IEEE Guide for Maintenance Methods on Energized Power Lines

IEEE Power & Energy Society

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Abstract: General recommendations for performing maintenance work on energized power lines are provided. Technical explanations as required to cover certain laboratory testing of tools and equipment, field maintenance and care of tools and equipment, and work methods for the maintenance of energized lines and for persons working in the vicinity of energized lines are included.
Keywords: energized, equipment, maintenance, power lines, tools

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Introduction

This introduction is not part of IEEE Std 516-2009, IEEE Guide for Maintenance Methods on Energized Power Lines.

Live-line maintenance of transmission lines began in the early 1920s and developed into a major working practice as the transmission systems were expanded and the voltages increased.

In the 1950s, when the transmission line voltage exceeded 300 kV line to line, the use of fiberglass to replace wooden tools made a significant change in the industry. Economic conditions prohibited the construction and operation of redundant lines, and the need for live-line maintenance of transmission line increased rapidly.

During the 1950s and 1960s, several papers were written regarding the safety aspects of live-line maintenance. In the early 1970s, the IEEE Transmission and Distribution Committee recognized the need to consolidate information on live-line maintenance, and thus a task group was formed to write a guide. The task group later became the Engineering in Safety, Maintenance, and Operation of Lines (ESMOL) Subcommittee.

This guide was started in the late 1970s and was published in 1986 on a trial-use basis. In 1987, the guide was released as a full-use ANSI/IEEE guide. Since the original publication of the guide, the ESMOL Subcommittee has been working on revisions to the guide to bring it up to the current state of the art and into conformance with other international standards issued in recent years. The ESMOL Subcommittee has added sections from other ESMOL sponsored guides in this edition to expand the scope of the guide to cover more of the industry's needs.

In the guide editions up to 1995, most of table data were obtained from plots. In the 2003 guide, the tables were calculated using the formulas in the guide in a step calculation method.

In this edition of the guide, the tables were calculated using the formulas in the guide. Additional text has been added on the determination of maximum anticipated per-unit transient overvoltage (TOV) T and use of the minimum air insulation distance (MAID) and minimum approach distance (MAD).

During the original development of the guide, it was not intended that it would be used as a document to establish government regulations. However, since its publication in 1986, several government regulatory agencies have used the guide in their rule making. This edition of the guide includes revisions that make it more compatible for use in governmental regulations.

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1. Overview

1.1 Scope

This guide provides the general recommendations for performing maintenance work on energized power lines. It is not intended to include all of the proven practical methods and procedures; however, these selected comprehensive recommendations are based on sound engineering principles, engineering safety considerations, and field experience by many utilities. Included are technical explanations as required to cover certain laboratory testing of tools and equipment, in-service inspection, maintenance and care of tools and equipment, and work methods for the maintenance of energized lines for persons working in vicinity of energized lines.

1.2 Purpose

The purpose of this guide is to

a) Present, in one guide, sufficient details of some of the methods and equipment presently in use to enable the performance of energized line maintenance with maximum safety.

b) Direct attention to appropriate standards and other documents for the acquisition of knowledge on the inspection, care, and use of required tools and equipment.

c) Provide guidance for establishing an appropriate work area, taking into consideration safety and the physical effects of the work area on personnel.

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It is not intended that this guide should replace present proven utility practices or imply that these recommendations are superior to existing practices and, therefore, should be universally adopted as utility standards. This compilation of many accepted practices is presented specifically in the form of a guide to be used by those electric utilities and agencies that are seeking guidance in establishing methods and procedures for maintenance of energized power lines.

1.3 Application

This guide, although general in scope and purpose, is specific enough to be applicable to all aspects of energized-line maintenance.

Since energized-line maintenance practices for different projects are influenced by the magnitude and nature of each project and by local conditions and circumstances, some alternative methods that have been successfully employed are presented.

The practices described provide for the performance of energized-line maintenance with maximum safety. They are based on practices of operating utilities with many years of successful experience.

The approach used in this guide is to

a) Indicate the engineering and other technical considerations essential to the performance of energized-line maintenance with maximum safety.

b) Provide guidance for the necessary test equipment and procedures associated with manufacturer and user acceptance, testing, and care of equipment.

c) Detail various work methods for working on or near energized lines and associated devices.

Advancement in technology or changes in system design will probably justify modifying the minimum requirements recommended in this guide.

CAUTION

Requirements of federal, state, or local regulations should be observed. When any conflict exists between this guide and the rules of the owner of the line, the owner's rules shall take precedence.

2. Normative references

The following referenced documents are indispensable for the application of this document (i.e., they must be understood and used; therefore, each referenced document is cited in text and its relationship to this document is explained). For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments or corrigenda) applies.

ANSI/SIA A92.2, American National Standard for Vehicle-Mounted Elevating and Rotating Aerial Devices.[1]

ASTM D 120, Standard Specification for Rubber Insulating Gloves.[2]

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