

IEEE Guide for the Safe Installation of Mobile Substation Equipment

Sponsor
**Substations Committee
of the
IEEE Power Engineering Society**

Approved 26 June 1997
IEEE Standards Board

Abstract: Information pertaining to the installation of mobile substation equipment up to 230 kV is provided.
Keywords: grounding, installation, lighting, lightning stroke protection, mobile substation equipment, shielding, step voltage, surge protection, touch voltage, transferred voltage

The Institute of Electrical and Electronics Engineers, Inc.
345 East 47th Street, New York, NY 10017-2394, USA
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ISBN 1-55937-938-3

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Introduction

(This introduction is not part of IEEE Std 1268-1997, IEEE Guide for the Safe Installation of Mobile Substation Equipment.)

Prior to the development of this guide, information regarding safe installation and operation of mobile substations was not available from a single source. To provide a single source of information for general transport, set-up, installation, and safe operation of mobile substation equipment, members of Working Group D4 (Substation Safety) unanimously voted to develop a comprehensive guide. The West Coast Subcommittee volunteered to assist in the development of the guide. Accordingly, a project authorization was requested and was approved by the IEEE Standards Board in September 1991.

This guide was developed with the intent to identify specific areas of concern and offer design assistance in those areas. Recognizing that mobile substations and their installation practices vary widely, the intent of this guide is not to provide a step-by-step set of instructions for individual units. Instead, an attempt was made by the working group to provide generic information on topics and items pertaining to safe installation and operation of mobile substation equipment.

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IEEE Guide for the Safe Installation of Mobile Substation Equipment

1. Overview

1.1 Scope

This guide contains information on general topics and items pertaining to the installation of mobile substation equipment. The guide recognizes that mobile substations vary widely regarding the particular devices and equipment used. It is beyond the scope of this guide to provide a specific step-by-step set of instructions for individual units. This guide covers installation of mobile substation equipment up to 230 kV.

1.2 Purpose

The purpose of this guide is to establish general transport, set-up, and installation guidelines for the safe use of mobile substation equipment. This guide has been developed with the intent to identify specific areas of concern and offer design assistance in those areas.

2. References

This guide shall be used in conjunction with the following standards. When the following standards are superseded by an approved revision, the revision shall apply.

Accredited Standards Committee C2-1997, National Electrical Safety Code® (NESC®).¹

ANSI C37.32-1990 Schedules of Preferred Ratings, Manufacturing Specifications, and Application Guide for High-Voltage Air Switches, Bus Supports, and Switch Accessories.²

ANSI Z535.2-1991 Environmental and Facility Safety Signs.

¹The NESC® is available from the Institute of Electrical and Electronics Engineers, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331, USA.

²ANSI publications are available from the Sales Department, American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036, USA.

Canadian Electrical Code, Part I, 17th Edition (C22.1-1994), Safety Standard for Electrical Installations.³

IEEE Std 80-1986 (Reaff 1991) IEEE Guide for Safety in AC Substation Grounding (ANSI).⁴

IEEE Std 100-1996 IEEE Standard Dictionary of Electrical and Electronics Terms.

IEEE Std 525-1992 IEEE Guide for Design and Installation of Cable Systems in Substations (ANSI).

IEEE Std 998-1996 IEEE Guide for Direct Lightning Stroke Shielding of Substations (ANSI).

IEEE Std 1119-1988 (Reaff 1993) IEEE Guide for Fence Safety Clearances in Electric-Supply Stations (ANSI).⁵

IEEE Std C37.91-1985 (Reaff 1990) IEEE Guide for Protective Relay Applications to Power Transformers (ANSI).

IEEE Std C62.22-1991 IEEE Guide for the Application of Metal-Oxide Surge Arresters for Alternating-Current Systems (ANSI).

NFPA 70-1996, National Electrical Code® (NEC®).⁶

3. Definitions

Definitions of terms pertinent to the subject matter are listed here. Definitions as given herein apply specifically to the application of this guide. For additional definitions, see IEEE Std 100-1996 .

3.1 clearances: The separation between two conductors, between conductors and supports or other objects, or between conductors and ground.

3.2 electric-supply equipment: Equipment that produces, modifies, regulates, controls, or safeguards a supply of electric energy.

3.3 electric-supply station: Any building, room, or separate space within which electric-supply equipment is located and the interior of which is accessible, as a rule, only to properly qualified persons. This includes generating stations and substations, including their associated generator, storage battery, transformer, and switchgear rooms.

3.4 exposed: Not isolated or guarded.

3.5 ground potential rise (GPR): The maximum electrical potential that a substation grounding grid may attain relative to a distant grounding point assumed to be at the potential of remote earth.

3.6 live parts: Those parts that are designed to operate at voltage different from that of the earth.

3.7 metal-to-metal touch voltage: The voltage between metallic objects or structures within the substation site that may be bridged by direct hand-to-hand or hand-to-feet contact.

3.8 mobile substation equipment: Substation equipment mounted and readily movable as a system of transportable devices.

³The Canadian Electrical Code is available from the Canadian Standards Association, 178 Rexdale Boulevard, Etobicoke, Ontario, Canada M9W 1R3.

⁴IEEE publications are available from the Institute of Electrical and Electronics Engineers, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331, USA.

⁵IEEE Std 1119-1988 has been withdrawn; however, copies can be obtained from Global Engineering, 15 Inverness Way East, Englewood, CO 80112-5704, USA, tel. (303) 792-2181.

⁶The NEC® is available from Publications Sales, National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101, USA. It is also available from the Institute of Electrical and Electronics Engineers, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331, USA.