



Standard Specification for Poly(Vinyl Chloride) Insulation for Wire and Cable, 90°C Operation¹

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1. Scope

1.1 This specification covers a thermoplastic insulation of poly (vinyl chloride) or the copolymer of vinyl chloride and vinyl acetate. This insulation is recommended for use at conductor temperatures not in excess of 90°C.

1.2 Depending on the thickness of the insulation, the maximum voltage used, and whether the location is wet or dry, this insulation may be used for 300 V (dry) and 600 V (wet or dry) power and control circuits.

1.3 This insulation may have low-temperature installation limitations. Consult the manufacturer for specific recommendations for installation.

1.4 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.

1.5 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:

D 1711 Terminology Relating to Electrical Insulation²

D 2633 Test Methods for Thermoplastic Insulations and Jackets for Wire and Cable³

3. Terminology

3.1 *Definitions:* 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 or oil at a temperature and for an interval of time as required 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 Annual Book of ASTM Standards, Vol. 10.01.

³ Annual Book of ASTM Standards, Vol. 10.02.

TABLE 1 Physical Properties Requirements for Insulation

Unaged requirements:	
Tensile strength, min, psi (MPa)	2000 (13.8)
Elongation at rupture, min, %	150
Aged requirements:	
After air oven test at 136 ± 1°C for 168 h:	
Tubular Specimens - up to size AWG 6 (13.3 mm ²)	
Tensile strength, min, percent of unaged value:	70
Elongation at rupture, min, percent of unaged value:	65
Buffed die-cut Specimens - sizes AWG 6 and larger	
Tensile strength, min, percent of unaged value:	70
Elongation at rupture, min, percent of unaged value:	45
Heat shock, 121 ± 1°C	no cracks
Heat distortion, 121 ± 1°C, max, percent decrease	25
Vertical flame test, after five 15-s applications:	passes
Oil resistance:	
After oil immersion at 70 ± 1°C for 4 h:	
Tubular Specimens - up to size AWG 6 (13.3 mm ²)	
Tensile strength, min, percent of unaged value	85
Elongation, min, percent of unaged value	85
Buffed die-cut Specimens - sizes AWG 6 and larger	
Tensile strength, min, percent of unaged value	80
Elongation, min, percent of unaged value	60
Cold bend test, -30 ± 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. (See Table 2 for optional oil resistance requirements.)

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 3. Unless otherwise specified, 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 14 (2.08 mm²) and larger shall have an insulation resistance of at least that corresponding to a constant of 2000 MΩ-1000 ft at 60°F (15.6°C).