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IEEE
Std C62.92.5-1992

IEEE Guide for the Application of Neutral Grounding in Electrical Utility Systems, Part V—Transmission Systems and Subtransmission Systems

Sponsor
**Surge-Protective Devices Committee
of the
IEEE Power Engineering Society**

Approved June 18, 1992
IEEE Standards Board

Approved December 8, 1992
American National Standards Institute

Abstract: Basic factors and general considerations in selecting the class and means of neutral grounding for a particular ac transmission or subtransmission system are covered. An apparatus to be used to achieve the desired grounding is suggested, and methods for specifying the grounding devices are given. Transformer tertiary systems, equipment-neutral grounding, and the effects of series compensation on grounding are discussed.

Keywords: electrical utility systems, equipment neutral grounding, grounding, neutral grounding, subtransmission systems, transformer tertiary systems, transmission systems, series compensation

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

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Printed in the United States of America

ISBN 1-55937-244-3

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Foreword

(This foreword is not a part of IEEE Std C62.92.5-1992, IEEE Guide for the Application of Neutral Grounding in Electrical Utility Systems, Part V—Transmission Systems and Subtransmission Systems.)

This guide is a part of a series on neutral grounding in electrical utility systems. When the series of documents are approved and published, they will replace IEEE Std 143-1954, IEEE Guide for Ground-Fault Neutralizers, Grounding of Synchronous Generator Systems, and Neutral Grounding of Transmission Systems. In the new series of documents, individual considerations and practices have been given to the grounding of synchronous generator systems, generator-station auxiliary systems, and distribution systems.

IEEE Std 143-1954 is a revision of AIEE No. 954, October 1954, which was a compilation of the following three AIEE Transaction papers:

- AIEE Committee Guide Report, “Application of Ground-Fault Neutralizers,” *AIEE Transactions (Power Apparatus and Systems)*, vol. 72, pt. III, pp. 183–190, April 1953.
- AIEE Committee Report, “Application Guide for the Grounding of Synchronous Generator Systems,” *AIEE Transactions (Power Apparatus and Systems)*, vol. 72, pt. III, pp. 517–530, June 1953.
- AIEE Committee Report, “Application Guide on Methods of Neutral Grounding of Transmission Systems,” *AIEE Transactions (Power Apparatus and Systems)*, vol. 72, pt. III, pp. 663–668, June 1953.

The contents of Parts I–V of the revision of IEEE Std 143-1954 are based on the foregoing documents but are amplified and updated with new material from the IEEE tutorial course “Surge Protection in Power Systems” (79H0144-6-PWR) and other sources.

In Parts I through V of this series, emphasis is on power system grounding practices as contrasted with the grounding, for example, of industrial systems, which is covered in other guides and standards. These guides and standards should be referenced, when appropriate, to gain a full picture of other grounding practices.

It is impossible to give recognition to all those who have contributed to the technology and practices of grounding of power systems, since work involving the preparation of this guide has been in progress for over 30 years. However, the assistance of members, past and present, of the Neutral Grounding Devices Subcommittee of the Surge-Protective Devices Committee, and other similar groups with comparable purposes, should be acknowledged.

Disclaimer

This guide is specifically written for electrical utility systems and does not recognize the neutral grounding requirements for dispersed storage and generation. These requirements must recognize the restrictions imposed by the specific network to which the dispersed storage or generation is connected. Neutral grounding of dispersed storage and generation needs to be coordinated with the electrical utility system.

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1. Scope

The purpose of this document is to give the basic factors and general considerations in selecting the class and means of neutral grounding for a particular ac transmission or subtransmission system, and the suggested method and apparatus to be used to achieve the desired grounding.

Definitions of grounding terms used in this part of the guide may be found in IEEE Std C62.92-1987 [1].

2. References

This guide is to be used in conjunction with the following publications:

2.1 General

[1] IEEE Std C62.92-1987, IEEE Guide for the Application of Neutral Grounding in Electrical Utility Systems, Part I—Introduction (ANSI).¹

[2] ANSI C92.1-1982, American National Standard for Power Systems—Insulation Coordination.²

[3] AIEE Committee Report, “Application Guide on Methods of Neutral Grounding of Transmission Systems,” *AIEE Transactions on Power Apparatus and Systems*, vol. 72, pt. III, pp. 663–668, August 1953 (AIEE 954, October 1954).

[4] IEEE Std 32-1972 (Reaff. 1991), IEEE Standard Requirements, Terminology, and Test Procedures for Neutral Grounding Devices (ANSI).

[5] IEEE Tutorial Course, *Surge Protection in Power Systems*, Chapter 2, “Grounding Power System Neutrals,” 79EH0144-6 PWR.

¹IEEE publications are available from the Institute of Electrical and Electronics Engineers, Service Center, 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.

[6] IEEE Std C62.2-1987, IEEE Guide for the Application of Gapped Silicon-Carbide Surge Arresters for Alternating-Current Systems (ANSI).

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