- 13.3. **Measurement.**
- 13.3.1. **Water Main (SCCP).** This item will be measured in place by the linear foot of SCCP pipe along center line of pipe installed.
- 13.4. **Payment.**
- 13.4.1. **Water Main (SCCP).** The work performed and the materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for at the unit price bid for "Water Main (SCCP)" of the type and size specified. This price is full compensation for furnishing all required materials, including all pipe, fittings and accessories; mechanically or welded joint restraint systems, flexible connections, couplings; and all appurtenances defined herein to include, but not limited to the following items: tapping sleeves and

valves, butterfly valves with manholes, air/vacuum release valves, blow-off valves assemblies, valve/access manholes, concrete collars, end plugs, bends, tees, couplings, reducers, marking tape, concrete thrust blocks, welded or mechanical thrust restraint and all other items for the project not indicated as being covered under the other specific bid items shown on the proposal; furnishing all required labor, including testing, coordination, traffic control, potholing, excavation, including hand-digging, if needed; embedment and backfilling; compaction and compaction testing; disinfection, pressure testing, dewatering of groundwater, where required; cutting, capping, tie-ins and connection of new water main to existing water lines.

All fittings and appurtenances shown on the plans will not be paid for directly but will be subsidiary to the water pipe installation.

All related work to cutting, removal and disposal of sections from existing 24" SCCP and existing steel casings, as shown on plans, required for the installation of new fittings and special pieces for connection to main line will not be paid by directly but will be consider subsidiary to the water pipe installation.






Cutting and restoring pavement will be paid for in accordance with Item 400, "Excavation and Backfill for Structures". Flowable fill will be paid for in accordance with Item 401, "Flowable Fill". Trench excavation protection will be paid for in accordance with Item 402, "Trench Excavation Protection".

Add to Special Specifications 7016 the following Article:





Article 14. Cathodic Protection for Bar Wrapped Steel Cylinder Concrete Pipe (SCCP) Water Mains

14.1. **Description.** Furnish all labor, materials, equipment and incidentals required to install cathodic protection for SCCP water mains as shown on plans and as specified herein.

14.2. SERVICES OF CONTRACTOR:

-  The Contractor will provide the services of a corrosion Engineer to supervise and to inspect installation of the cathodic protection system and conduct all testing required, in the presence of the Engineer.
-  Corrosion Engineer refers to a person who by reason of his/her knowledge of the physical sciences and principles of engineering and mathematics, acquired by professional education and related practical experience, is qualified to engage in the practice of corrosion control on buried or submerged metallic piping systems and other metallic structures.
-  Such person may be a licensed professional Engineer or may be a person certified as being qualified by NACE if such licensing or certification includes suitable experience in corrosion control on buried or submerged metallic piping systems and other metallic structures.
-  The Corrosion Engineer must have a minimum of seven (7) years of experience in the field of buried steel pipeline cathodic protection design and testing.
-  The Contractor must insure that the cathodic protection system is installed, tested and placed in service in accordance with the requirements specified and as recommended by manufacturer.

14.3. References. Comply with the applicable requirements of the following items listed below.

-  American National Standards Institute (ANSI):
ANSI C2-1993 National Electrical Safety Code.
-  American Society of Testing
and Materials (ASTM) B 3-74 (1985) Soft or
Annealed Copper Wire.
-  National Association of Corrosion Engineers (NACE):
NACE RP0169-92 Recommended Practice, Control of External Corrosion on Underground or
Submerged Metallic Piping Systems.
-  National Electrical Manufacturers Association (NEMA):

NEMA 250-85 Enclosures for Electrical Equipment.



National Fire Protection Association (NFPA):

NFPA 70-93

National Electrical Code



Underwriters' Laboratories (UL):

1. UL 83-85 - Thermoplastic - Insulated Wires.
2. UL 467-85 - Bonding and Grounding Equipment.
3. UL 486A-85 - Wire Connectors.
4. UL 510-82 - Insulating Tape.

14.4.

