

Section 02532W

HIGH DENSITY POLYETHYLENE (HDPE)
SOLID WALL PIPE FOR WATER

1.00 GENERAL

1.01 SECTION INCLUDES

- A. Furnish labor, materials, equipment and incidentals necessary to install polyethylene pipe, and complete installation in accordance with the Contract Documents. The finished pipe shall be continuous over the entire length of the water line between fittings and be free from defects.
- B. Domestic water piping shall be approved by the Underwriters Laboratory and shall be accepted by the State Fire Insurance Commission for use in water distribution systems. HDPE water pipe shall bear the seal of approval (or "NSF" mark) of the National Sanitation Foundation Testing Laboratory for potable water pipe.
- C. References to Technical Specifications:
 - 1. Section 01200 – Measurement and Payment Procedures
 - 2. Section 01350 – Submittals
 - 3. Section 02510 – Water Mains
- D. Standards: Comply with local governing regulations if more stringent than specified herein. Piping shall meet the following standards and shall be a part of this Section as if written here in their entirety.
 - 1. American Society for Testing and Materials (ASTM) Standards:
 - a. ASTM F1473, Test Method for Notch Tensile Test to Measure the Resistance to Slow Crack Growth of Polyethylene Pipes and Resins
 - b. ASTM D2122, Determining Dimensions of Thermoplastic Pipe and Fittings
 - c. ASTM F2620, Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings
 - d. ASTM D2837, Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials
 - e. ASTM D3035, Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Controlled Outside Diameter (up to 3-Inch IPS)
 - f. ASTM D3350, Specification for Polyethylene Plastics Pipe and Fittings Material
 - g. ASTM F714, Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter (4-Inch IPS and larger)
 - 2. American Water Works Association (AWWA) Standards:
 - a. AWWA C906, Polyethylene (PE) Pressure Pipe and Fittings, 4 through 64 Inches, for Water Distribution
 - b. AWWA M55, Polyethylene (PE) Pipe Design and Installation

1.02 MEASUREMENT AND PAYMENT

- A. Unless indicated as a Bid Item, no separate payment will be made for HDPE pipe under this Section. Include cost in Bid Items for water mains.
- B. If HDPE pipe is included as a Bid Item, measurement will be based on the units shown in Section 00300 – Bid Proposal and in accordance with Section 01200 – Measurement and Payment Procedures.

1.03 SUBMITTALS

- A. Make Submittals required by this Section under the provisions of Section 01350 – Submittals.
- B. Submit Shop Drawings showing design of pipe and fittings indicating alignment and grade, laying dimensions, fabrication, fittings, flanges, and special details.
- C. Submit product quality, material sources, and field quality information in accordance with this Section.

1.04 QUALITY ASSURANCE

- A. Polyethylene pipe jointing shall be performed by personnel trained in the use of the thermal butt-fusion equipment and recommended methods for new pipe connections. Personnel directly involved with installing the new pipe shall have received training in the proper methods for handling and installing the polyethylene pipe. Training shall be performed by a qualified representative of the pipe manufacturer. The Contractor shall maintain records of trained personnel, and shall certify that training was received not more than 12 months before commencing construction.

1.05 DELIVERY AND STORAGE

- A. Transport, handle, and store pipe and fittings as recommended by manufacturer.
- B. If new pipe and fittings become damaged before or during installation, it shall be repaired as recommended by the manufacturer or replaced as required by the Owner's Project Representative at the Contractor's expense, before proceeding further.
- C. Deliver, store, and handle other materials as required to prevent damage.

2.00 PRODUCTS**2.01 MATERIALS**

- A. Pipe: Polyethylene Plastic Pipe shall be high density polyethylene pipe (HDPE).
 - 1. Solid wall high density polyethylene for pressure water pipe shall meet the requirements of AWWA C906 "Polyethylene (PE) Pressure Pipe and Fittings, 4 through 64 Inches, for Water Distribution" (Ductile Iron Pipe Sizing).

- B. All pipe shall be made of virgin material. No rework except that obtained from the manufacturer's own production of the same formulation shall be used.
 - 1. The pipe shall be homogenous throughout and shall be free of visible cracks, holes, foreign material, blisters, or other deleterious faults.
 - 2. Dimension Ratios: The minimum wall thickness of the polyethylene pipe shall meet the following:
 - a. Pressure Applications: AWWA C906 DR-11 Pressure Class 160.
 - 3. All HDPE shall be carbon black or solid gray stabilized throughout the structural wall for ultra-violet protection. The pipe shall have a near white inside diameter to facilitate future TV inspection.
- C. Bends and Fittings: ANSI A21.10, ductile iron; ANSI A21.11 single rubber gasket push-on type joint; minimum 150 psi pressure rating.
- D. Coatings and Linings: Conform to requirements of Section 02634 – Ductile Iron Pipe and Fittings.

2.02 MATERIALS TEST

- A. Tests for compliance with this Section shall be made as specified herein and in accordance with the applicable ASTM Specification. A certificate of compliance with ISO 9000 shall be furnished, by the manufacturer for all material furnished under this Section. Polyethylene plastic pipe and fittings may be rejected for failure to meet any of the requirements of this Section.

