

Section 02528

POLYETHYLENE WRAP

PART 1 GENERAL

1.01 SUMMARY

This Section includes specifications for materials and installation of polyethylene encasement for pipe, valves, fittings, and other appurtenances in ductile or cast iron systems.

1.02 MEASUREMENT AND PAYMENT

A. Unit Prices

No separate payment will be made for polyethylene wrap. Include cost of polyethylene wrap in unit price for pipes and fittings to be wrapped.

B. Stipulated Price (Lump Sum). If the Contract is a Stipulated Price Contract, payment for Work in this Section is included in the total Stipulated Price.

1.03 REFERENCES

A. ASTM D 149 – Standard Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies.

B. ASTM D 882– Standard Test Method for Tensile Properties of Thin Plastic Sheeting.

C. ASTM D 1709 REV A – Standard Test Methods for Impact Resistance of Plastic Film by the Free-Falling Dart Method.

D. ASTM D 1922– Standard Test Method for Propagation Tear Resistance of Plastic Film and Thin Sheeting by Pendulum Method.

E. ASTM D 4976 REV A– Standard Specification for Polyethylene Plastics Molding and Extrusion Materials.

F. AWWA C600 – Installation of Ductile-Iron Water Mains and Their Appurtenances.

G. ANSI A 21.5 (AWWA C 105) - Polyethylene Encasement for Ductile-Iron Pipe Systems

1.04 SUBMITTALS

A. Submit product data in accordance with Section 01330 – “Submittal Procedures”.

B. Submit product data for proposed film and tape for approval.

- C. Submit quality assurance plan for field application.
- D. Submit polyethylene film manufacturer's certification of compliance with this Section.

1.05 RELATED REQUIREMENTS

- A. Section 01110 – “Summary of Work”
- B. Section 01270 – “Measurement and Payment”
- C. Section 01330 – “Submittal Procedures”

1.06 – 1.13 NOT USED

PART 2 PRODUCTS

2.01 MANUFACTURER(S) (NOT USED)

2.02 MATERIALS AND/OR EQUIPMENT

- A. Polyethylene Film: Tubular or sheet form without tears, breaks, holidays, or defects; conforming to the requirements of AWWA C 105, for linear, low density polyethylene film.

- 1. Linear Low Density, Polyethylene: Low-density, Linear polyethylene material conforming to the following:

- a. Raw Material. Raw materials to meet the requirements of ASTM D 4976:

- 1) Group: 2 (Linear)
- 2) Low-density: 0.910 to 0.935 g/cm<sup>3</sup>
- 3) Dielectric Strength: Volume resistivity, 10<sup>15</sup> ohm-cm, minimum

- b. Physical Properties: Physical properties to be as follows:

- 1) Tensile Strength: 3,600 psi for an 8 mil minimum thickness, minimum in machine and transverse direction (ASTM D 882)
- 2) Elongation: 700 percent, minimum in machine and transverse direction (ASTM D 882)
- 3) Dielectric Strength: 800 volts/mil thickness, minimum (ASTM D 149)
- 4) Impact Resistance: 600 g, minimum (ASTM D 1709 Method B)

- 5) Propagation Tear Resistance: 2550 gf, minimum in machine and transverse direction (ASTM D1922)
  - c. Thickness: Linear, low density polyethylene film shall have a minimum thickness of 0.008 in. (8 mils)
  - d. Color: Supply white polyethylene film with a minimum 2 percent hindered-amine ultraviolet inhibitor.
2. Polyethylene Tube and Sheet Size: For push-on joint pipe, polyethylene tube and sheet sizes to conform to the following:

| <b>Nominal Pipe Diameter</b> | <b>Minimum Polyethylene Width (inches)</b> |                  |
|------------------------------|--|------------------|
|                              | <u>Inches</u>                              | <u>Flat Tube</u> |
| 3                            | 14   | 28               |
| 4                            | 14   | 28               |
| 6                            | 16   | 32               |
| 8                            | 20   | 40               |
| 10                           | 24   | 48               |
| 12                           | 27   | 54               |
| 14                           | 30   | 60               |
| 16                           | 34   | 68               |
| 18                           | 37   | 74               |
| 20                           | 41   | 82               |
| 24                           | 54   | 108              |
| 30                           | 67   | 134              |
| 36                           | 81   | 162              |
| 42                           | 81   | 162              |
| 48                           | 95   | 190              |
| 54                           | 108  | 216              |
| 60                           | 108  | 216              |
| 64                           | 121  | 242              |

