

# 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 PacifiCorp Documents

PacifiCorp purchase order or purchase order release

### 2.2 Codes and Standards

ASTM D 2160 — Solid Wall High-Density Polyethylene

ASTM D 2122 — Specification for Ovality

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 <sup>3</sup>	ASTM D 792 or 1505	3
melt flow index	0.4 – 0.15 g / 10 minutes max	ASTM D 1238	3
flexural modulus	80,000 psi minimum	ASTM D 790	4
tensile strength at yield	3,000 psi minimum	ASTM D 638	4
environmental stress crack resistance	condition B, F10 max, 10% Igepal, 96 hrs. minimum	ASTM D 1693	2
brittleness temperature	-60° C	ASTM D 746	0
elongation	400% minimum	ASTM D 638	—
Class E	colored, with UV stabilizer	ASTM D 3350	E
Class C	minimum 2% carbon black	ASTM D 3350	C

**MATERIAL SPECIFICATION  
Distribution**

© 2009 by PacifiCorp. All rights reserved.

Engineer (D. Wedam): *DMW*  
Standards Manager (G. Lyons): *GL*

**High-Density  
Polyethylene  
(HDPE) Conduit**



5 Oct 09

**ZG 031**  
Page 1 of 4

# ZG 031

## 3.2 Color

Conduit shall be black with red longitudinal stripes. Red color shall be UV-stablized 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 feet, with a lightning bolt warning symbol visible at a distance of 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 D 3350
- 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 D 3035 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 PacifiCorp 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.

**3.5.1.1** Lubricant shall be chemically compatible with all cable jacket materials.

**3.5.1.2** Lubricant shall be chemically compatible with the conduit material.

**3.5.1.3** 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 2500 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. PacifiCorp 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”.

**MATERIAL SPECIFICATION  
Distribution**

© 2009 by PacifiCorp. All rights reserved.

Engineer (D. Wedam): *DMW*  
Standards Manager (G. Lyons): *GL*

**High-Density  
Polyethylene  
(HDPE) Conduit**



5 Oct 09

**ZG 031**  
Page 3 of 4

# ZG 031

## 5 Material Specification Issuing Department

The T & D Standards Engineering Documentation Department of PacifiCorp is responsible for issuing this material specification. Comments and suggestions are welcome. Submit comments or requests for additional copies of this document to:

PacifiCorp T & D Standards Engineering Documentation  
825 NE Multnomah St., Suite 1600, Portland, OR 97232  
telephone: (503) 813-5293; fax: (503) 813-6804

Technical questions regarding this material specification may be submitted to:

PacifiCorp T & D Standards Engineering  
825 NE Multnomah St., Suite 1600, Portland, OR 97232  
telephone: (503) 813-6883; fax: (503) 813-6804

These materials and standards were developed by PacifiCorp for use in its operations and are the property of PacifiCorp. No other use is intended. Except in support of PacifiCorp projects, these materials may not be reproduced or distributed to third parties.

