



Designation: D4566 – 20

Standard Test Methods for Electrical Performance Properties of Insulations and Jackets for Telecommunications Wire and Cable¹

This standard is issued under the fixed designation D4566; 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 These test methods cover procedures for electrical testing of thermoplastic insulations and jackets used on telecommunications wire and cable and for the testing of electrical characteristics of completed products. To determine the procedure to be used on the particular insulation or jacket compound, or on the end product, reference should be made to the specification for the product.

1.2 These test methods appear in the following sections of this standard:

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1.3 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.* Specific hazard statements are given in Sections 7 and 38.

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

- B193 Test Method for Resistivity of Electrical Conductor Materials
- D150 Test Methods for AC Loss Characteristics and Permittivity (Dielectric Constant) of Solid Electrical Insulation
- D1711 Terminology Relating to Electrical Insulation
- D2633 Test Methods for Thermoplastic Insulations and

¹ These test methods are under the jurisdiction of ASTM Committee D09 on Electrical and Electronic Insulating Materials and are the direct responsibility of Subcommittee D09.07 on Electrical Insulating Materials.

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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.

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

Jackets for Wire and Cable

D3426 Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials Using Impulse Waves

D5423 Specification for Forced-Convection Laboratory Ovens for Evaluation of Electrical Insulation

E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

2.2 *ANSI Standard*.³

ANSI/IEEE Standard 100 IEEE Standard Dictionary of Electrical and Electronics Terms

2.3 *IEC Standard*.³

IEC 61156-1 Multicore and Symmetrical Pair/Quad Cables for Digital Communications—Part 1: Generic Specification

3. Terminology

3.1 Definitions:

3.1.1 For definitions of terms used in this standard, refer to Terminology **D1711**.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *air core, n*—refers to products in which the air spaces between cable core components (pairs, etc.) remain in their unfilled or natural state.

3.2.2 *armored wire or cable, n*—wire or cable in which the shielded or jacketed or shielded and jacketed wire or cable is completely enclosed by a metallic covering designed to protect the underlying telecommunications elements from mechanical damage.

3.2.3 *cable, telecommunications, n*—products of six or more pairs.

3.2.4 *filled core, n*—those products in which air spaces are filled with some materials intended to exclude air or moisture, or both.

3.2.5 *low frequency cable, n*—cable used for transmitting signals at a frequency of 2 MHz or less.

3.2.6 *pair, n*—two insulated conductors combined with a twist.

3.2.7 *sheath, n*—the jacket and any underlying layers of shield, armor, or other intermediate material down to but not including the core wrap.

3.2.8 *shielded wire or cable, n*—wire or cable in which the core (or inner jacket) is completely enclosed by a metallic covering designed to shield the core from electrostatic or electromagnetic interference, or both.

3.2.9 *wire, telecommunications, n*—products containing less than six pairs.

ELECTRICAL TESTS OF INSULATION—IN-PROCESS

4. Hazards

4.1 High Voltage:

4.1.1 **Warning**—Lethal voltages are a potential hazard during the performance of this test. It is essential that the test apparatus, and all associated equipment electrically connected to it, be properly designed and installed for safe operation.

4.1.2 Solidly ground all electrically conductive parts which it is possible for a person to contact during the test.

4.1.3 Provide means for use at the completion of any test to ground any parts which were at high voltage during the test or have the potential for acquiring an induced charge during the test or retaining a charge even after disconnection of the voltage source.

4.1.4 Thoroughly instruct all operators as to the correct procedures for performing tests safely.

4.1.5 When making high voltage tests, particularly in compressed gas or in oil, it is possible for the energy released at breakdown to be sufficient to result in fire, explosion, or rupture of the test chamber. Design test equipment, test chambers, and test specimens so as to minimize the possibility of such occurrences and to eliminate the possibility of personal injury. If the potential for fire exists, have fire suppression equipment available. Design test equipment, test chambers, and test specimens so as to minimize the possibility of such occurrences and to eliminate the possibility of personal injury. See Section 4.

5. Scope

5.1 In-process electrical tests are used primarily as process control tools in an attempt to minimize the number and magnitude of problems detected at final test of completed cable.

6. Significance and Use

6.1 Electrical tests, properly interpreted, provide information with regard to the electrical properties of the insulation. The electrical test values give an indication as to how the insulation will perform under conditions similar to those observed in the tests. Electrical tests provide data for research and development, engineering design, quality control, and acceptance or rejection under specifications.

7. Spark Test

7.1 The spark test is intended to detect defects in the insulation of insulated wire conductors. Spark testers are commonly used to detect insulation defects (faults) at conductor insulating operations, at pair twisting operations, and (occasionally) at operations for assembly or subassembly of conductors. In selected instances, spark tests are used to detect defects in the jackets of shielded wire and cable, and in such cases, spark testers appear on cable jacketing lines. The basic method calls for a voltage to be applied between a grounded conductor and an electrode that is in mechanical contact with the surface of the material being tested. The wire or cable under test usually moves continuously against the electrode. When the dielectric medium is faulty (for example, excessively thin or missing, as in a pin-hole or when mechanically damaged), the impressed voltage will produce an arc to the grounded conductor. This arcing or sparking will usually activate one or more indicators (such as, warning buzzers or lights, counters,

³ Available from Global Engineering Documents, 15 Inverness Way, East Englewood, CO 80112-5704, <http://www.global.ihs.com>.