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IEEE 3003 STANDARDS:
POWER SYSTEMS GROUNDING

IEEE Std 3003.1™ - 2019

Recommended Practice
for System Grounding of
Industrial and Commercial
Power Systems

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IEEE Recommended Practice for System Grounding of Industrial and Commercial Power Systems

Developed by the

Industrial and Commercial Power Systems Standards Development Committee
of the
IEEE Industry Applications Society

Approved 13 June 2019

IEEE SA Standards Board

Abstract: Discussed in this recommended practice is the system grounding of industrial and commercial power systems. The recommended practices in this document are intended to provide explanations of how electrical systems operate. It can also be an aid to all engineers responsible for the electrical design of industrial and commercial power systems.

Keywords: effectively grounded, ground, grounding system, high resistance ground, IEEE 3003.1™, neutral

The Institute of Electrical and Electronics Engineers, Inc.
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PDF: ISBN 978-1-5044-5944-0 STD23745
Print: ISBN 978-1-5044-5945-7 STDPD23745

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Introduction

This introduction is not part of 3003.1–2019, IEEE Recommended Practice for System Grounding of Industrial and Commercial Power systems.

IEEE 3000 Series®

This recommended practice was developed by the Industrial and Commercial Power Systems Standards Development Committee of the IEEE Industry Applications Society as part of a project to repackage IEEE's popular series of "color books." The goal of this project is to speed up the revision process, eliminate duplicate material, and facilitate use of modern publishing and distribution technologies.

When this project is completed, the technical material included in the 13 "color books" will be included in a series of new standards. Approximately 60 "dot" standards, organized into the following categories, will provide in-depth treatment of many of the topics formerly covered in the color books:

- Power Systems Design (3001 series)
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- Power Systems Grounding and Bonding (3003 series)
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In many cases, the material in a "dot" standard comes from a particular chapter of a particular color book. In other cases, material from several color books has been combined into a new "dot" standard. The material in this recommended practice largely comes from Chapter 1 of IEEE Std 142™-2007.

IEEE Std 3003.1™

This recommended practice covers the system grounding of industrial and commercial power systems. It is likely to be of greatest value to the power-oriented engineer with limited experience in this area. It can also be an aid to all engineers responsible for the electrical design of industrial and commercial power systems.

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IEEE Recommended Practice for System Grounding of Industrial and Commercial Power Systems

1. Overview

1.1 Scope

This recommended practice covers the system grounding of industrial and commercial power systems. The basic reasons for grounding or not grounding the electrical system and the various types of system grounding, as well as the practices commonly used to ground electrical systems are discussed.

1.2 Purpose

Grounding of an electrical system is a decision that must be faced by engineers charged with planning or modifying electrical distribution. Grounding in some form is generally recommended, although there are certain exceptions. Several methods and criteria exist for system grounding; each has its own purpose.

It is the intention of this recommended practice to assist the engineer in making decisions by presenting basic reasons for grounding or not grounding and by reviewing general practices and methods of system grounding. The practices set forth herein are primarily applicable to industrial, institutional, and/or commercial power systems that distribute and utilize power at medium or low voltage, usually within a smaller geographical area than is covered by a utility.

Where distances or power levels may dictate circuitry and equipment similar to a utility, consideration of utility practices is warranted. In addition to the general technical considerations in the practice of grounding as discussed in this recommended practice, pertinent codes or standards imposed by local regulatory authorities, the particular needs of service, and the experience and training of the workforce should also be considered. Where an industrial or commercial power system includes power-generating equipment, the reasons for grounding these components may be the same as those for grounding similar components of public utility systems. The methods of grounding would generally be similar under like conditions of service. However, in the industrial or commercial setting, conditions of service may be altered by the following:

- a) Location within the power system
- b) Individual generator characteristics
- c) Manufacturing process requirements
- d) Emergency/life safety requirements of the local codes