

IEEE Standard for Insulation Coordination—Definitions, Principles, and Rules

Sponsor

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Abstract: The procedure for selection of the withstand voltages for equipment phase-to-ground and phase-to-phase insulation systems is specified. A list of standard insulation levels, based on the voltage stress to which the equipment is being exposed, is also identified. This standard applies to three-phase ac systems above 1 kV.

Keywords: atmospheric correction factor, basic lightning impulse insulation level (BIL), basic switching impulse insulation level (BSL), crest value, ground fault factor, insulation coordination, overvoltage, phase-to-ground insulation configuration, phase-to-phase insulation configuration, protective margin, protective ratio, standard withstand voltages, voltage stress

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Introduction

(This introduction is not a part of IEEE Std 1313.1-1996, IEEE Standard for Insulation Coordination—Definitions, Principles, and Rules.)

This standard is a revision of IEEE Std 1313-1993. This standard presents the definitions and the procedure for insulation coordination. A related draft standard, IEEE P1313.2, is an application guide, which presents practical examples.

A new concept in this standard is the addition of phase-to-phase insulation coordination, and longitudinal insulation coordination, which is the coordination of switching surges and power frequency voltage across an open switch. The introduction of the very fast front short-duration overvoltages is an acknowledgment of the problems observed when a disconnect switch operates in a gas-insulated substation (GIS).

The basic concept of insulation coordination remains the same as in IEEE Std 1313-1993. The first step is the determination of voltage stresses using digital computer simulation, a transient analyzer, or mathematical methods. These analyses result in nonstandard overvoltage waveforms, which have to be converted to an equivalent standard waveshape. The second step is the selection of insulation strength to achieve the desired level of probability of failure. The standard considers both the BIL and BSL as either a conventional or statistical variable. For equipment in Class I (1–240 kV), use of the low-frequency withstand voltage and lightning impulse withstand voltage are recommended. For Class II (> 242 kV), use of the lightning impulse withstand voltage and switching withstand voltage are recommended.

This standard was prepared by the Insulation Coordination Working Group, under the sponsorship of the Technical Council of the IEEE Power Engineering Society. At the time this standard was completed, the Insulation Coordination Working Group had the following membership:

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