



Standard Specification for Poly(Vinyl Chloride) Insulation for Wire and Cable, 60 °C Operation¹

This standard is issued under the fixed designation D2219; 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.

^{e1} NOTE—The text of 5.2, 5.4, and Note 1 of Table 2 was revised editorially October 2007.

1. Scope

1.1 This specification covers a thermoplastic insulation of poly(vinyl chloride) or the copolymer of vinyl chloride and vinyl acetate.

1.2 This insulation is recommended for use at conductor temperatures not in excess of 60 °C in wet or dry locations at a maximum voltage rating of 600 V for power and control circuits.

1.3 Whenever two sets of values are presented, in different units, the values in the first set are 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

D1711 Terminology Relating to Electrical Insulation

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

3. Terminology

3.1 *Definitions*:

3.1.1 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*—exposure of materials to air or oil at a temperature and a time as specified in Table 1.

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.

TABLE 1 Physical Properties Requirements

Unaged Requirements:	
Tensile strength, min, psi (MPa)	1500 (10.3)
Elongation at rupture, min, %	100
Aged Requirements:	
After air oven test at 100 ± 1 °C for 168 h:	
Tubular Specimens—up to size AWG 6 (13.3 mm ²)	
Tensile strength, min, % of unaged value	65
Elongation, min, % of unaged value	65
Buffed die-cut Specimens—sizes AWG 6 and larger	
Tensile strength, min, % of unaged value	65
Elongation, min, % of unaged value	45
Heat shock, 121 ± 1 °C	no cracks
Heat distortion, 121 ± 1 °C, max, %	50
Vertical flame test, after five 15-s applications	passes
Oil resistance test:	
After oil immersion at 70 ± 1 °C for 4 h:	
Tubular Specimens—up to size AWG 6 (13.3 mm ²)	
Tensile strength, min, % of unaged value	85
Elongation, min, % of unaged value	85
Buffed die-cut Specimens—sizes AWG 6 and larger	
Tensile strength, min, % of unaged value	80
Elongation, min, % of unaged value	60
Cold bend test, –10 ± 1 °C for 1 h	no cracks

4. Physical Properties

4.1 The insulation shall conform to the requirements for physical properties prescribed in Table 1.

5. Electrical Requirements

5.1 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.

5.2 *AC Voltage Test*—Test the insulated conductor at the ac withstand voltage as specified in Table 2. It is acceptable to omit this test if the dc withstand voltage test described in 5.4 is performed.

5.3 *Insulation Resistance*:

5.3.1 Insulated conductors in sizes AWG 26 (0.13 mm²) and larger shall have an insulation resistance of at least that corresponding to a constant of 500 MΩ-1000 ft at 60 °F (15.6 °C).

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 by multiplying the measured value by the proper