3.00 EXECUTION

3.01 HANDLING

- A. The joints shall be handled near the middle with wide web slings and spreader bars. Rope slings also work well with straight lengths. The use of chains, end hooks or cable slings that may scar the pipe are not permitted. The following procedures shall be observed when handling HDPE pipe.
 - 1. Always stack the heaviest series of pipe at the bottom.
 - 2. Protect the pipe from sharp edges when overhanging the bed of a truck or trailer by placing a smooth, rounded protecting strip on the edge of the bed.
 - 3. The load should be anchored securely to prevent slippage.
- B. Lengths of small-diameter, lightweight pipe can be unloaded manually.
- C. Pipe applications shall normally be handled by:
 - 1. Unloading the pipe from the truck in a row along the side of the installation area and moving the fusion unit along the row of joints.
 - 2. Stacking the pipe beside the fusion unit and trailing the pipe out after fusion, then dragging the long length of pipe into place for installation. It is suggested that as the pipe is fused and moved through the fusion machine, additional joints of pipe should be placed in the moveable jaw side of the machine for

each subsequent fusion. This prevents the hydraulic system of the machine from having to pull the previously fused long length.

- D. Dragging the pipe into place is permitted provided the pipe isn't damaged from sharp rocks or excessive abrasion created by pulling the pipe great distances.

3.02 PIPE JOINING

- A. The polyethylene pipe shall be assembled and joined at the Site using the thermal butt-fusion method to provide a leak proof joint. Threaded or solvent-cement joints and connections are not permitted. All equipment and procedures used shall be in strict compliance with the manufacturer's recommendations. Fusing shall be accomplished by personnel certified as fusion technicians by a manufacturer of polyethylene pipe and/or fusing equipment.
- B. The butt-fused joint shall be in true alignment and shall have uniform roll-back beads resulting from the use of proper temperature and pressure. The joint shall be allowed adequate cooling time before removal of pressure. When cool, all weld beads shall then be removed from the inside surface such that the joint surfaces shall be smooth. The fused joint shall be watertight and shall have a tensile strength equal to that of the pipe. All joints shall be subject to acceptance by the Owner's Project Representative. All defective joints shall be cut out and replaced at no cost to the Owner. Any section of the pipe with a gash, blister, abrasion, nick, scar or other deleterious fault greater in depth than 10 percent of the wall thickness, shall not be used and must be removed from the Site. However, a defective area of the pipe may be cut out and the joint fused in accordance with the procedures stated above. In addition, any section of pipe having other defects such as concentrated ridges, discoloration, excessive spot roughness, pitting, variable wall thickness or any other defect of manufacturing or handling as determined by the Owner's Project Representative shall be discarded and not used.

3.03 BENDING PIPE

- A. HDPE may be cold-bent to a minimum radius of 40 times the pipe diameter as it is installed, eliminating the need in many cases for elbows for slight bends. The minimum bending radius that can be applied to the pipe without kinking varies with the diameter and wall thickness of the pipe. Contractor shall conform to manufacturer's recommendations. If adequate space is not available for the required radius, a fitting of the desired angle shall be fused into the piping system to obtain the necessary change in direction.

3.04 INSTALLATION BELOW GROUND

- A. Conform to requirements of Section 02510 – Water Mains.

- B. Pipe Laying:
1. When pulling pipe, either a pulling head or a suitable wraparound sleeve with rubber protective cover shall be used to prevent the pulling cables from damaging the pipe. The pipe shall not be pulled by the flanged end.
 2. Install pipe in accordance with Section 02318 – Excavation and Backfill for Utilities, and manufacturer's recommendations.

3.05 FIELD QUALITY CONTROL

- A. Testing shall be as specified in Section 01450 - Testing Laboratory Services.
- B. Hydrostatic Testing for pressure piping systems shall be performed in accordance with ASTM F2164. Testing pressure shall not exceed 1.5 times the system design pressure and total testing time including the time required to pressurize, stabilize, hold test pressure, and depressurize should not exceed 8 hours. If 5 psi is lost during testing pipeline must be re-pressurized.
- C. HDPE pipe deflection shall not exceed deflection percentages identified in ASTM F1962 or manufacturer's maximum allowable deflection, whichever is lower. Allowable pipe deflection varies based on DR rating. The following maximum deflection percentages can be used for the following DR ratings: DR21 – 7.5 percent, DR17 – 6.0 percent, DR15.5 – 6.0 percent, DR13.5 – 6.0 percent, DR11 – 5.0 percent, DR9 – 4.0 percent, DR7.3 – 3.0 percent. Deflection measurements can be taken by mandrel or by measurement of inside diameter before and after backfill operations.
- D. Do not enclose or cover any Work until inspected.

3.06 CLEAN AND ADJUST

- A. Remove surplus pipeline materials, tools, rubbish and temporary structures and leave the construction site clean, to the satisfaction of the Owner's Project Representative.

END OF SECTION