

# IEEE Trial-Use Recommended Practice for Grounding of DC Equipment Enclosures in Traction Power Distribution Facilities

IEEE Vehicular Technology Society

Sponsored by the  
Rail Transportation Standards Committee



# **IEEE Trial-Use Recommended Practice for Grounding of DC Equipment Enclosures in Traction Power Distribution Facilities**

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**Rail Transportation Standards Committee  
of the  
IEEE Vehicular Technology Society**

Approved 11 December 2013

**IEEE-SA Standards Board**

**Abstract:** The grounding of dc equipment enclosures installed in dc traction power distribution facilities as well as related insulation treatments required for solid and resistance grounding methods are covered in this standard. Guidelines are also given for material, installation, and testing of insulation used in dc traction facilities and further recommended criteria for acceptability are provided. System grounding, though related, is not covered in this document.

**Keywords:** 64, 64GS, 64HS, 64M, 64MR, bonding, building enclosure, dc, dc circuit breakers, device 64, diode ground, direct current, distribution facilities, electric trolley bus, enclosure ground, equipment enclosure, equipment ground, ETB, floor insulation, ground, ground protection, ground relay, grounded structure, grounding, GS, heavy rail, high resistance, high-resistance grounding, hot structure, HS, IEEE 1653.6™, insulation dielectric test, insulation testing, light rail, low resistance, low-resistance grounding, low-voltage equipment, negative return, rail transit, rectifier, single-point grounding, switchgear, system grounding, traction power, transfer trip, wall insulation

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## Introduction

This introduction is not part of IEEE Std 1653.6™-2013, IEEE Trial-Use Recommended Practice for Grounding of DC Equipment Enclosures in Traction Power Distribution Facilities.

This document contains recommended practices for grounding and bonding of dc equipment enclosures installed within traction power distribution facilities where the conventional practice in most dc traction power systems is to isolate both the positive and negative poles from ground. There exists a variety of system grounding methods, including single-point grounding, positive- or negative-pole grounding, resistive grounding, diode grounding, etc; however, details on system grounding and related applications, e.g., stray current control, rail-to-ground protective relay devices, are not covered by the scope of this document. For additional information regarding transit power systems grounding, refer to IEEE Std 142™, IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems.<sup>a, b, c</sup>

The necessity of this recommended practice stems from the lack of uniformity of enclosure grounding practices in the dc traction industry. Furthermore, grounding of dc traction equipment enclosures is not covered in the National Electric Code® [B4]<sup>d</sup> and National Electrical Safety Code® [B2]. As such, the goal of this document is to provide users with the various grounding methods used specifically for grounding dc traction equipment enclosures and preparing dc traction distribution facilities when implementing these grounding methods.

The organization of this document follows a typical equipment layout within a dc traction distribution facility. The main sections include ac equipment enclosures, dc equipment enclosures, floor insulation, and wall insulation. Refer to Figure a.

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<sup>d</sup> The numbers in brackets correspond to those of the bibliography in Annex B.

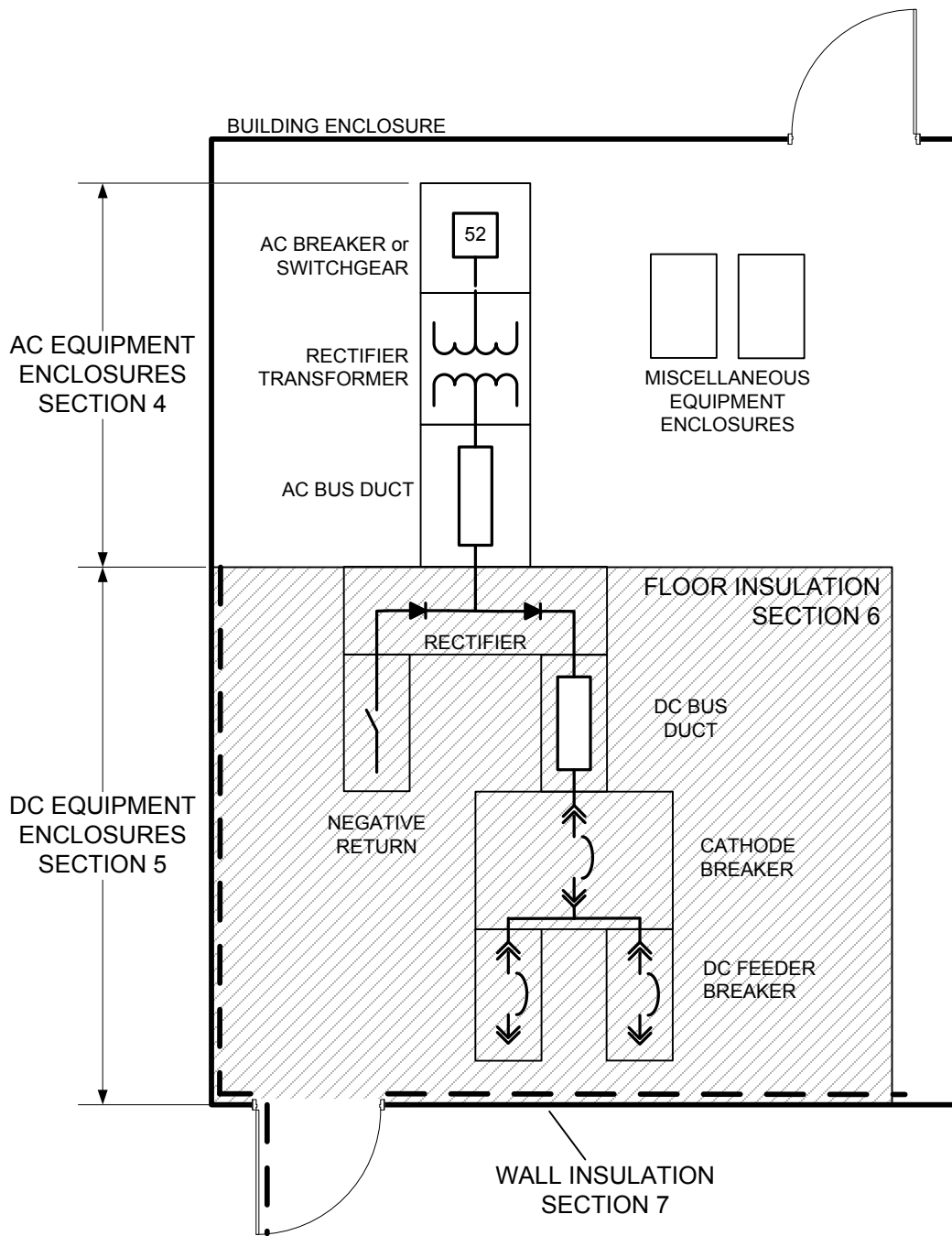


Figure a—Typical dc traction power distribution facility

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## 1. Overview

### 1.1 Background

Grounding of dc equipment enclosures in dc traction power substations include many features not found in ac power distribution systems. The practices and methods vary throughout the industry in the United States and other parts of the world. It is appropriate that the practices be documented with input from the designers, users, and manufacturers as grounding practices and methods are essential for the protection of equipment and proper operation of dc traction power substations.

### 1.2 Scope

This document includes recommended practices for grounding of dc equipment enclosures installed in dc traction power distribution facilities. DC distribution facilities may include, but are not limited to, traction power substations, tie breaker stations, gap breaker stations, section huts, cross-tie substations, circuit breaker houses, and equalizer houses.