



Standard Specification for Poly(Vinyl Chloride) Insulation for Wire and Cable, 60°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 60°C in wet or dry locations at a maximum voltage rating of 600 V for power and control circuits.

1.2 The values stated in inch-pound units are the standard, except in cases where SI units are more appropriate. The values in parentheses are for information only.

1.3 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 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 Methods of Testing Thermoplastic Insulations and Jackets for Wire and Cable³

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 or oil at a temperature and a time as specified in Table 1.

4. Physical Properties

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

5. Thickness of Insulation

5.1 The average thickness of the insulation shall be at least that prescribed in Table 2. The minimum thickness shall be at

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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

Physical properties requirements:	
Tensile strength, min, psi (MPa)	1500 (10.3)
Elongation at rupture, min, %	100
Air Oven Aging 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	45
Elongation, min, % of unaged value	65
Heat shock, 121 ± 1°C	no cracks
Heat distortion, 121 ± 1°C, max,%	50
Vertical flame test, max burning time 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

least 90 % of the thickness prescribed in Table 2.

6. Workmanship, Finish, and Appearance

6.1 Apply the insulation directly to the surface of the conductor or conductor covering and obtain a tight fit to that surface.

6.2 *Repairs and Joints*—When making repairs or joints in the insulation, do the work in such a manner that the repaired part of the joint, and all parts affected by the process, meet the same electrical tests as the remainder of the insulation and maintain the limitations on the thickness specified in Section 5.

7. Electrical Requirements

7.1 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.

7.2 *AC Voltage Test*—Test the insulated conductor at the ac withstand voltage as specified in Table 2. This test may be omitted if the dc withstand voltage test described in 7.4 is performed.

7.3 Insulation Resistance:

7.3.1 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 at 60°F (15.6°C).