

# IEEE Guide for Determining the Effects of High-Temperature Operation on Conductors, Connectors, and Accessories

IEEE Power and Energy Society

Sponsored by the  
Transmission and Distribution Committee



# **IEEE Guide for Determining the Effects of High-Temperature Operation on Conductors, Connectors, and Accessories**

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**Transmission and Distribution Committee  
of the  
IEEE Power and Energy Society**

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**Abstract:** Possible adverse impacts to an operating overhead transmission line which might occur when operating the line at high temperatures are discussed. Specifically, the transmission line's conductor, connectors, and attached accessories in terms of degradation in mechanical properties due to annealing elastic and in-elastic elongation, and accelerated aging are explored along with limited mitigation recommendations. Additionally, predictor equations for accelerated creep and conductor loss of strength are detailed in annexes with limited example calculations.

**Keywords:** accelerated aging, accelerated creep, annealing, conductor core, conductors, connectors, IEEE 1283™

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## Introduction

This introduction is not part of IEEE Std 1283-2013, IEEE Guide for Determining the Effects of High-Temperature Operation on Conductors, Connectors, and Accessories.

The annexes are provided as either information or representative examples of some computational techniques in use today within the industry; however, they are not the only accepted techniques available nor are they to be considered the recommended techniques by the Task Force under the Conductors Working Group preparing this guide. Other techniques can be found in the references, bibliography, and other sources which provide equally acceptable results. The reader is encouraged to investigate any and all techniques to determine which best suit anticipated applications.

## Contents

1. Overview .....	1
1.1 Scope .....	1
1.2 Purpose .....	1
2. Normative references.....	3
3. Definitions and acronyms.....	4
3.1 Definitions .....	4
3.2 Acronyms .....	5
4. Conductors.....	5
4.1 Elevated temperature creep.....	5
4.2 Loss of strength and annealing .....	6
4.3 High-temperature effects on conductor core.....	7
4.4 High-temperature effects on sags and tensions.....	8
5. Connectors.....	11
5.1 Design of connectors .....	11
5.2 Connector high-temperature operation .....	11
5.3 Analysis of connector high-temperature operation .....	13
5.4 Mitigation of connector high-temperature operation.....	14
6. Conductor hardware .....	14
6.1 Metallic conductor hardware .....	15
6.2 Non-metallic conductor hardware .....	16
6.3 Insulators and connecting hardware .....	16
Annex A (informative) Creep predictor equations for high-temperature operation .....	18
A.1 General.....	18
A.2 Definition of terms.....	18
A.3 Creep predictor equations .....	19
A.4 Temperature change value .....	21
A.5 Use of predictor equations .....	21
Annex B (informative) Example of calculating elevated temperature creep and its effect on conductor sag .....	23
B.1 General.....	23
B.2 Problem statement.....	23
B.3 Example calculation (metric) .....	23
B.4 Example calculation (English) .....	25
Annex C (informative) Residual conductor strength predictor equations for high-temperature operation.....	27
C.1 General.....	27
C.2 Definition of terms.....	27
C.3 Residual conductor strength predictor equations .....	27
Annex D (informative) Bibliography .....	29



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## 1. Overview

### 1.1 Scope

The scope of this guide is to describe the effects and impacts of high temperature operation on conductors, connectors, and conductor hardware. The guide will identify operating metrics which constitute elevated temperature operation based on present industry practices and its effects on overhead line components, and it will suggest potential mitigation options to manage or avoid identified adverse impacts.

### 1.2 Purpose

The purpose of this guide is to provide general recommendations for consideration when evaluating existing overhead transmission lines or designing new overhead transmission lines which will be operated at high temperatures. Although this guide is intended for overhead transmission lines, most of the discussion will also be applicable to distribution lines. Recently within the industry a number of new and novel conductors have been designed using non-traditional materials specifically designed for high-temperature operation. The collection of new and novel conductors is identified in the industry as high