Designation: D 4246 – 9702

An American National Standard

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

This standard is issued under the fixed designation D 4246; 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 ~~T~~Whenever two sets of values ~~stated~~ are presented, in ~~inch-pound units~~ different units, the values in the first set are the standard, ~~except~~ while those in ~~cases where SI units are more appropriate. The values 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:*

---

[1] This specification is under the jurisdiction of ASTM Committee ~~D-9~~ 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 Telecommunications Wires and Cables.

Current edition approved ~~Jan.~~ March 10, ~~1997.~~ 2002. Published ~~February 1998.~~ June 2002. Originally published as D 4246 – 83. Last previous edition D 4246 – ~~89~~97.

D 470 Test Methods for Crosslinked Insulations and Jackets for Wire and Cable[2]
D 1711 Terminology Relating to Electrical Insulation[2]
D 2633 Methods of Testing Thermoplastic Insulations and Jackets for Wire and Cable[3]

3. Terminology

3.1 *Definitions:* For definitions of terms used in this specification refer to Terminology D 1711.
3.2 *Definition of Term Specific to This Standard.*
3.1.2.1 *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 number 1(*a*), (Conductor Sizes, Insulation Thicknesses, and AC Test Voltages for Rubber Insulations) of Test Methods D 470 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 number 1(*a*) (Conductor Sizes, Insulation Thicknesses, and AC Test Voltages, for Rubber Insulations) of Methods D 470 under the columns labelled "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 number 2, (Temperature Correction Factors for Insulation Resistance at 60°F) of Test Methods D 470 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 D 470. 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 non-metallic 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.

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 D 470 under the columns labelled "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 number 7 (Mandrel Diameters for Cold Bend Test) in Test Methods ~~D 2633.~~ D 470.

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 D 470.

[2] *Annual Book of ASTM Standards* , Vol 10.01.
[3] *Annual Book of ASTM Standards*, Vol 10.02.

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 sample of insulation)	50

8. Heat Distortion

8.1 The insulation shall meet the requirements in Table number 1 when tested in accordance with the procedure in Methods D 2633.

9. Sampling

9.1 Unless otherwise instructed, sample the insulation in accordance with Test Methods D 470.

10. Test Methods

10.1 Unless otherwise instructed, test the insulation in accordance with Test Methods D 470.

11. Keywords

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