DEFINITIONS:

Ferrous Metal Pipe: Any pipe made of steel or iron as well as containing steel or iron as a principal structural material, except reinforced concrete pipe and concrete cylinder pipe.

Foreign-Owned Structure: Any buried pipe or cable not specifically installed under this contract.

Lead, Lead Wire, Joint Bonds, Cable, Conductor, Insulated Copper Conductor: The same as wire.

Electrically Continuous Pipeline: A pipeline which has a linear electrical resistance equal to or less than the sum of the resistance of the pipe plus the maximum allowable bond resistance for each joint as specified in this section.

Electrical Isolation: The condition of being electrically isolated from other metallic structures including, but not limited to, pipe, reinforcement, and casing, and the environment as defined in NACE Standard RP0169-83.

14.5.

SUBMITTALS. Submit before starting construction three sets of catalog data for the manufactured items of materials, equipment, components, and test equipment to be used in the work described in this item and indicated on the Drawings. Include specific performance data, material descriptions, ratings, capacities, brand names, catalog or part numbers, general or specific types, and all other pertinent information and data. Include, but do not limit to, the following items:

- a. Pipe joint bonding cables and clips
- b. Test station boxes and terminal boards.
- c. Test station cables.
- d. Exothermic welding equipment.
- e. Exothermic weld caps.
- f. Testing instruments and equipment.
- g. Testing plans and schedule.

14.6.

Ensure that items furnished fit the space available. Make necessary field measurements, including those for connections, and order such sizes and shapes of equipment in order that the final installation suits the true intent and meaning of the drawings and specifications.





Existing cathodic protection test stations in service indicated on the plans to remain in place, will be required to be adjusted to proposed grades, as shown on the plans.

14.7.













Where equipment requires different arrangement of connections from those indicated on the Drawings, install the equipment to operate properly and in accordance with the intent of the Drawings and Specifications. Make all changes in the Work required by the different arrangement of connections.

14.8.

Contact closeout submittals. Upon acceptance of the submittals, furnish 3 final copies of catalog data of materials, equipment, and components together with operating and maintenance instructions.

- 14.9. Delivery, storage and handling. Store all materials and equipment in such a manner as to protect from the detrimental effects of the elements.
- 14.10. Joint Bonding and Electrical Isolation. The following specifications cover the requirements of SCCP transmission water line for electrical continuity and electrical isolation devices for installation at connections to existing piping, at selected below grade to above ground piping transitions, at cased crossings and at tunnels.
- 14.10.1. References. Comply with the following applicable requirements:
-  ASTM D 1248- Polyethylene Plastics Molding and Extrusion material
 -  AWWA C207 – Steel Pipe Flange for Water Works Service
 -  AWWA M9 Manual – Concrete Pressure Pipe
 -  ANSI B16.5 - Cast Iron Pipe Flanges and Flanged Fittings
- 14.10.2. Submittals. Submit in accordance with project requirements.
- Design Drawings and calculations: Prepare all computations and drawings by or under the direct supervision of the Corrosion Engineer.
- Catalog Cuts: Submit manufacturer's catalog cuts for each item. Include the manufacturer's name in the catalog cuts and provide sufficient information to show that the materials meet the requirements of the drawings and specifications. Where more than one item or catalog number appears on a catalog cut, identify the item proposed.
- Test Results: Submit electrical continuity and flange isolation test results to El Paso Water Utilities or its designated representative.
- 14.10.3. Quality Control.
- Provide manufacturer's certification that all electrical continuity bonding meets the requirements of the drawings and specifications. Reference certification to applicable section of the specifications and applicable standard details.
- Provide manufacturer's certification that all isolation devices meet the published material specifications.
- Provide manufacturer's Certificate of registration for Electrical Isolation Device against the provisions of a Certified ISO 9001:2000 Quality Assurance Program.
- All materials, fabrication, and installations are subject to inspection and testing by EL PASO WATER UTILITIES or its designated representative.
- 14.10.4. Joint Bonding and Electrical Isolations Materials. These materials to be incorporated into the project include but not limited to Electrical Continuity Bonds and Flange isolation Assemblies.
- 14.10.5. Electrical Continuity Bonds. Applications for electrical continuity bonds include bonding across bolted joint assemblies and bonding across gasketed joint assemblies.
- Use prestressed pipe for this project that has been fabricated in such a manner as to establish electrical continuity between metallic components of pipe and joints. Establish electrical continuity as indicated in drawings and specifications.
- When using tensile wire, pipe manufacturer to obtain a resistance no greater than 0.03 ohms between any wire and steel joint ring at end of pipe farthest from that wire.
- When using internal pipe joint components, pipe manufacturer to obtain resistance of less than 0.03 ohms between any component and steel pipe cylinder.
- Electrical bond clips (3) to comply with ASTM 366 steel bonding clip, each approximately 0.13-in. thick, 2-1/2-in. long, and 1-1/4-in. wide, with 1/8-in. fillet welds to the bell and spigot of adjacent prestressed

