



IEEE Standard for Extruded and Laminated Dielectric Shielded Cable Joints Rated 2500 V to 500 000 V

IEEE Power Engineering Society

Sponsored by the
Insulated Conductors Committee

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IEEE Standard for Extruded and Laminated Dielectric Shielded Cable Joints Rated 2500 V to 500 000 V

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**Insulated Conductors Committee
of the
IEEE Power Engineering Society**

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IEEE-SA Standards Board

Abstract: Electrical ratings and test requirements of cable joints used with extruded and laminated dielectric shielded cable rated in preferred voltage steps from 2500 V to 500 000 V are established in this standard. In addition, test requirements for cable jacket and cable shield restoration devices are defined. A variety of common joint constructions are also defined. This standard has been designed to provide uniform testing procedures that can be used by manufacturers and users to evaluate the ability of underground power cable joints, and associated cable shield and cable jacket restoration components, to perform reliably in service.

Keywords: cable joints, dielectric integrity tests, extruded dielectric cable, impulse withstand voltage (BIL), laminated dielectric cable, sheath/shield sectionalizers, transition joints, withstand voltage

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Introduction

This introduction is not part of IEEE Std 404-2006, IEEE Standard for Extruded and Laminated Dielectric Shielded Cable Joints Rated 2500 V to 500 000 V.

This revision of IEEE Std 404™-2000 now includes fingerprint tests to establish and subsequently confirm the properties of materials or components used in certain cable joints, such as heat-shrinkable, hand-taped, and certain multi-component cold-shrink joints that cannot be subjected to the 100% electrical production tests of premolded and single-component cold-shrink joint designs.

This revision of the standard has now harmonized the requirements between the cable accessory standards for joints and terminations, making it easier to perform qualification tests on a complete cable system.

In addition, test requirements for cable jacket and cable shield restoration devices have been added, which were not present in previous editions of the standard.

Joints that connect more than two cables or connect cables with two different conductor sizes are not covered by this standard. However, manufacturers and users are encouraged to use appropriate parts of this standard to evaluate these types of joints.

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1. Scope

This standard establishes electrical ratings and test requirements of cable joints used with extruded and laminated dielectric shielded cables rated in preferred voltage steps from 2500 V to 500 000 V. In addition, it defines test requirements for cable jacket and cable shield restoration devices.

This standard also defines a variety of common joint constructions.

Joints that connect more than two cables or connect cables with two different conductor sizes are not covered by this standard. However, manufacturers and users are encouraged to use appropriate parts of this standard to evaluate these joints.

2. Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments or corrigenda) applies.

AEIC CS1, Specifications for Impregnated Paper-Insulated Metallic-Sheathed Cable, Solid Type.¹

AEIC CS2, Specification for Impregnated Paper and Laminated Paper Polypropylene Insulated Cable, High Pressure Pipe Type.

AEIC CS3, Specifications for Impregnated-Paper-Insulated Metallic Sheathed Cable, Low Pressure Gas-Filled Type.

AEIC CS4, Specifications for Impregnated-Paper-Insulated Low and Medium Pressure Self-Contained Liquid Filled Cable.

¹ AEIC publications are available from the Association of Edison Illuminating Companies, 600 N. 18th Street, P.O. Box 2641, Birmingham, AL 35291-0992, USA (<http://www.aeic.org/>). AEIC publications are also available from Global Engineering Documents, 15 Inverness Way East, Englewood, CO 80112-5704, USA (<http://global.ihs.com/>).

AEIC CS6, Specifications for Ethylene Propylene Rubber Insulated Shielded Power Cables Rated 5 Through 69 kV.

AEIC CS7, Specifications for Crosslinked Polyethylene Insulated Shielded Power Cables Rated 69 Through 138 kV.

AEIC CS8, Specification for Extruded Dielectric Shielded Power Cables Rated 5 Through 46 kV.

ANSI C119.4, Electric Connectors—Connectors for Use Between Aluminum-to-Aluminum or Aluminum-to-Copper Bare Overhead Connectors.²

ASTM D149-97a, Standard Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies.³

ASTM D412-98, Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers.

ASTM D991-89, Standard Test Method for Rubber Property-Volume Resistivity of Electrically Conductive and Antistatic Products.

ASTM D4325-02, Standard Test Methods for Nonmetallic Semi-Conducting and Electrically Insulating Rubber Tapes.

ASTM D4496-04, Standard Test Method for DC Resistance or Conductance of Moderately Conductive Materials.

ICEA P-32-382, Short-Circuit Characteristics of Insulated Cable.⁴

ICEA P-45-482, Short-Circuit Performance of Metallic Shields and Sheaths on Insulated Cable.

IEEE Std 4™, IEEE Standard Techniques for High-Voltage Testing.^{5,6}

IEEE Std 82™, IEEE Standard Test Procedure for Impulse Voltage Tests on Insulated Conductors.

IEEE Std 575™-1988, IEEE Guide for the Application of Sheath-Bonding Methods for Single-Conductor Cables and the Calculation of Induced Voltages and Currents in Cable Sheaths.⁷

IEEE Std 592™, IEEE Standard for Exposed Semiconducting Shields on High-Voltage Cable Joints and Separable Insulated Connectors.

IEEE Std C37.09™, IEEE Standard Test Procedure for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis.

NEMA WC4/ICEA S-65-375, Varnished-Cloth-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.⁸

² ANSI publications are available from the Sales Department, American National Standards Institute, 25 West 43rd Street, 4th Floor, New York, NY 10036, USA (<http://www.ansi.org/>).

³ ASTM publications are available from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, USA (<http://www.astm.org/>).

⁴ ICEA publications are available from the Insulated Cable Engineers Association, P.O. Box 20048, Minneapolis, MN 55420, USA (<http://www.icea.net/>).

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⁷ IEEE Std 575-1988 has been withdrawn; however, copies can be obtained from Global Engineering, 15 Inverness Way East, Englewood, CO 80112-5704, USA, tel. (303) 792-2181 (<http://global.ihs.com/>).

⁸ NEMA publications are available from Global Engineering Documents, 15 Inverness Way East, Englewood, CO 80112, USA (<http://global.ihs.com/>).