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IEEE Standard for Extruded and Laminated Dielectric Shielded Cable Joints Rated 2.5 kV to 500 kV

IEEE Power & Energy Society

Sponsored by the
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IEEE
3 Park Avenue
New York, NY 10016-5997
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18 June 2012

IEEE Std 404™-2012
(Revision of
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Approved 29 March 2012

IEEE-SA Standards Board

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Abstract: Electrical ratings and test requirements of cable joints used with extruded and laminated dielectric shielded cable rated in preferred voltage steps from 2.5 kV to 500 kV are established in this standard. In addition, test requirements for joint metallic-shield and jacketing components 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 metallic-shields and jacketing components, to perform reliably in service.
Keywords: basic insulation level (BIL), cable joints, dielectric integrity tests, extruded dielectric cable, IEEE 404, laminated dielectric cable, sheath/shield sectionalizers, transition joints, withstand voltage

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Thomas C. Champion, III
Philip Cox
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Milan Uzelac
Tim Wall
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Vitaliy Yaroslavskiy
Harry Yaworski

The following members of the individual balloting committee voted on this standard. Balloters may have voted for approval, disapproval, or abstention.

Roy Alexander
Saleman Alibhay
Martin Baur
Michael Bayer
Vern Buchholz
William Byrd
Thomas C. Champion, III
Robert Christman
David E. Crotty
Gary Donner
Donald Dunn
Gary Engmann
Michael Faulkenberry
James Fitzgerald
Robert Gear, Jr.
Steven Graham
Randall Groves
Frank DiGuglielmo
Richard L. Harp
Jeffrey Hartenberger
Timothy Hayden
Jeffrey Helzer
Lauri Hiivala
Werner Hoelzl
David Hughes
Edward M. Jankowich
A. S. Jones
John Kay
Dan Kennedy
Gael Kennedy
Joesph L. Koepfinger
Robert Konnik
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Glenn J. Luzzi
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Serge Pelissou
Johannes Rickmann
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Peter Tirinzoni
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Introduction

This introduction is not part of IEEE Std 404-2012, IEEE Standard for Extruded and Laminated Dielectric Shielded Cable Joints Rated 2.5 kV to 500 kV.

This standard provides manufacturers and users with a consistent set of qualification test requirements for all cable joints. It also provides production test requirements for many cable joints used on extruded dielectric cables. Material properties and sampling rates are included for joint designs not easily production tested in their final form.

This revision of the standard provides closer harmonization to international standards for those cable joints used on extruded dielectric cables rated 69 kV and above.

It provides more applicable testing protocols to verify appropriate joint operation in the field for extruded dielectric cable joints in a joint-series. A joint-series is a family of joints designed and manufactured to cover a wide range of cable including various conductor sizes and materials as well as various extruded insulation thicknesses and materials.

It changes the format of the design test sequence tables to provide a more clear and concise format to eliminate interpretation errors.

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1. Overview

1.1 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 2.5 kV to 500 kV. In addition, it defines test requirements for joint jacket seal devices and joint metallic-shield 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 (i.e., they must be understood and used, so each referenced document is cited in text and its relationship to this document is

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explained). 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, Specification 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, Specification for Impregnated-Paper-Insulated Metallic Sheathed Cable, Low Pressure Gas-Filled Type.

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

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

AEIC CS9, Specification for Extruded Insulation Power Cables and Their Accessories Rated Above 46 kV Through 345 kV ac.

ANSI C119.4, Electric Connectors—Connectors to Use Between Aluminum-to-Aluminum or Aluminum-to-Copper Conductors.[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 D4325-08, 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.

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