Designation: D 1523 – 9500

An American National Standard

Standard Specification for Synthetic Rubber Insulation for Wire and Cable, 90°C Operation[1]

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1. Scope*

1.1 This specification covers a crosslinked insulating compound for electrical wires and cables. The rubber polymer is primarily composed of synthetic rubber.

1.2 This type of insulation is suitable for continuous operation at conductor temperatures not exceeding 90°C in dry locations, and operating voltages not exceeding 2000 V. This insulation may have low-temperature limitations. Consult the manufacturer for specific recommendations for installation.

1.3 ~~T~~In many instances the ~~va~~ insulation cannot be tested unless it has been formed around a conductor. Therefore, tests are done on insulated wire in this stan~~c~~dard solely to determine th~~-~~e relevant property of the insulation and not to test the conductor or completed cable.

1.4 When~~i~~ever two sets of values are presented, in different units, the ~~standard, except~~ values in ~~cases where SI units~~ the first set are ~~more appropriate. The values~~ the standard, while those in parentheses are for information only.

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.

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

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

3. Terminology

3.1 *Definitions*:
3.1.1 For definitions of terms used in this specification refer to Terminology D 1711.
3.2 *Definitions of Terms Specific to This Standard:*
3.2.1 *aging (act of), n*—exposure of materials to air at 121°C for 168 h or heat and pressure at 127°C for 42 h.

4. Physical Properties

~~3~~4.1 Table 1 lists the ~~unexposed (unaged)~~ unaged and ~~exposed (aged)~~ aged physical property requirements.
~~3~~4.2 *Thickness of Insulation* —Table number 1A of Test Methods D 470 lists the minimum average thickness for the insulation. The required minimum thickness is 90 % of that given in Table number 1A of Test Methods D 470.

~~4~~5. Electrical Requirements

~~4~~5.1 *Order of Testing*—Perform the ac voltage, insulation resistance, and dc voltage tests in that order when any of these tests are required. The sequence for other testing is not specified.
~~4~~5.2 *AC Voltage Test*—Unless otherwise specified, omit this test if the dc voltage test described in ~~4.4~~ 5.4 is to be performed. Test each insulated conductor for 5 min at the ac withstand voltage given in Table number 1A of Test Methods D 470 under the columns labeled "Other Than Ozone-Resisting Insulations."
~~4~~5.3 *Insulation Resistance*:
~~4~~5.3.1 The insulated conductor shall have an insulation resistance value of at least that corresponding to a constant of 4000 at 60°F (15.6°C).
~~4~~5.3.2 If the temperature at the time measurement was made differs from 60°F (15.6°C) correct the insulation resistance to 60°F. Table number 2 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.
~~4~~5.3.3 Where a nonconducting separator is applied between the conductor and insulation, or where an insulated conductor is covered with a nonmetallic jacket 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.
~~4~~5.4 *DC Voltage Test*—Unless otherwise specified, omit this test if the ac test described in ~~4.2~~ 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 1B of Test Methods D 470 under the columns labeled "Other Than Ozone-Resisting Insulations."

~~5. Sampling~~

~~5.1 Sample the insulation in accordance with Test Methods D 470.~~

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

TABLE 1 Physical Properties for Synthetic Rubber Insulation, 90°C Operation[A]

~~Unexposed (Unaged) Requirements:~~	
Unaged Requirements:	
~~Tensile strength, min, psi (MPa)~~	
Tensile strength, min, psi (MPa)	700 (4.8)
~~Elongation at rupture, min, %~~	~~700 (4.8)~~
Elongation at rupture, min, %	300
~~Set in 2-in. (or 50-mm) gage length, max, %~~	~~300~~
Set in 2-in. (or 50-mm) gage length, max, %	25
~~Exposed (Aged) Requirements:~~	~~25~~
Aged Requirements:	
~~After Air Pressure Heat Test at 127± 1°C for 42 h:~~	
~~Tensile strength and elongation, min, percentage of unexposed value~~	
After Air Pressure Heat Test at 127± 1°C for 42 h:	
Tensile strength and elongation, min, percentage of unaged value	50
After Air Oven Test at 121 ± 1°C for 168 h:	
~~Tensile strength and elongation, min, percentage of unexposed value~~	~~50~~
Tensile strength and elongation, min, percentage of unaged value	50

[A] The values specified are applicable to insulation having a nominal wall thickness of 0.030 in. (0.76 mm) or greater.

6. ~~Test Methods~~

~~6.1 Test~~Sampling

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

7. Test Methods

7.1 Test the insulation in accordance with Test Methods D 470.

8. Keywords

~~7~~8.1 AC voltage test; crosslinked insulation; DC voltage test; insulation resistance; synthetic rubber insulation; 90°C synthetic rubber insulation; thickness

SUMMARY OF CHANGES

(1) Added new sections 1.3, 1.4, and 3.
(2) General editorial review.