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IEEE Standard Performance Requirements for Communications and Control Cables for Application in High-Voltage Environments

IEEE Power and Energy Society

Sponsored by the
Power System Communications Committee

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USA

IEEE Std 789™-2013

IEEE Standard Performance Requirements for Communications and Control Cables for Application in High-Voltage Environments

Sponsor

Power System Communications Committee
of the
IEEE Power and Energy Society

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Abstract: Information to assist in determining the electrical parameters of communication and control cables necessary to improve the overall reliability of these cables when used in high-voltage environments is the objective of this standard. There should be a very high probability (greater than 99%) that these cables will perform their intended function for specified periods of time in high-voltage interference conditions. The end result being more reliable communications over said cables. The information presented in this standard will apply equally to either new or existing [already installed] cables.
Keywords: communication cables, design requirements, electrical parameters, ground potential rise, high-voltage engineering, IEEE 789™, testing requirements, wires

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Introduction

This introduction is not part of IEEE Std 789-2013, IEEE Standard Performance Requirements for Communications and Control Cables for Application in High-Voltage Environments.

Wire-line communications and control cables either entering electric supply locations or passing through their zone of influence (ZOI) are subjected to extraneous voltages that include the longitudinally induced voltage as well as the Ground Potential Rise (GPR) voltage.

Environmental hazards at electric supply locations include, among others, electrical interference and electromagnetic radiation. See CIGRE TB-124 [B4][a]. In these high-voltage environments, the insulation withstand capability of ordinary outside type telephone cables may be insufficient to provide full effective electrical protection. For more background information on these subjects the reader should refer to IEEE Std 487, particularly the Clause which deals with these dedicated cables. The problems of less than adequate dielectric withstand become more acute when critical non-interruptible channels are involved and if GPR levels exceed 300 V.

This standard defines the performance requirements for communications and control cables suitable for these classes of service.

IEEE Std 789-1988 was reaffirmed in 1994 however it was withdrawn as a standard in 1999. Although the Standard has been withdrawn from active status it is still available for purchase.

At the present time there are three IEEE Standards that deal with Cabling Design, two dealing with Cable Installation and one dealing with both Design and Installation. These are, in numerical order, IEEE Std 422™ [B12], IEEE Std 525™, IEEE Std 628™, IEEE Std 690™, IEEE Std 1185™, and IEEE Std1428™ [B17]. See Annex A, Bibliography for more information.

The Wire-Line Subcommittee believes it is important to bring this standard back to the active status and to bring it up to date because it contains information that may be useful for the deployment of Smart Grid devices.

This standard was prepared by the Wire-Line Subcommittee of the IEEE Power Systems Communications Committee of the IEEE Power and Energy Society.

[a] The numbers in brackets refer to those of the references listed in Annex A.

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IEEE Standard Performance Requirements for Communications and Control Cables for Application in High-Voltage Environments

1. Overview

1.1 Scope

This standard applies to wires and cables, used principally for power system communications and control purposes, which are located within electric supply locations or are installed within the zone of influence (ZOI) of the power station ground potential rise (GPR), or which may be buried adjacent to electric power transmission and distribution lines.

This standard covers the appropriate design requirements, electrical and mechanical parameters, the testing requirements, and the handling procedures for cables that are to be installed and operated in high-voltage environments where they may be subjected to high voltages either by conduction, or induction coupling, or both.

Coaxial and fiber optic cables, except for those used in Ethernet applications, are specifically excluded from this standard.