

IEEE Standard for Calculating the Current-Temperature Relationship of Bare Overhead Conductors

IEEE Power and Energy Society

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IEEE Standard for Calculating the Current-Temperature Relationship of Bare Overhead Conductors

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Approved 19 October 2012

IEEE-SA Standards Board

Abstract: A method of calculating the current-temperature relationship of bare overhead lines, given the weather conditions, is presented. Along with a mathematical method, sources of the values to be used in the calculation are indicated. This standard does not undertake to list actual temperature-ampacity relationships for a large number of conductors nor does it recommend appropriately conservative weather conditions for the rating of overhead power lines. It does, however, provide a standard method for doing such calculations for both constant and variable conductor current and weather conditions.

Keywords: bare overhead lines, current-temperature relationship, IEEE 738™

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Introduction

This introduction is not part of IEEE Std 738-2012, IEEE Standard for Calculating the Current-Temperature Relationship of Bare Overhead Conductors.

In 1986, IEEE Std 738, IEEE Standard for Calculation of Bare Overhead Conductor Temperature and Ampacity Under Steady-State Conditions, was first published. The standard was developed “so that a practical sound, and uniform method (of calculation) might be utilized and referenced.”

As part of the revision in 1993, the Working Group on the Calculation of Bare Overhead Conductor Temperatures, which was responsible for the revision of this standard, decided to address fault current and transient ratings and include their calculation in this standard. In the present revision, SI units were added throughout, the solar heating calculation was extensively revised, and many editorial changes were made.

In the 2006 revision, SI units were added throughout, the solar heating calculation was extensively revised, and many editorial changes were made. This standard includes a computer program listing in “pseudo-code.” The working group has made every effort to ensure that the numerical algorithms included in the listing are accurate, but the user is cautioned that there may be values of rating parameters for which the method is not appropriate. The listing does not include input or output commands but is included to allow the user to develop their own computer program of spreadsheet application using proven algorithms.

Richard E. Kennon, James Larkey, Jerry Reding, and Dale Douglass (Task Force Chairman) did much of the revisions in the 1993 and 2006 versions of the standard.

Many persons have contributed to the preparation of this most recent standard. The primary contributors were Dale Douglass, Glenn Davidson, Zsolt Peter, Dean Stoddart, Jerry Reding, and Bill Black. Mark Lancaster, Tapani Seppa, Mark Ryan, Mohammad Pasha, Cody Davis, Francesco Zanellato, Gord Baker, Kathy Beaman, and Doug Harms provided both editorial and technical support. Many other members of IEEE W.G. 15.11.02/06 “T&D Overhead Conductors & Accessories,” chaired by Craig Pon, contributed their time and thought.

We would also like to recognize the contribution of the late B.S. Howington, who served as Chair of the working group for many years and was responsible for developing the original standard.

Incorporated corrections were made to Clause 4 as required by IEEE Std 738-2012/Cor 1-2013.

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1. Overview

1.1 Scope

The standard describes a numerical method by which the core and surface temperatures of a bare stranded overhead conductor are related to the steady or time-varying electrical current and weather conditions. The method may also be used to determine the conductor current that corresponds to conductor temperature limits. The standard does not recommend suitable weather conditions or conductor parameters for use in line rating calculations.

1.2 Disclaimer

A computer program is included in this standard as a convenience to the user. Other numerical methods may well be more appropriate in certain situations.

The IEEE Working Group on Calculation of Bare Overhead Conductor Temperatures of the Towers, Poles and Conductors Subcommittee has made every effort to ensure that the computer program yields accurate calculations under anticipated conditions; however, there may well be certain calculations for which the method is not appropriate. It is the responsibility of the user to check calculations against either test data or other existing calculation methods.