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IEEE Guide for Evaluating AC Interference on Linear Facilities Co-Located Near Transmission Lines

IEEE Power and Energy Society

Developed by the
Transmission and Distribution Committee

IEEE Std 2746™-2020

IEEE STANDARDS

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Approved 6 May 2020

IEEE SA Standards Board

Abstract: This guide identifies the mechanisms and analytic approach for ac interference effects on conductive linear facilities due to the operation of co-located electric transmission lines. The common mechanisms for ac interference such as magnetic inductive coupling, capacitive coupling, and conductive voltage transfer through soil are discussed. Included are general guidelines and considerations for performing detailed ac interference analyses, with sections specific to the analysis of co-located pipeline and railroad facilities. This guide does not dictate specific compliance limits, direct when an ac interference analysis must be performed, or cover other issues that may need to be considered in joint-use corridors, such as effects due to lightning striking the line or dc corrosion on structures.

Keywords: ac interference, fences, IEEE 2746™, induction, lines, pipelines, transmission lines

The Institute of Electrical and Electronics Engineers, Inc.
3 Park Avenue, New York, NY 10016-5997, USA

PDF: ISBN 978-1-5044-6713-1 STD24192
Print: ISBN 978-1-5044-6714-8 STDPD24192

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Introduction

This introduction is not part of IEEE Std 2746-2020, IEEE Guide for Evaluating AC Interference on Linear Facilities Co-Located Near Transmission Lines.

AC interference is a growing area of concern, with more lines being co-located with pipelines and railroads. The railroad side is somewhat covered by the Electric Power Research Institute (EPRI)/American Railway Engineering and Maintenance-of-Way Association (AREMA) handbook [B9], while some pipeline consortiums have developed material on their side (CEPA [B6], INGAA [B16]).[1] This guide helps to fill in the gaps and is written with members of electric utilities in mind. It captures common guidelines/limits from other sources that electric utilities may not have access to as well as provide guidance as to what is practical to consider/analyze. While the guide focuses on pipelines and railroads, other co-located facilities including fences, other power lines, communications facilities, etc., may apply portions of this guide and, where applicable, additional IEEE guides are referenced.

[1]The numbers in brackets correspond to those of the bibliography in Annex A.

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IEEE Guide for Evaluating AC Interference on Linear Facilities Co-Located Near Transmission Lines

1. Overview

1.1 Scope

This guide identifies the mechanisms and analytical approach for ac interference effects on conductive linear facilities due to the operation of co-located electric transmission lines. The common mechanisms for ac interference, including magnetic inductive coupling, capacitive coupling, and conductive voltage transfer through soil are discussed. Included are general guidelines and considerations for performing detailed ac interference analyses, with sections specific to the analysis of co-located pipeline and railroad facilities.

This guide does not dictate specific compliance limits, direct when an ac interference analysis must be performed, or cover other issues that may need to be considered in joint-use corridors, such as effects due to lightning striking the line or dc corrosion on structures.

1.2 Purpose

The electric utility industry is often encouraged or required to share corridors with other linear facilities, such as pipelines and railroads. Electric transmission lines can electromagnetically couple onto and energize adjacent facilities, resulting in electrical hazards to personnel and equipment. Guidance for analyzing these hazards is limited. The purpose of this guide is to provide general guidance on when a study may be required to analyze these hazards, what data is needed for a study, available industry compliance limits, general scenarios that may need to be analyzed, and sample mitigation approaches. This guide aids users, from both the electric utility and affected facility, in understanding the concerns and to develop approaches for studying and mitigating ac interference issues on their systems. While the guide focuses on co-located transmission lines and pipeline or railroad facilities, much of the information applies to similar linear facilities.

2. Normative references

The following referenced documents are indispensable for the application of this document (i.e., they must be understood and used, so 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.