Designation: D4246 – 14

Standard Specification for Ozone-Resistant Thermoplastic Elastomer Insulation For Wire and Cable, 90°C Operation[1]

This standard is issued under the fixed designation D4246; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 This specification covers an ozone-resistant insulating compound for electrical wire and cables 14 AWG and larger. This compound consists substantially of a thermoplastic elastomer.

1.2 This type of insulation is considered suitable for continuous operation at conductor temperatures not exceeding 90°C in dry locations. Operating voltages are not to exceed 2000 V. The minimum installation temperature is -40°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.

1.4 In many instances the insulation material cannot be tested unless it has been formed around a conductor or cable. Therefore, tests are done on insulated wire or cable in this specification solely to determine the relevant property of the insulation material and not to test the conductor or completed cable.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D470 Test Methods for Crosslinked Insulations and Jackets for Wire and Cable

D1711 Terminology Relating to Electrical Insulation

D2633 Test Methods for Thermoplastic Insulations and Jackets for Wire and Cable

3. Terminology

3.1 *Definitions*—For definitions of terms used in this specification refer to Terminology D1711.

3.2 *Definitions of Terms Specific to This Standard:*

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

4. Physical Properties

4.1 Requirements for physical properties are listed in Table 1.

4.2 *Thickness of Insulation*—Table 1(*a*), (Conductor Sizes, Insulation Thicknesses, and AC Test Voltages for Rubber Insulations) of Test Methods D470 lists the minimum average thickness for the insulation. The required minimum thickness is 90 % of the specified average thickness.

5. Electrical Requirements

5.1 *Order of Testing*—Perform the ac voltage, insulation resistance, and dc voltage tests in that order when any of these tests are specified. The sequence of other testing is not specified.

5.2 *AC Voltage Test*—Unless otherwise specified, omit this test if the dc voltage test described in 5.4 is to be performed. Test each insulated conductor for 5 min at the ac voltage given in Table 1(*a*) (Conductor Sizes, Insulation Thicknesses, and AC Test Voltages, for Rubber Insulations) of Methods D470, under the columns labeled "Ozone-Resisting Insulations."

5.3 *Insulation Resistance*—The insulated conductor shall have an insulation resistance value of at least that corresponding to a constant of 10 000 at 60°F (15.6°C).

5.3.1 If the water temperature at the time measurement was made differs from 60°F (15.6°C), correct the insulation resistance to 60°F. Table 2 (Temperature Correction Factors for Insulation Resistance at 60°F) of Test Methods D470 contains the correction factors. Each insulation manufacturer can furnish the 1°F coefficient for the insulation material by using the procedure given in Test Methods D470. Multiply the measured value by the correction factor to obtain the insulation resistance value corrected to 60°F.

5.3.2 If the insulated conductor is covered with a nonmetallic sheath so that the insulation resistance can be measured only on the completed assembly, the required insulation resistance shall be at least 60 % of that required for the primary insulation based on the thickness of that insulation.

[1] This specification is under the jurisdiction of ASTM Committee D09 on Electrical and Electronic Insulating Materials and is the direct responsibility of Subcommittee D09.18 on Solid Insulations, Non-Metallic Shieldings and Coverings for Electrical and Telecommunication Wires and Cables.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

***A Summary of Changes section appears at the end of this standard**

TABLE 1 Requirements for Physical Properties

Unaged Requirements:	
Tensile strength, min, psi (MPa)	1000 (6.9)
Elongation at rupture, min, %	300
Aged Requirements	
(after air oven test at 121 ± 1°C for 168 h):	
Tensile strength and elongation, at rupture min, % of unaged value	75
Heat Distortion (at 150 ± 1°C, max, % of unaged value):	
4/0 AWG (107 m^2) and smaller (insulation on cable)	50
Larger than 4/0 AWG (107 mm^2) (buffed, planed, or skived sample of insulation)	50

5.4 *DC Voltage Test*—Unless otherwise specified, omit this test if the ac voltage test described in 5.2 has been performed. After completion of the insulation resistance test, test each insulated conductor for 5 min at the dc test voltage given in Table number 1(*b*) (Conductor Sizes, and DC Test Voltages for Rubber Insulations) of Test Methods D470, under the columns labeled "Ozone-Resisting Insulations."

6. Cold Bend

6.1 The insulation shall not show any cracks when tested at a temperature of -55°C, in accordance with the procedure and Table 7 (Mandrel Diameters for Cold Bend Test) in Test Methods D470.

7. Ozone

7.1 The insulation shall show no cracking or surface checking visible to the unaided eye after exposure to an ozone concentration of not less than 0.025, nor more than 0.030 % by volume, when tested in accordance with Test Methods D470.

8. Heat Distortion

8.1 The insulation shall meet the requirements in Table 1 when tested in accordance with the procedure in Methods D2633.

9. Sampling

9.1 Unless otherwise instructed, sample the insulation in accordance with Test Methods D470.

10. Test Methods

10.1 Unless otherwise instructed, test the insulation in accordance with Test Methods D470.

11. Keywords

11.1 90°C insulation; ac voltage test; dc voltage test; insulation; insulation resistance; ozone-resistant; thermoplastic elastomer; thermoplasatic elastomer insulation

SUMMARY OF CHANGES

Committee D09 has identified the location of selected changes to this standard since the last issue (D4246 – 02 (2010)) that may impact the use of this standard. (Approved Nov. 1, 2014.)

(1) Revised Table 1.

(2) Revised 5.2.