concrete cylinder pipe or steel pipe with rubber gasketed joints. Manufacturer clips to maintain continuity regardless of small deflections of finished joints.

- 14.10.6. Flange isolation. Required applications of dielectric isolation assemblies include but not limited to the following:
- At selected locations where new piping is mechanically connected to existing piping.
 - At selected below grade to aboveground piping transitions.
 - At locations shown on the drawings.
- 14.10.7. Isolation. Provide electrical isolation through the installation of the following materials:
- Welded flange connections to steel pipe.
 - Flange connections to bell and spigot adapters for concrete cylinder and ductile iron pipe.
 - Flange isolation gasket.
 - Sleeve and Washers.
- 14.10.8. Flange isolation gasket. Flange isolation gasket must comply with the following:
- Gasket: Provide type "E" gaskets with an EPDM sealing element, to be 1/8" in. thick.
 - Dimension: Gasket to be 1/8 in. less in I.D. than the I.D. of the flange in which it is to be installed and extend to the O.D. of the flange.
 - Flange face: Provide sealing element positioned to accommodate either flat or raised face flanges.
 - Temperature Range: Temperature range of the products must be -65°F to + 250° F.
- 14.10.9. Product performance testing: Gasket must meet or exceed the following criteria:
-  ASTM D149 – Dielectric Strength, 550 volt/mil
 -  ASTM D695- Compressive Strength, 50,000 psi maximum
 -  ASTM D229 – Water Absorption, 0.15% maximum
 -  ASTM D790 – Flexural Strength, 50,000 psi minimum
 -  ASTM D785 – Hardness, 110 minimum
 -  ASTM D256 – IZOID Impact Strength, 12.5 ft-lbs/in minimum
 -  ASTM D638 – Tensile Strength, 45,000 psi minimum
 -  ASTM D32 – Shera Strength – 20,000 minimum
 -  ASTM F-36 – Compressibility, 2.1% maximum
 -  ASTM F-36 – Recovery, 88.9% minimum
 -  ASTM F-38(B) – Creep Relation, 5.1% maximum
 -  DIN 3535 – Gas permeability, 0.43cm³/min. maximum
- 14.10.10. Alternate Isolation Gasket: As an alternate to the above, provide a plain-faced phenolic gasket. Place the phenolic gasket between two full faced gaskets. Provide cloth-inserted rubber gasket material, 1/8 in. thick in accordance with AWWA C207. Use factory cut gaskets of proper dimensions.
- 14.10.11. Electrical Isolation Sleeves and Washers. Isolation sleeves and washers must comply with the following:
- Sleeve – Provide full length 1/32 in. thick, mylar sleeves for each bolt. The length of the sleeve will extend half way into the outside steel backup washers.
 - Isolation Washers: Supply two, 1/8 in. thick, Pyrox G-10 isolation washers per bolt. Isolation washers to have a compressive strength of 50,000 psi, a dielectric strength of 550 volts/mil and maximum water absorption of 0.10%.
 - Backup washers: Provide two, 1/8 in. thick, zinc plated, hot rolled steel backup washers for each bolt. For pipe greater than 30 in. diameter, provide two additional steel washers to be placed inside isolation washers for additional support.
 - Size: The isolation washers and the backup washers must be of the same O.D. and I.D., with sufficient large I.D. to fit over the isolation sleeve.
- 14.10.12. Coatings: Coat buried isolation flanges with petroleum base type or synthetic, a-polar polymer wrap.