- 3. Large Bell Circumferences: Where bell ends of the pipe are larger than the sheet sizes listed above, use sufficiently large tubes or sheets to cover the joints. Submit sheet dimensions to Engineer for approval prior to application.
- 4. Marking: The polyethylene film shall be clearly marked every 2 feet with the following information:
  - a. Manufacturer’s name or trademark
  - b. Year of manufacture
  - c. ANSI/AWWA C105/A21.5

- d. Minimum film thickness and material type (LLDPE)
  - e. Applicable range of nominal pipe diameter size(s)
  - f. Warning – Corrosion Protection – Repair Any Damage
5. Letters and numerals used for marking items “a” through “e” shall not be less than 1 inch in height and item “f” shall not be less than 1½ inches in height.
- B. Polyethylene Tape: Provide 3-inch wide, plastic-backed, adhesive tape; Paleocene No. 900, Scotchwrap No. 50, or approved equal.

2.03 – 2.04 NOT USED

### PART 3 EXECUTION

#### 3.01 GENERAL / MANUFACTURER(S) (NOT USED)

#### 3.02 PREPARATION

- A. Remove lumps of clay, mud, and cinders from pipe surface prior to installation of polyethylene encasement. Prevent soil or embedment material from becoming trapped between pipe and polyethylene.
- B. Fit polyethylene film to contour of pipe to effect a snug, but not tight fit; encase with minimum space between polyethylene and pipe. Allow sufficient slack in contouring to prevent stretching polyethylene where it bridges irregular surfaces, such as bell-spigot interfaces, bolted joints, or fittings, and to prevent damage to polyethylene due to backfilling operations. Secure overlaps and ends with adhesive tape to hold polyethylene encasement in place until backfilling operations are complete.
- C. For installations below water table or in areas subject to tidal actions, seal both ends of polyethylene tube with adhesive tape at joint overlap. Circumferentially wrap with tape, every 2 feet along the barrel. Seals shall be confirmed by Project Manager or Inspector before backfill.

#### 3.03 ERECTION/INSTALLATION APPLICATION AND/OR CONSTRUCTION

- A. Tubular Type (Method A):
  - 1. Cut polyethylene tube to a length approximately 2 feet longer than pipe section. Slip tube around pipe, centering tube to provide 1-foot overlap on each adjacent pipe section. Bunch accordion-fashion lengthwise until it clears pipe ends.
  - 2. Lower pipe into trench and make up pipe joint with preceding section of pipe. Make shallow bell hole at joints to facilitate installation of polyethylene tube.

3. After assembling pipe joint, make overlap of polyethylene tube. Pull bunched polyethylene from preceding length of pipe, slip it over end of adjoining length of pipe, and secure in place. Then slip end of polyethylene from adjoining pipe section over end of first wrap until it overlaps joint at end of preceding length of pipe. Secure overlap in place. Take up slack width at top of pipe to make a snug, but not tight, fit along barrel of pipe, securing fold at quarter points.
4. Repair cuts, tears, punctures, or other damage to polyethylene. Proceed with installation of next section of pipe in same manner. Any tears, punctures, or other damage shall be repaired at no cost to Owner.

**B. Tubular Type (Method B):**

1. Cut polyethylene tube to a length approximately 1 foot shorter than pipe section. Slip tube around pipe, centering it to provide 6 inches of bare pipe at each end. Take up slack width at top of pipe to make a snug, but not tight, fit along barrel of pipe, securing fold at quarter points; secure ends.
2. Before making up joint, slip 3-foot length of polyethylene tube over end of preceding pipe section, bunching in accordion-fashion lengthwise. After completing joint, pull 3-foot length of polyethylene over joint, overlapping polyethylene previously placed on each adjacent section of pipe by at least 1 foot; make each end snug and secure.
3. Repair cuts, tears, punctures, or other damage to polyethylene. Proceed with installation of next section of pipe in same manner. Any tears, punctures, or other damage shall be repaired at no cost to Owner.

