



**STANDARD FOR 600 VOLT SINGLE LAYER
THERMOSET INSULATED UTILITY UNDERGROUND
DISTRIBUTION CABLES**

**Approved by
AMERICAN NATIONAL STANDARDS INSTITUTE
October 5, 2005
Publication # ANSI/ICEA S-105-692-2004**

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**Approved as an American National Standard
ANSI Approval Date: October 5, 2005**

ANSI/ICEA Publication S-105-692-2004

***Standard For 600 Volt Single Layer Thermoset Insulated
Utility Underground Distribution Cables***

Developed and Published by

Insulated Cable Engineers Association, Inc.
Post Office Box 1568
Carrollton, GA 30112, USA

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Foreword

This standard publication for 600 Volt Single Layer Thermoset Insulated Utility Underground Distribution Cables, *ICEA S-105-692* was developed by the Insulated Cable Engineers Association, Inc. (ICEA)

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Request for interpretation of this standard must be submitted in writing to the Insulated Cable Engineers Association, Inc. Box 1568, Carrollton, Georgia 30112. An official written interpretation will be provided. Suggestions for improvements gained in the use of this standard will be welcomed by the Association.

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Section 1 GENERAL

1.1 SCOPE

This standard applies to the materials, constructions, and testing of single conductor cables and assemblies of completed single conductor thermoset insulated cables, with an insulated or bare copper or an insulated aluminum neutral, used for the distribution of electrical energy at phase-to-phase voltages not exceeding 600 volts, or phase-to-ground voltage not exceeding 480 volts, 60 Hz, and at conductor temperatures not exceeding 90 °C for use in direct burial and underground ducts.

1.2 CONSTRUCTIONS

Single conductor cables and assemblies of single conductor cables shall use conductors not smaller than 8 AWG and not larger than 1000 kcmil. The conductors of a duplex assembly shall be of the same size. When allowed, the neutral in an assembly of three cables for use in single-phase 3-wire circuits, or the neutral in an assembly of four cables, may be reduced but shall not be less than 50% of the cross-sectional area of one phase conductor. The neutral shall be insulated if the conductor is aluminum and may be bare or insulated if the conductor is copper.

1.3 DESIGN OPTIONS

The user of this standard should recognize that it covers many options. The user should select the necessary options required for a complete description of the desired cable.

1.3.1 Conductors

Metal - Aluminum 1350, AA-8000 Series alloy, or copper.
Size - 8 AWG to 1000 kcmil, aluminum or copper.

Conductor Stranding - See Part 2.

1.3.2 Insulation

90 °C Rated - See Part 3.1

1.3.3 Neutral

Insulated aluminum, bare copper, insulated copper

1.3.4 Assembly

See Part 4.1 - Twisted or parallel - Two or more insulated conductors without an overall covering

1.4 OPERATING CONDITIONS

The design and construction of the cable shall be such that the cable will operate satisfactorily under maximum conductor temperatures as follows:

Conductor Temperature, °C		
<u>Operation</u>		
<u>Normal Service</u>	<u>Emergency Overload</u>	<u>Short Circuit</u>
90	130	250

Exception: When adequate knowledge of the thermal characteristics of a cable environment is lacking, the permissible conductor temperature should be reduced by 10 °C or in accordance with available data.

1.4.1 The 90 °C "Normal Service" temperature is the highest allowable temperature that may be attained by the hottest portion of a cable line during daily operating load cycles. It may be used in ampacity calculations where adequate information is known about the overall thermal characteristics of the environment to assure that the normal service temperature will not be exceeded.

1.4.2 The 130 °C "Emergency Overload" temperature is the highest allowable temperature that may be attained by the hottest portion of a cable line during an emergency. Operation at that overload temperature shall not exceed 100 hours in any twelve consecutive months or 500 hours during the lifetime of the cable.

1.4.3 The 250 °C "Short Circuit" temperature is the highest allowable temperature that may be attained by an insulated conductor along any part of a cable line during a short circuit of a specified magnitude and number of cycles. (See ICEA Publication P-32-382)

1.4.4 The "Rated Voltage" for the purpose of this standard is 600 volts phase-to-phase.

1.5 QUALIFICATION

Each manufacturer shall qualify their cable. The Qualification Tests in Section 6 shall be made initially on cable specimens and whenever an insulating material is changed. These tests are intended to demonstrate the capability of the manufacturer to furnish cable with the desired performance characteristics. If requested, a manufacturer shall furnish copies of qualification tests on cable specimens with the type of insulation being supplied.

1.6 TESTING

All cables shall comply with the requirements given in Sections 2, 3, 4 and those of Section 6 for Qualification Testing. A program of sampling frequencies is given in ICEA Publication T-26-465/NEMA WC 54 if a frequency is not provided in this standard.

1.7 TEST METHODS

When cables are tested for the requirements in Sections 2, 3, 4, or 6, the test method shall be in accordance with ICEA Publication T-27-581/NEMA WC 53 unless otherwise specified in this standard.

1.8 STANDARDS AND SPECIFICATIONS

In this standard, units are most often expressed in the English System. To convert from an English unit to the appropriate metric unit, multiply the value of the English unit by the appropriate number from Appendix A.

U.S. customary units, except for temperature, are specified throughout this standard. Approximate International System of Units (SI) equivalents are included for information only.

A list of standards and specifications referenced in this document are in Appendix B. The recommended bending radii for insulated conductors and cable assemblies are in Appendix C. Minimum drum diameters of reels for singles and assemblies are in Appendix D.