

1441™

IEEE Guide for Inspection of Overhead Transmission Line Construction

IEEE Power Engineering Society

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IEEE Guide for Inspection of Overhead Transmission Line Construction

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

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Abstract: Various approaches to good inspection practices for the construction of overhead transmission lines are covered in this guide. Inspection responsibilities and reporting, as well as inspection of various overhead transmission line components, are discussed. The guide is intended to be used as a reference for those involved in the ownership, design, and construction of overhead transmission lines.

Keywords: construction, inspection, transmission lines

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Introduction

This introduction is not part of IEEE Std 1441-2004, IEEE Guide for Inspection of Overhead Transmission Line Construction.

This guide is one of several documents, covering all aspects of overhead transmission construction, that are being prepared by the Working Group on Construction of Overhead Lines of the Towers, Poles, and Conductors Subcommittee of the Transmission and Distribution Committee of the IEEE Power Engineering Society. This guide presents, in one document, the considerations necessary for the inspection of overhead line construction. This guide is intended to be used as a reference source for parties involved in the ownership, design, and construction of transmission lines.

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IEEE Guide for Inspection of Overhead Transmission Line Construction

1. Overview

This guide contains a consensus of the industry related good practice for inspecting the construction of transmission lines. It is not intended to be all-inclusive, and does not supersede the related typical practices of various utilities formulated for their specific locations and conditions.

1.1 Scope

This guide covers the inspection procedures and practices for right-of-way issues, foundations, structures, and wire installation for overhead lines.

1.2 Purpose

The objective of this guide is to provide a convenient tool to facilitate thorough and consistent administrative and quality control techniques for the transmission line owner. The guidelines and procedures presented in this document are intended to not only document the standards expected of the construction inspectors, but also to help ensure that the project is constructed in compliance with the drawings and specifications.

The owner's specification is the inspector's primary source of direction when specific guidance is required. In the absence of specific owner's directions, this guide may be used.

1.3 Application

This guide is applicable to inspection methods and procedures used during the construction of overhead transmission lines. Actual practices for transmission line construction will be governed and detailed by the individual owner's construction specifications, drawings, and instructions. This guide is intended as a reference for field personnel to aid in ensuring that overhead transmission line construction is accomplished in accordance with the owner's specifications.

1.4 Safety

Construction of overhead transmission lines requires the constructor to implement a safety and health program that takes all reasonable precautions to protect the safety and health of workers and members of the public and to prevent damage to private property.

In the United States, compliance with the latest applicable Occupational Safety and Health Administration (OSHA) standards and other applicable federal, state, or local regulations is required.

- a) In any state where the state OSHA's plan is accepted by the federal government, the constructor must comply with the state OSHA regulations.
- b) The inspector should have completed at least the minimum level of OSHA Construction Safety and Health training as applicable to the work.
- c) The constructor should also keep a copy of applicable OSHA standards at the jobsite.

The inspector should have a working knowledge of applicable safety practices and requirements. Safety authority and responsibility should be discussed at the start of construction with the owner and constructor. This is especially important if the inspector finds or observes life threatening construction procedures or acts.

2. Normative references

The following referenced documents are indispensable for the application of this standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments or corrigenda) applies.

IEEE Std 524™, IEEE Guide to the Installation of Overhead Transmission Line Conductors.^{1, 2}

IEEE Std 951™, IEEE Guide to the Assembly and Erection of Metal Transmission Structures.

IEEE Std 977™, IEEE Guide to Installation of Foundations for Transmission Line Structures.

IEEE Std 1025™, IEEE Guide to the Assembly and Erection of Concrete Pole Structures.

IEEE Std 1048™, IEEE Guide for Protective Grounding of Power Lines.

3. Inspection responsibilities

3.1 Inspector qualifications

Inspectors should have practical experience and understanding of construction principles. An inspector should know how the work is to be done and why it is to be done in a certain way. Knowledge of and consideration for typical environmental construction stipulations is important. The inspector should also be aware of basic safety issues and concerns, including the potential hazards of induction coupling to other nearby electrical facilities.

Ideally, the inspector should have previous experience in the construction of transmission lines or similar facilities.

3.2 Inspector responsibilities

Communication is the key to effective construction inspection.

- a) An inspector's primary responsibilities are to
 - 1) Know the drawings and specifications, including any standard specifications for the project.
 - 2) Verify that work is executed according to drawings and specifications.
 - 3) Prepare complete and accurate written reports in a timely manner, describing all events that occur.

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- 4) Review the constructor's final drawings of record for compliance with the as-constructed transmission line.
 - 5) Ensure that access to right-of-way is according to arrangements with landowners.
 - 6) Be proactive in observing any construction practices to avoid potential problems. Maintain good communication with the construction supervisor and crews.
- b) On-site inspector functions include the following:
- 1) Check preparatory work, such as preparation of subgrade, placement of reinforcement steel, alignment of forms, and operations requiring inspection during progress of work.
 - 2) Check the use of materials, equipment, and workmanship for conformance with specifications and for acceptable construction practices.
 - 3) Inform the constructor of the potential unacceptability of any phase of construction that is not being performed in accordance with drawings and specifications.
 - 4) Notify the constructor of any faulty construction.
 - 5) Inform the constructor of violations of access conditions.
 - 6) Observe constructor safety meetings or briefings.
- c) Authority for requiring the removal of faulty construction or of construction performed without inspection is a function generally reserved for the owner.