- 14.10.13. Installation of Flange Isolation Devices. Install above-grade dielectric isolators a minimum of 12 in. and a maximum of 48 in. above final grade. Place gasket, sleeves and washers as shown on the drawings. Follow manufacturer's recommendations for tightening to proper torque.

Immediately after insulating fitting has been installed, test electrical isolation with a Gas Electronics model, 601 meter. Fully document test results and submit to El Paso Water Utilities or its designated representative.

Do not use metal base paints on insulating fittings.

Encapsulate below grade isolating flanges with petroleum based tape or synthetic, a-polar polymer wrap after the isolation flange has been tested for effectiveness.

- 14.10.14. Electrical Continuity Test. Immediately after the pipe has been installed in the casing, but before connecting the line, perform an electrical continuity test to determine whether the casing is in fact isolated from the pipe. Have the continuity check fully documented and approved by El Paso Water Utilities or its designated representative before backfilling.

If the electrical isolation between pipe and casing is not effective, immediately investigate the cause and remedy the situation. Under no circumstances, backfill a shorted casing.





- 14.11. Anodes. Magnesium bar in pre-packaged backfill with test lead wire in weights shown on plans.

- 14.11.1. Chemical Composition of Magnesium Anodes: Percent by weight in accordance with Table 2.

Table 2.
Chemical Composition of Magnesium Anodes

Chemical	Standard	High Potential
Aluminum	5.0-7.0	0.01 Max.
Zinc	2.0-4.0	0.05 Max.
Manganese	0.150 Min.	0.5-1.30
Copper	0.100 Max.	0.02 Max.
Silicon	0.300 Max	0.05 Max.
Iron	0.003 Max	0.03 Max.
Nickel	0.003 Max	0.001 Max.
Others	0.300 Max	0.50 each or 0.300 Max Total
Magnesium	Balance	Balance









- 14.11.2. Pre-packaged Backfill.

 75 percent ground hydrated gypsum
 20 percent powdered bentonite
 5 percent anhydrous sodium sulfate
 In water permeable fabric sack with anode centered in sack

- 14.11.3. Lead Wire: No. 12 AWG 600 volts solid copper wire with THW, THWN, or THHN white insulation, at least 15-ft. long and factory connected to core with silver brazing alloy with minimum silver content of 15 percent.

- 14.11.4. Detectable Warning Tape. Yellow Mylar encased aluminum foil, minimum 6 in. wide, with imprinted words "CATHODIC PROTECTION".

- 14.11.5. Thermite Welding Of Wires. Thermite weld test lead and joint bond wires to ductile iron and steel pipe joints and fittings, except where limited use of lugs is permitted following standard details. This weld process may be specified for use on other metallic structures.

