Designation: D 2526 – 02

An American National Standard

Standard Specification for Ozone-Resisting Silicone Rubber Insulation for Wire and Cable[1]

This standard is issued under the fixed designation D 2526; 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-resisting crosslinked silicone rubber insulating compound for electrical wires and cables.

1.2 This type of insulation is considered suitable for continuous operation at conductor temperatures up through 125°C for power cable applications. It is considered suitable for conductor sizes up to and including 1000 kcmil (507 mm^2) at a maximum of 5000 V for both single-and-multiple-conductor cables. Minimum conductor sizes and insulation thicknesses are given in Table 1.

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 done on insulated wire or cable in this document are solely to determine the relevant property of the insulation material and not to test the insulated conductor or completed cable.

2. Referenced Documents

2.1 *ASTM Standards:*

D 470 Test Methods for Crosslinked Insulations and Jackets for Wire and Cable[2]

D 1711 Terminology Relating to Electrical Insulation[2]

2.2 *ICEA Standard:*

T-24-380 Guide for Partial-Discharge Procedure[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:*

3.2.1 *aging (act of), n*—exposure of material to air at 200 ± 2°C for 168 h.

4. Physical Properties Requirements

4.1 The crosslinked insulation shall conform to the requirements for physical properties listed in Table 2.

5. Electrical Requirements

5.1 *Order of Testing*—Perform the partial discharge, 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 *Partial-Discharge (Corona) Extinction Level*—When tested in accordance with ICEA T-24-380 as modified in Test Methods D 470, each length of completed power cable rated for service at 2001 to 5000 V with insulation shielding on the individual conductors shall have a partial discharge (corona) extinction level of 4.0 kV for an insulation level of 100 % (grounded neutral) and 5.0 kV for an insulation level of 133 % (ungrounded neutral).

5.3 *AC Voltage Test*—Each insulated conductor in the completed cable shall withstand for 5 min the ac test voltage specified in Table 1. Unless otherwise specified, omit this test if the dc voltage test described in 5.5 is to be performed.

5.4 *Insulation Resistance*—The insulated conductor shall have an insulation-resistance value equal to or greater than that corresponding to a constant of 4000 M Ω-1000 ft (305 m) at 60°F (15.6°C). When the temperature of the water in which the insulation is tested differs from 60°F, apply a correction factor. Table 2, titled "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.

5.4.1 Where a nonconducting separator is applied between the conductor and insulation, or where an insulated conductor is covered with a nonmetallic sheath so that the insulation resistance can be measured only on the completed assembly,

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

[3] Available from Insulated Cable Engineers Association, PO Box 440, South Yarmouth, MA 02664.

TABLE 1 Minimum Conductor Size and Insulation Thicknesses

Rated Circuit Voltage, Phase to Phase, V	Size, AWG or kcmil (mm^2)	100 % Insulation Level, Grounded Neutral or 133 % Insulation Level, Ungrounded Neutral			
		mils	mm	AC Test Voltage, kV	DC Test Voltage, kV
0 to 600	18 to 16 (0.823 to 1.31)	30	0.76	1.0	
	14 to 9 (2.08 to 6.63)	45	1.14	4.5	13.5
	8 to 2 (8.37 to 33.6)	60	1.52	6.0	18.0
	1 to 4/0 (42.4 to 107)	80	2.03	7.5	22.5
	225 to 500 (114 to 253)	95	2.41	8.5	25.5
	525 to 1000 (266 to 507)	110	2.79	10.0	30.0
601 to 1000	14 to 8 (2.08 to 8.37)	60	1.52	6.0	18.0
	7 to 2 (10.6 to 33.6)	80	2.03	7.5	22.5
	1 to 4/0 (42.4 to 107)	95	2.41	8.5	25.5
	225 to 500 (114 to 253)	110	2.79	10.0	30.0
	525 to 1000 (266 to 507)	125	3.18	11.5	34.5
1001 to 2000	14 to 8 (2.08 to 8.37)	80	2.03	7.5	22.5
	7 to 2 (10.6 to 33.6)	95	2.41	8.5	25.5
	1 to 4/0 (42.4 to 107)	110	2.79	10.0	30.0
	225 to 500 (114 to 253)	125	3.18	11.5	34.5
	525 to 1000 (266 to 507)	140	3.66	11.5	34.5
2001 to 5000	8 to 4/0 (8.37 to 107)	155	3.94	13.0	35.0
	225 to 1000 (114 to 507)	170	4.32	13.0	35.0

TABLE 2 Requirements for Physical Properties

Unaged Requirements:	
Tensile strength, min, psi (MPa)	800 (5.5)
Elongation at rupture, min, %	250
Aged Requirements:	
After air oven test at 200 ± 2°C for 168 h:	
Tensile strength, min, psi (MPa)	500 (3.4)
Elongation at rupture, min, %	125

the required insulation resistance shall be at least 60 % of that required for the primary insulation based on the thickness of that insulation.

5.5 *DC Voltage Test*—Upon completion of the insulation resistance test, each insulated conductor in the completed cable shall withstand for 5 min the dc test voltage specified in Table 1. Unless otherwise specified, omit this test if the ac voltage test described in 5.3 has been performed.

5.6 *Capacitance and Dissipation Factor*—Test a specimen of insulated conductor rated for service at 2001 V and above for capacitance and dissipation factor. Conduct the test in room temperature water using suitable 60 Hz equipment at the working voltage. The increase in capacitance between the initial reading (within 1 h of immersion) and the 24 h reading shall not exceed 5 %. The dissipation factor shall not exceed 0.035 after 24 h.

6. Ozone Resistance

6.1 The insulation shall show no visible cracking after exposure for 3 h to an ozone concentration not less than 0.025 nor more than 0.030 by volume %.

7. Accelerated Water Absorption

7.1 The insulation shall conform to the requirements for accelerated water absorption, specified in Table 3. Maintain the water at 75 ± 1°C.

8. Sampling

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

9. Test Methods

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

10. Keywords

10.1 accelerated water absorption; ac voltage test; capacitance; dc voltage test; dissipation factor; ozone-resisting; partial discharge; silicone-rubber insulation

TABLE 3 Accelerated Water Absorption Requirements

Electrical Method:	
Increase in capitance, max %	
From 1 to 14 days	10.0
From 7 to 14 days	3.0