

IEEE Standard for the Electrical Protection of Communication Facilities Serving Electric Supply Locations Through the Use of Neutralizing Transformers

IEEE Power and Energy Society

Sponsored by the
Power System Communications Committee

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USA

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Power System Communications Committee
of the
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Abstract: Engineering design procedures for the electrical protection of communication facilities serving electric supply locations through the use of neutralizing transformers are presented in this standard.

Keywords: electric supply locations, IEEE 487.4™, neutralizing transformers power stations, protection, wire-line communications

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Percy Pool, Co-Chair
Larry Young, Co-Chair and Secretary

Ben Bloom
Steve Blume
Joe Boyles
Tim Conser
Bhimesh Dahal

Jean de Seve
Ernest Duckworth
John Fuller
Ernest Gallo
Dave Hartmann
Dan Jendek

Richard Knight
Randall Mears
Mark Tirio
Thomas Vo
John Wruble

The following members of the individual balloting committee voted on this standard. Balloters may have voted for approval, disapproval, or abstention.

William Ackerman
David Bassett
Steve Blume
Claude Brisson
Gustavo Brunello
William Byrd
Tim Conser
Brian Cramer
Ernest Duckworth
John Fuller
Doaa Galal
Frank Gerleve
Jalal Gohari
Randall Groves
Edward Hare

Dave Hartmann
Yuri Khersonsky
Richard Knight
Joseph L. Koepfinger
Jim Kulchisky
Marc Lacroix
Michael Lauxman
Lawrence Long
Greg Luri
Michael Maytum
William McCoy
Joseph Mead
Jerry Mui
H. Neri
Michael S. Newman
Charles Negethe

Yury Lissen
Lorraine Padden
Donald Parker
Percy Pool
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Introduction

This introduction is not part of IEEE Std 487.4-2013, IEEE Standard for the Electrical Protection of Communication Facilities Serving Electric Supply Locations Through the Use of Neutralizing Transformers.

Wire-line communication facilities serving electric supply locations often require special high-voltage protection against the effects of fault-produced ground potential rise (GPR) or induced voltages, or both. Some of the telecommunication services are used for control and protective relaying purposes and may be called upon to perform critical operations at times of power system faults. Even when critical services are not involved, special high-voltage protection may be required for both personnel safety and plant protection at times of power system faults.

Effective protection of any wire-line telecommunication circuit requires coordinated protection of all circuits provided over the same telecommunication cable.

This standard presents workable methods for the electrical protection of wire-line communication circuits serving electric supply locations through the use of neutralizing transformers.

This project is part of a reorganization of IEEE Std 487™ in which the main document is broken down into a family of related documents (i.e., dot-series) segregated on the basis of technology.

- 487
- 487.1 (Metallic wire-line)
- 487.2 (Optical fiber facilities)
- 487.3 (Hybrid facilities)
- 487.4 (Neutralizing transformers)
- 487.5 (Isolation transformers)

Neutralizing transformers are considered mature technology. Neutralizing transformers were used extensively and although there are many still in use today, they are usually no longer provided for new installations. For newer technologies refer to IEEE Std 487.1™, IEEE Std 487.2™, and IEEE Std 487.3™.

This standard has been prepared by the Wire Line Subcommittee of the Power System Communications Committee of the IEEE Power and Energy Society. This standard represents the consensus of both power and communications engineers.

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1. Overview

1.1 Background

Wire-line telecommunication facilities serving electric supply locations often require special high-voltage protection against the effects of fault-produced ground potential rise (GPR) or induced voltages, or both. Some of the telecommunication services are used for control and protective relaying purposes and may be called upon to perform critical operations at times of power system faults. This requirement presents a major challenge in the design and protection of the telecommunication system because power system faults can result in the introduction of interfering voltages and currents into the telecommunication circuit at the very time when the circuit is most urgently required to perform its function. Even when critical services are not involved, special high-voltage protection may be required for both personnel safety and plant protection at times of power system faults. Effective protection of any wire-line telecommunication circuit requires coordinated protection on all circuits provided over the same telecommunication cable.

1.2 Scope

This standard presents engineering design procedures for the electrical protection of communication facilities serving electric supply locations through the use of neutralizing transformers. Other telecommunication alternatives, such as radio and microwave systems, are excluded from this document.

1.3 Purpose

This standard presents workable methods that can be used with greater reliability to improve the electrical protection of communication facilities serving electric supply locations through the use of neutralizing transformers.

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.

IEEE Std 487TM-2007, IEEE Recommended Practice for the Protection of Wire-line Communication Facilities Serving Electric Supply Locations.^{1,2}

IEEE Std 789TM, IEEE Standard Performance Requirements for Communications and Control Cables for Applications in High-Voltage Environments.

3. Definitions

3.1 Definitions, acronyms, and abbreviations

For the purposes of this document, the following terms and definitions apply. The *IEEE Standards Dictionary Online* should be consulted for terms not defined in this clause.³

drainage units or **drainage reactors**: Center-tapped inductive devices designed to relieve conductor-to-conductor and conductor-to-ground voltage stress by draining extraneous currents to ground. They are also designed to serve the purpose of a mutual drainage reactor, forcing near-simultaneous protector-gap operation.

electric power station: A substation or generating station.

electric supply locations: Any building, separate space, or site in which electric supply equipment is located that may be subjected to the effects of *GPR* from power system fault currents. This definition includes generation, transformation, conversion, switching, and delivery facilities.

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