

# IEEE Guide for Rail Transit Traction Power Systems Modeling

IEEE Vehicular Technology Society

Developed by the  
Rail Transportation Standards Committee

IEEE Std 1653.3™-2021  
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Developed by the

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

Approved 25 March 2021

**IEEE SA Standards Board**

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**Abstract:** A description of the data, techniques, and procedures typically used in modeling and analysis of traction power systems is provided in this guide.

**Keywords:** analysis, IEEE 1653.3™, modeling, traction power

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## Introduction

This introduction is not part of IEEE Std 1653.3–2021, IEEE Guide for Rail Transit Traction Power Systems Modeling.

During development and updating of various IEEE standards and recommended practices related to rail transit traction power, the Rail Transportation Standards Committee of the Vehicular Technology Society recognized a need for a published document to describe the process of traction power system modeling. This guide provides an introduction to the terminology and methodology of rail transit traction power systems modeling.

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# IEEE Guide for Rail Transit Traction Power Systems Modeling

## 1. Overview

### 1.1 Scope

This guide provides a description of the data, techniques, and procedures used in modeling and analysis of rail transit traction power systems.

### 1.2 Purpose

This guide provides methods and terminology for rail transit traction power system modeling.

#### 1.2.1 Applicability

This guide is intended for application by engineers involved in the design and specification of new traction power systems, as well as the technical evaluation of existing traction power systems in response to re-definition of operating parameters (e.g., increase in service).

#### 1.2.2 DC versus ac traction power systems

This guide is intended to apply primarily to dc traction power systems. However, many of the techniques can be applied to ac traction power system analysis.

### 1.3 Word usage

The word *shall* indicates mandatory requirements strictly to be followed in order to conform to the standard and from which no deviation is permitted (*shall* equals *is required to*).<sup>1,2</sup>

The word *should* indicates that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others; or that a certain course of action is preferred but not necessarily required (*should* equals *is recommended that*).

The word *may* is used to indicate a course of action permissible within the limits of the standard (*may* equals *is permitted to*).

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<sup>1</sup>The use of the word *must* is deprecated and cannot be used when stating mandatory requirements, *must* is used only to describe unavoidable situations.

<sup>2</sup>The use of *will* is deprecated and cannot be used when stating mandatory requirements, *will* is only used in statements of fact.