



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

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**IEEE Power Engineering Society**

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(Revision of  
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# **IEEE Standard for Calculating the Current-Temperature of Bare Overhead Conductors**

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**Transmission and Distribution Committee  
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IEEE Power Engineering Society**

Approved 16 November 2006

**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, but rather provides a standard method of doing such calculations.

**Keywords:** bare overhead lines, current-temperature relationship

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## Introduction

This introduction is not part of IEEE Std 738-2006, IEEE Standard for Calculating the Current-Temperature of Bare Overhead Conductors.

In 1986, IEEE Std 738-1993, 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.

Consistent with IEEE guidelines for standards such as this, SI units are used exclusively in the main body. “English” units are used in Annex A since they are widely utilized by power transmission line design engineers in North America.

This standard includes a computer program listing to serve as a basis for program development. The working group has made every effort to ensure that the program yields accurate results. The user is cautioned that there may be values of rating parameters for which the method is not appropriate.

Many persons have contributed to the preparation, analysis, and review of this standard. We would 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. Richard E. Kennon, James Larkey, Jerry Reding, and Dale Douglass (Task Force Chairman) did most of the revisions in the latest version of the standard. Many of the other Working Group members contributed their time and thought. Catherine Berger, an IEEE staff editor, was immensely helpful in getting the standard completed in an acceptable format.

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

## 1. Overview

### 1.1 Scope

The purpose of this standard is to present a method of calculating the current-temperature relationship of bare overhead conductors.

Conductor surface temperatures are a function of the following:

- a) Conductor material properties
- b) Conductor diameter
- c) Conductor surface conditions
- d) Ambient weather conditions
- e) Conductor electrical current

The first two of these properties are specific chemical and physical properties. The third may vary with time and be dependent upon ambient atmospheric conditions other than weather. The fourth, weather, varies greatly with the hour and season. The fifth, conductor electrical current, may be constant or may vary with power system loading, generation dispatch, and other factors.

The equations relating electrical current to conductor temperature may be used in either of the following two ways:

- To calculate the conductor temperature when the electrical current is known
- To calculate the current that yields a given maximum allowable conductor temperature