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IEEE Guide for Overhead AC Transmission Line Design

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IEEE Guide for Overhead AC Transmission Line Design

Developed by the

Corporate Advisory Group
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Abstract: Methods for designing 110 kV to 1000 kV ac overhead transmission lines are provided and may also be used as reference for the design of lower voltage overhead transmission lines. The principles and procedures for designing weather-resistant conductor, ground wire, insulator, structure, and foundation of ac transmission overhead lines are specified.

Keywords: AC overhead transmission line, conductor, electrical design, fitting, foundation, ground wire, IEEE 1863™, insulator, lightning protection, load, radio interference, structure design, weather loads

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Introduction

This introduction is not part of IEEE Std 1863-2019, IEEE Guide for Overhead AC Transmission Line Design.

This guide is for the design of 110 kV to 1000 kV ac overhead transmission lines and can also be used as reference for the design of lower voltage overhead transmission lines.

The main content in this guide is divided into five parts:

- Clause 3 defines terms.
- Clause 4 shows requirements of each component and explains how to choose them.
- Clause 5 proposes methods of determining designs to withstand wind velocity and icing thickness. Also, it puts forward the relative reliability level of different overhead transmission lines.
- Clause 6 through Clause 8 introduce several electrical, foundation, and structure designs. The designers can choose the design methods suitable for the line's geography, environment, and importance.

The annexes give exact limit values and some calculation methods of electric parameters.

Contents

IEEE Guide for Overhead AC Transmission Line Design

1. Overview

1.1 Scope

This guide applies to three-phase overhead ac transmission line (110 kV to 1000 kV) design and construction, and it can be used as reference for lower voltage levels. This guide specifies design methodologies of the overhead transmission line conductors and ground wires, insulators and fittings, insulation coordination, lightning protection and grounding, conductor arrangement, as well as tower types, loads, materials, structure, and foundations.

1.2 Purpose

This guide applies to the design of ac overhead transmission lines, and gives primary methods for electrical, structural, and foundation design. The design engineer can choose the appropriate design methods based on the location, ambient conditions, and importance of the line.

1.3 Word usage

The word *shall* indicates mandatory requirements strictly to be followed in order to conform to the standard and from which no deviation is permitted (shall equals is required to).[1, 2]

The word *should* indicates that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others; or that a certain course of action is preferred but not necessarily required (should equals is recommended that).

The word *may* is used to indicate a course of action permissible within the limits of the standard (may equals is permitted to).

The word *can* is used for statements of possibility and capability, whether material, physical, or causal (can equals is able to).

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[1] The use of the word *must* is deprecated and cannot be used when stating mandatory requirements, *must* is used only to describe unavoidable situations.

[2] The use of *will* is deprecated and cannot be used when stating mandatory requirements, *will* is only used in statements of fact.