4. Inspection reports

Inspection reports are intended to document construction progress on a daily, weekly, or monthly basis. Specific item reports document quality and verify conformance with the specifications. Sample inspection reports are included in Annex A.

Inspection reports are a very important part of the construction process and serve as the ultimate project record in terms of progress payments, contract compliance, and what was installed.

4.1 Daily field reports

Inspectors should make daily field reports for work under their inspection. Daily reports should be complete and accurate.

Normally, field reports are to be written and submitted to the lead inspector at the completion of each day. A good practice is to acquire the constructor's signature on all reports as they are submitted. This practice will help to reduce potential disputes as issues arise during the project.

4.1.1 Purpose of daily field reports

- a) Advise the lead inspector of work progress, difficulties encountered, noncompliance with drawings and specifications, and other similar matters.
- b) Substantiate or refute constructor's claims.
- c) Record details of methods and materials that can be referred to in later years in order to evaluate the methods and materials involved.
- d) Pass on to other inspectors details that will assist them in their work.
- e) Record items completed.

4.1.2 Information contained in daily field reports

The information contained in daily field reports answers the questions related to what, how, and who.

4.1.2.1 Routine data

- a) Time—date, shift starting and quitting time for both the inspector and the constructor
- b) Description and location of each phase of the work
- c) Description of weather, including approximate average temperature
- d) Number of workers on the job
- e) Description of work accomplished
- f) A record of construction items completed

4.1.2.2 Description of construction activities

- a) Type and location of work being performed.
- b) Problems or unusual conditions encountered.
- c) Any protest by the constructor's representative regarding work requested that constructor believes is "extra work."
- d) The start of any new phase of the operations or a new subcontractor. Report the completion of any phase of the work.
- e) Delays affecting the work and the cause of the delays.
- f) Any instruction to or discussions with the constructor. Include who, what, when, where, and why.
- g) A record of contacts with landowners citing who, what, when, and where. Observational reports also should be made if property damage, either on or off right-of-way, is observed.
- h) Photographs documenting work in progress, specifically any work believed to be not in conformance with the specifications, drawings, or owner's directions.

4.1.2.3 Specifics

- a) Location, quantities and/or limits from which quantities may be computed, and field measurement for payment. If necessary, include a sketch to show work accomplished or payment quantity.
- b) Constructor's personnel and equipment including the following:
 - 1) Number and classification of all workers including subcontractor's personnel
 - 2) Description of what each crew is working on
 - 3) Number and type of major pieces of equipment, identifying by brand, year, model number, and size
 - 4) Idle time for all equipment

4.2 Weekly inspection reports

The primary purpose of weekly inspection reports is for the lead inspector to summarize construction progress, particularly those pay items that the constructors will be claiming in their monthly pay requests. Diligent accounting for completed work on daily and weekly reports greatly simplifies the owner's monthly verification of the constructor's pay request.

4.3 Monthly progress reports

The lead inspector should prepare a narrative report of monthly progress during the last week of every month. Pictures of constructor activities or unusual job-related occurrences might accompany this report. The purpose of the report is to verify the constructor's pay request.

Inspectors are to submit, for verification purposes, quantities of work for the respective contract bid items. If and when contract modifications are executed and involve items for pay, a record of the quantities of these items should also be reported with the original contract bid items. Use the copy of the latest contract summary and project payment request to determine the pay quantities when making out each month's quantity report. During the month, pay quantities are recorded on respective daily and weekly inspection reports.

4.4 Specific reports

The inspector should prepare specific reports documenting certain construction activities for conformance with specification requirements and for the owner's records. These reports may include, but are not limited to, the following at the owner's option, as applicable:

- a) Material receiving reports
- b) Pulling site reports
- c) Vendor shortage lists
- d) Foundation reports
- e) Stub angle checklists
- f) Gate and fence grounding lists
- g) Right-of-way clearing reports
- h) Structure shakedown reports
- i) Tree clearing inspection reports
- j) Sag check reports (verifies location of sag checks and values measured)

See Annex A for sample report forms.

5. Inspection

The inspection process includes the review of construction of the various components of an overhead transmission line.

5.1 Gates and road approaches

Location and function of gates during and after construction is an important landowner concern. The inspector must verify that gates are properly installed, function properly, and are secure against unauthorized personnel entry or escape of livestock.

Permanent installation of gates prior to clearing is desirable because it provides orderly access, and constructor's crews and equipment are less likely to trespass beyond the limits of access provided. This is frequently a property owner complaint. Fencing should not be cut until the gateposts are installed and fencing prepared for reinstallation.