

ZG 031 High-Density Polyethylene (HDPE) Conduit

1. Scope

This material specification provides guidelines for specifying HDPE conduit. HDPE conduit can be installed by plowing and short-directional boring methods. Primary, secondary, transmission or communication conductors can be pulled into this type of duct.

2. Applicable Documents

The latest revisions of the following documents in effect on the date of invitation to bid apply to the extent specified herein.

2.1. Company Documents

Company purchase order or purchase order release

2.2. Codes and Standards

ASTM D2122 *Standard Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings*

other ASTM standards as indicated in Table 1

3. Material Requirements

3.1. Material Type

Conduit/pipe shall be constructed of High Density Polyethylene (HDPE) meeting the requirements in Table 1.

**Table 1—HDPE Conduit Material Requirements
(ASTM D3350 with a minimum cell classification code of 334420 C or E)**

Characteristic	Requirement	Relevant Standard(s)	Code
density	0.941 – 0.955 g/cm ³	ASTM D792 or 1505	3
melt flow index	0.4 – 0.15 g / 10 minutes max	ASTM D1238	3
flexural modulus	80,000 psi minimum	ASTM D790	4
tensile strength at yield	3,000 psi minimum	ASTM D638	4
environmental stress crack resistance	condition B, F10 max, 10% Igepal, 96 hrs. minimum	ASTM D1693	2
brittleness temperature	-60° C	ASTM D746	0
elongation	400% minimum	ASTM D638	—
Class E	colored, with UV stabilizer	ASTM D3350	E
Class C	minimum 2% carbon black	ASTM D3350	C

3.2. Color

Conduit shall be black with red longitudinal stripes. Red color shall be UV-stabilized for color retention.

3.3. Markings

Markings specified in this section 3.3 shall be heat-indented, using a print color that is easily distinguishable (such as yellow or white) and UV-stabilized for color retention.

All conduit shall be durably and legibly marked at intervals of approximately two (2) feet, with a lightning bolt warning symbol visible at a distance of eight (8) feet.

All conduit shall be durably and legibly marked with the following, at intervals not to exceed five feet:

- manufacturer's name
- "HDPE" material designation
- trade size based on ASTM D3350
- month & year of manufacture
- manufacturing or lot code
- manufacturing plant location
- sequential footage markings
- classification code, 334420 E or C
- standard dimensional ratio [SDR = (nominal outside diameter) / (minimal wall thickness)]

3.4. Standard Sizes and Wall Thicknesses

**Table 2—HDPE Conduit Diameters and Wall Thicknesses
ASTM D3035 with Standard Dimensional Ratio (SDR) of 13.5**

Nominal Diameter	Outside Diameter	Inside Diameter	Minimum Wall Thickness	Minimum Weight, lbs./100 ft.
2"	2.375"	2.023"	0.176"	53
3"	3.500"	2.982"	0.259"	113
4"	4.500"	3.834"	0.333"	187
6"	6.625"	5.643"	0.491"	405

3.5. Friction Reduction

The HDPE conduit shall be delivered with a low-friction internal wall rated no higher than 0.20. The conduit supplier shall provide to company engineering the coefficient of friction between their product's inner wall and the polyethylene of a typical cable jacket.

3.5.1. Interior Lubrication

Conduit shall be supplied with interior walls lubricated, to facilitate cable pulling.

- Lubricant shall be chemically compatible with all cable jacket materials.
- Lubricant shall be chemically compatible with the conduit material.
- Lubricant shall be a permanent silicone emulsion that will not lose its lubricity over time.

3.6. Ovality

Conduit, after removal from the reel, shall display no greater than 10% ovality as defined below, where "OD" refers to conduit outer diameter. Conduit shall be coiled onto reel at temperatures no greater than 65° F, to help prevent ovality and coil set.

$$\% \text{ ovality} = 100 \times (\text{maximum OD} - \text{minimum OD}) / (\text{average OD})$$

3.7. Pulling Tapes

Unless specified otherwise, silicone-impregnated flat pulling tapes rated for 2,500 lbs. shall be provided, pre-installed in the conduit, with suitable extra length at the ends to allow for partial usage of reels. The coefficient of friction of the tape on the inner conduit wall, as measured in accordance with Bellcore R-000356, Issue 2, shall be less than 0.15.

4. Delivery

4.1. Reels

Conduit shall be delivered on collapsible, reusable steel reels, 96" in diameter and not more than 52" wide. The company shall have the option to return empty reels.

4.2. Securing Bands

Every two wraps on the reel shall be secured with a securing band.

4.3. Dimension Control on Reels

The outside diameter of the conduit coiled on the reels shall not exceed 95". The inside diameter of the coiled conduit shall be 48".

5. Material Specification Issuing Department

The transmission and distribution standards department of the company authored and published this document. Technical questions and comments may be directed to distribution standards engineering. This material specification shall be used and duplicated only in support of company projects.

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