



Standard Specification for Track-Resistant Black Crosslinked Polyethylene Insulation for Wire and Cable¹

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1. Scope

1.1 This specification covers a black track-resistant crosslinked polyethylene insulation, the base polymer which consists substantially of polyethylene or its copolymers. This insulation shall be carbon black pigmented.

1.2 This insulation is suitable for use on wire or in cable used for power transmission in overhead spaced-line service, installed at temperatures above -25° and exposed to sunlight and other atmospheric environments between -55 and $+75^{\circ}\text{C}$.

1.3 Whenever two sets of values are presented, in different units, the values in the first set are the standard, while those in parentheses are for information only.

2. Referenced Documents

2.1 ASTM Standards:

- D 470 Test Methods for Crosslinked Insulations and Jackets for Wire and Cable²
- D 1711 Terminology Relating to Electrical Insulation²
- D 2132 Test Method for Dust-and-Fog Tracking and Erosion Resistance of Electrical Insulating Materials²
- D 2633 Methods of Testing Thermoplastic Insulations and Jackets for Wire and Cable³
- D 2765 Test Methods for Determination of Gel Content and Swell Ratio of Crosslinked Ethylene Plastics⁴

3. Terminology

3.1 *Definitions:* For definitions of terms used in this speci-

fication refer to Terminology D 1711.

3.2 Definition of Term Specific to This Standard:

3.2.1 *aging, (act of), n*—exposure of materials to air at a temperature of 121°C for 168 h.

4. Physical Properties

4.1 When tested for physical and aging requirements, heat distortion, cold bend, U-bend discharge, surface resistivity, and track resistance in accordance with Test Methods D 470 and for solvent extraction in Test Methods D 2765, the track-resistant black crosslinked polyethylene insulation shall meet the requirements specified in Table 1.

5. Electrical Requirements

5.1 Subject cable specimens to a 5 min ac or dc voltage withstand test at voltages which are based on the nominal thickness of the insulation. Conduct tests in accordance with Methods D 2633 using 125 V/mil (5 kV/mm) for ac tests or 375 V/mil (15 kv/mm) for dc tests.

6. Sampling

6.1 Sample the insulation in accordance with Test Methods D 470 and D 2765.

7. Test Methods

7.1 Test the insulation in accordance with Test Methods D 470, D 2132, and D 2765, modified as noted in Table 1.

8. Keywords

8.1 ac test; cold bend; crosslinked polyethylene; dc test; elongation; environmental cracking; heat distortion. surface resistivity; tensile strength; track-resistant; u-bend discharge

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² *Annual Book of ASTM Standards*, Vol 10.01.

³ *Annual Book of ASTM Standards*, Vol 10.02.

⁴ *Annual Book of ASTM Standards*, Vol 08.02.

TABLE 1 Physical Requirements for Black Track-Resistant Crosslinked Polyethylene Insulation

Physical requirements (original):	
Tensile strength, min, psi (MPa)	1800 (12.4)
Elongation at rupture, min, %	250
Physical requirements [after aging in an air oven at $121 \pm 1^\circ\text{C}$ for 168 h]:	
Tensile strength, min, % of original value	75
Elongation at rupture, min, % of original value	75
Heat distortion at $121 \pm 1^\circ\text{C}$, max, % of original thickness:	
4/0 AWG (107 mm ²) and smaller (insulation on cable)	30
Larger than 4/0 AWG (107 mm ²) (buffed sample of insulation)	15
Solvent extraction:	
After 20-h drying time, max, %	30
Cold bend, $-25 \pm 1^\circ\text{C}$ for 1 h	no cracks
U-bend discharge, 125 V/mil (5 kV/mm)	no cable failures or cracks in insulation surface
Surface resistivity, min, M Ω	200 000
Track resistance:	
Average time to failure, min, h	200

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