**C. Sheet Type (Method C):**

1. Cut polyethylene sheet to a length approximately 2 feet longer than pipe section. Center length to provide 1-foot overlap on each adjacent pipe section, bunching sheet until it clears pipe ends. Wrap polyethylene around pipe so that sheet circumferentially overlaps top quadrant of pipe. Secure cut edge of polyethylene sheet at intervals of approximately 3 feet.
2. Lower wrapped pipe into trench and make up pipe joint with preceding section of pipe. Make shallow bell hole at joints to facilitate installation of polyethylene. After completing joint, make overlap and secure ends.
3. Repair cuts, tears, punctures, or other damage to polyethylene. Proceed with installation of next section of pipe in same manner. Any tears, punctures, or other damage shall be repaired at no cost to Owner.

**D. Installation in Directional Drilled Bore:**

1. Install as described in 3.03.A. Tubular Type (Method A).

2. Attach pulling head to spigot end.
  3. Securely anchor the polyethylene tube at the leading pipe length with circumferential wraps of tape every 1 foot.
  4. Overlap the polyethylene wrap on the following pipe section and secure with tape on each side of joint.
  5. Continue process while taping on each side of successive joints and every 2 feet along barrel.
- E. Pipe-shaped Appurtenances: Cover bends, reducers, offsets, and other pipe-shaped appurtenances with polyethylene in same manner as pipe.
- F. Odd-shaped Appurtenances: When it is not practical to wrap valves, tees, crosses, and other odd-shaped pieces in tube, wrap with flat sheet or split length of polyethylene tube by passing sheet around appurtenance and encasing it. Make seams by bringing edges together, folding over twice, and taping down. Tape polyethylene securely in place at valve stem and other penetrations.
- G. Openings in Encasement: Create openings for branches, service taps, blowoffs, air valves, and similar appurtenances by making an X-shaped cut in polyethylene and temporarily folding back film. After appurtenance is installed, tape slack securely to appurtenance and repair cut, as well as other damaged area in polyethylene, with tape. Service taps may also be made directly through polyethylene, with any resulting damaged areas being repaired as specified.
- H. Junctions between Wrapped and Unwrapped Pipe: Where polyethylene-wrapped pipe joins an adjacent pipe that is not wrapped, extend polyethylene wrap to cover adjacent pipe for distance of at least 3 feet. Secure end with circumferential turns of tape. Wrap service lines of dissimilar metals with polyethylene or suitable dielectric tape for minimum clear distance of 3 feet away from cast or ductile iron pipe.
- I. Backfill
- Use the same backfill material as that specified for pipe without polyethylene wrap. Prevent damage to the polyethylene wrap when placing backfill. Assure backfill material is free from cinders, refuse, boulders, rocks, stones, or other material that could damage the polyethylene. Follow AWWA C600 for backfilling.

### 3.04 REPAIR/RESTORATION

Repair any cuts, tears, punctures, or damage to polyethylene with adhesive tape or with short length of polyethylene sheet or cut open tube, wrapped around pipe to cover damaged area, and secured in place. Any tears, punctures, or other damage shall be repaired at no cost to Owner.

3.05 FIELD QUALITY CONTROL

- A. Freedom from Defects: All polyethylene film shall be clean, sound and free from defects. Defects shall be corrected by the Contractor at no expense to the Owner.
- B. Inspection: All parts of this Section are subject to inspection by the Owner or its designated representative.
- C. Non-Compliance: The CONTRACTOR shall correct any deficiencies in materials or installation at his expense, including excavating the pipe subsequent to backfilling and reinstalling the polyethylene wrap.

3.06 – 3.10 NOT USED

END OF SECTION