- 14.11.6. Select and use thermite welding equipment following equipment manufacturer's instructions and standard details.
-  Use equipment and molds to accommodate wire size, metallic structure's shape, wire position & attachment (vertical or horizontal) and other criteria specified.
 -  Before a mold is used, remove and clean slag, dirt, and other foreign matter from mold.
 -  Use cartridge and charge size based on manufacturer's recommendations for specific application.
 -  Different charges are required for steel and ductile iron.
- 14.11.7. Surface Preparation:
- Surfaces with Little or No Coating. Clean to bare metal by grinding or filing area approximately 3-in. square to produce bright metal surface. Remove coating, dirt, mill scale, oxide, grease, moisture, and other foreign matter from weld areas.
- Surfaces with High Performance or Thick Coating. Cut 4 in. square window through coating and clean 3 in. square of surface to bright metal, avoiding damage to surrounding coating.
- 14.11.8. Preparation for Welding. Before welding, remove wire insulation as required to fit mold, avoiding damage to exposed copper wire
-  If wire is cut or nicked over half way through its diameter, cut off and strip new end.
 -  If manufacturer requires use of copper sleeve, crimp it securely to wire and remove excess wire protruding from end of sleeve.
- 14.11.9. Test Connection. After charge is set, remove mold and slag from weld area with welder's hammer. Strike top and sides of weld with hammer to test secureness of connection. If weld does not hold, remove scrap weld material, clean, and begin weld process again. After welding and before coating cleaned weld area, joint bond wires may be test for electrical continuity.
- 14.11.10. Weld Caps. When weld passes test for soundness and electrical continuity, repair coating in weld area with petrolatum or petroleum wax mastic and weld cap placed over weld following standard details.
-  Apply mastic to fill weld cap or pre-filled weld cap and cover exposed metal of structure and wire bminimum thickness of 1/4 in. Repair damage to coating around weld area following coating manufacturer's recommendations.
 -  If weld cap will not fit due to physical space limitations, coat bare metal and wire in weld area wminimum 1/4-in. thickness of petrolatum or petroleum wax mastic
- 14.12. **Measurement.**
- 14.12.1. **Cathodic Protection for SCCP Water Main.** This item will be measure in place by the lump sum price as stated in the bid form.
- 14.13. **Payment.**
- 14.13.1. **Cathodic Protection (SCCP).** The work performed and materials furnished in accordance with this item and measured as provided under "Measurement" will be paid for at the unit price bid for "Cathodic protection (SCCP)". This is price is full compensation for furnishing all required labor, material, equipment, tools, superintendence and incidentals required for installing the cathodic protection system and corrosion monitoring test stations for SCCP water lines., including fittings, and casing including but limited to bonding joints, test stations, flange isolation, anodes, testing, bonding wires or clips, conductors, detectable warning tape, welding, services of corrosion engineer, warning tape.

All labor, equipment and materials required to the adjustment of existing cathodic protection test stations to proposed grades indicated on the plans will not be paid directly but will be consider subsidiary to the in the installation of the cathodic protection for SCCP.

Add to Special Specifications 7016 the following Article:

Article 15. Blow Off Valves Assembly for Water Mains

- 15.1. **Description.** Furnish all labor, materials, equipment and incidentals required to install blow off valves for water mains as shown on plans and as specified herein.
- 15.2. **Submittals.** Submit in accordance with project requirements.
- Pre-Cast manhole and installation must comply with Article 7.2.3 of Specifications
- Gate valve of the size specified must be flanged with blind flange and must comply with Article 7.2.1. of this Specifications.
- Spool piece will have bolted flanges on both ends and must comply with Article 7.2.2. of this Specifications.
- 15.3. **Construction.**
- Manhole and valve installation must comply with Article 7 of this Specifications
- 15.4. **Measurement.**
- Blow Off Valves for Water Mains. This item will be measured in place by each blow off valve installed for the size specified.
- 15.5. **Payment.**
- Blow off valves for water mains. The work performed and the materials furnished in accordance with this Item and measured as provided under "Measurement" will be paid for individually. All blow off valves shown on the plans pay items include all costs associated with coordination; excavation; disposal of excess material; backfill, compaction, compaction testing for utilities, removal and replacement of pavement structure, restoration of concrete sidewalk and curb and gutter, all labor, equipment and materials required for furnishing and installing all blow off valves as shown on the plans, complete in place, including but not limited to: Standard manhole precast or cast in place, installed to the depth shown on the plans, including base, pipe penetrations, grout, concrete sealant, protective coating, ring and cover, concrete collars, gate valve, spool piece, adjustable extension stem guides, valve stem steel extension and other appurtenances as shown on the plans and details in accordance with EPWU requirements. The additional depth of manhole and risers must be included in this item and will be not paid for individually as it is considered subsidiary to the blow off valve installation.