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IEEE Standard for Uncontrolled Traction Power Rectifiers for Substation Applications up to 1500 V DC Nominal Output

IEEE Vehicular Technology Society

Developed by the
Rail Transportation Standards Committee

IEEE Std 1653.2™-2020
(Revision of IEEE Std 1653.2-2009)

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Approved 30 January 2020

IEEE SA Standards Board

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Abstract: The design, manufacturing, and testing unique to the application of uncontrolled semiconductor power rectifiers for direct current (dc) supplied transportation substation applications up to 1500 V dc nominal output is covered in this standard. The standard is intended to address traction power substation rectifiers that are to be provided as part of a rectifier transformer unit or that are to be provided separately. Application information and extensive definitions of related technical terms are included.

Keywords: bridge rectifier, commutating reactance, double-way rectifier, extended heavy traction, extra heavy traction, heavy traction, IEEE 1653.2™, in-line test, interphase transformer, light traction, light transition load, power rectifier, rectifier transformer unit, service rating, traction power substation

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Introduction

This introduction is not part of IEEE Std 1653.2–2020, IEEE Standard for Uncontrolled Traction Power Rectifiers for Substation Applications up to 1500 V DC Nominal Output.

The intention of the working group that developed the first version of this standard was to provide an up-to-date replacement for the rescinded NEMA Standards Publication RI 9 and the rescinded ANSI C34.2. To make that task more manageable, the scope of that effort was limited to uncontrolled (diode type) traction power rectifiers supplying power to direct current (dc)-supplied transportation equipment. This first revision continues the same approach with primarily minor modifications except for changes to the standard service ratings, and a new Recommended Practice and Design Guide (Annex A).

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IEEE Standard for Uncontrolled Traction Power Rectifiers for Substation Applications up to 1500 V DC Nominal Output

1. Overview

1.1 Scope

This standard covers the design, manufacturing, and testing unique to the application of uncontrolled semiconductor power rectifiers for direct current (dc)-supplied transportation substation applications up to 1500 V dc nominal output.

1.2 Purpose

This standard defines the terminology, circuit arrangements, service ratings, performance characteristics, and test procedures unique to uncontrolled power rectifiers for transportation substation (traction) application. It also provides recommended design and application guidelines.

2. Normative references

The following referenced documents are indispensable for the application of this document (i.e., they must be understood and used, so each referenced document is cited in text and its relationship to this document is explained). For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments or corrigenda) applies.

ANSI C34.2, Practices and Requirements for Semiconductor Power Rectifiers (Rescinded).[1]

ANSI C84.1, Electric Power Systems and Equipment—Voltage Ratings (60 Hz).

JESD 282, Silicon Rectifier Diodes[2]

[1]ANSI publications are available from the Sales Department, American National Standards Institute, 11 West 42nd Street, 13th Floor, New York, NY 10036, USA (http://www.ansi.org/).
[2]JEDEC publications are available from Global Engineering Documents, 15 Inverness Way East, Englewood, Colorado 80112, USA (http://global.ihs.com/).

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