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IEEE Standard for the Electrical Protection of Communications Facilities Serving Electric Supply Locations—General Considerations

IEEE Power and Energy Society

Sponsored by the
Power System Communications Committee

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USA

IEEE Std 487™-2015
(Revision of
IEEE Std 487-2007)

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Abstract: General considerations are presented for the electrical protection of telecommunications facilities serving electric supply locations. This standard contains material that is common to the IEEE 487™ family of standards (i.e., dot-series) including fundamental protection theory; basic electrical protection philosophy, concepts, and designs; protection apparatus; service types; reliability; service performance objective (SPO) classifications; and transmission considerations. In general, special protective measures, handling procedures, and administrative procedures are necessary to provide electrical protection against damage to telecommunications facilities and equipment, maintain reliability of service, and ensure the safety of personnel.

Keywords: electric supply locations, high-voltage tower, IEEE 487™, power stations, protection, wire-line telecommunications

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Introduction

This introduction is not part of IEEE Std 487™-2015, IEEE Standard for the Electrical Protection of Communications Facilities Serving Electric Supply Locations—General Considerations.

Telecommunications facilities serving electric supply locations often require special high-voltage protection (HVP) against the effects of fault-produced ground potential rise (GPR) or induced voltages, or both. Some of the telecommunications services are used for control and protective relaying purposes and may be called on to perform critical operations at times of power system faults. This requirement presents a major challenge in the design and protection of the telecommunications system because power system faults can result in the introduction of interfering voltages and currents into the telecommunications circuit at the very time when the circuit is most urgently required to perform its function. Even when critical services are not involved, special HVP may be required for both personnel safety and plant protection at times of power system faults. Effective protection of any telecommunications circuit requires coordinated protection on all circuits provided over the same telecommunications cable. Figure 24 provides an overview of a basic protection system.

Some electrical environments, collectively called *electric supply locations*, require the application of unique electrical protection techniques because of their special nature. One such environment is the electric power station or substation. Another is at or near power line transmission and distribution structures such as towers or poles. Such structures often provide a convenient site for the location of wireless, personal communications service, and cellular antennas and their associated electronic equipment that is served by a link to the wired telecommunications network.

This standard presents general considerations for the electrical protection of telecommunications facilities serving electric supply locations. This standard contains material that is common to the IEEE 487™ family of standards (i.e., dot-series) including fundamental protection theory and basic electrical protection concepts and designs. In general, special protective measures, handling procedures, and administrative procedures are necessary to provide electrical protection against damage to telecommunications facilities and equipment, maintain reliability of service, and ensure the safety of personnel. It is important to note that special HVP for the purpose of personnel safety and plant protection may be required even when critical services are not involved. For leased circuits, mutually agreeable methods for the installation of protective equipment owned by either party are presented.

This project is part of a reorganization of the IEEE 487 documentation in which the main document is broken down into a family of related documents segregated on the basis of technology:

- IEEE Std 487™ for general considerations
- IEEE Std 487.1™ for applications using on-grid isolation equipment involving metallic wire-line
- IEEE Std 487.2™ for applications consisting entirely of optical fiber cables
- IEEE Std 487.3™ for applications of hybrid facilities where part of the circuit is on metallic wire-line and the remainder of the circuit is on optical fiber cable
- IEEE Std 487.4™ for applications using neutralizing transformers (NTs)
- IEEE Std 487.5™ for applications using isolation transformers

This standard has been prepared by the Wire-Line Subcommittee (SC6) of the Power System Communications Committee of the IEEE Power and Energy Society, and it represents the consensus of both power and telecommunications engineers.

Contents

IEEE Standard for the Electrical Protection of Communications Facilities Serving Electric Supply Locations—General Considerations

1. Overview

1.1 Background

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