



IEC 62590-2-2

Edition 1.0 2026-06

INTERNATIONAL STANDARD

**Railway applications - Electronic power converters for fixed installations -
Part 2-2: DC Traction applications - Controlled converters**



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**Railway applications -
Electronic power converters for fixed installations -
Part 2-2: DC Traction applications - Controlled converters**

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IEC 62590-2-2 has been prepared by IEC technical committee 9: Electrical equipment and systems for railways. It is an International Standard.

This first edition partially cancels and replaces IEC 62589 and IEC 62590. This edition constitutes a technical revision.

The text of this International Standard is based on the following documents:

Draft	Report on voting
9/3312/FDIS	9/3328/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC 62590 series, published under the general title *Railway applications - Electronic power converters for fixed installations*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

INTRODUCTION

Semiconductor converters for traction power supply differ from other electronic power converters for industrial use due to special electrical service conditions and due to the large range of load variation and the particular characteristics of the load.

Controlled rectifiers supply a DC traction network from a three-phase power network using controllable semiconductor valves. Inverters allow the recuperation of power from a DC traction network into a three-phase power network. Reversible converters combine the functions of a rectifier and an inverter.

DC converters are self-commutated converters for connecting the DC traction network to other DC networks or storage devices.

1 Scope

This part of IEC 62590 describes functions and working principles, specifies requirements, interfaces, and test methods for controlled converters for DC electric traction power supply systems:

- AC/DC converters:
 - rectifiers,
 - inverters,
 - combinations.
- DC converters.

The purpose of the converters can be a power connection to other power networks or energy storages.

The common characteristic of this equipment is the possibility to influence the power flow in the DC electric traction power supply system. The converters can be:

- line-commutated;
- self-commutated.

This document applies to fixed installations of the following electric traction systems:

- railway networks,
- metropolitan transport networks including metros, tramways, trolleybuses and fully automated transport systems, magnetic levitated transport systems, and electric road systems.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60071-1, *Insulation co-ordination - Part 1: Definitions, principles and rules*

IEC 60529, *Degrees of protection provided by enclosures (IP code)*

IEC 62590-1:2025, *Railway applications - Electronic power converters for fixed installations - Part 1: General requirements*

IEC 62695, *Railway applications - Fixed installations - Traction transformers*

IEC 62236-5, *Railway applications - Electromagnetic compatibility - Part 5: Emission and immunity of fixed power supply installations and apparatus*

Bibliography

IEC 60050-551, *International Electrotechnical Vocabulary - Part 551: Power electronics*, available at <https://www.electropedia.org>

IEC 60050-811, *International Electrotechnical Vocabulary - Part 811: Electric traction*, available at <https://www.electropedia.org>

IEC 60076, *Power transformers*

IEC 60146-1-1:2024, *Semiconductor converters - General requirements and line commutated converter - Part 1-1: Specification of basic requirements*

IEC/TR 60146-1-2, *Semiconductor converters - General requirements and line commutated converters - Part 1-2: Application guide*

IEC 60146-2, *Semiconductor converters - Part 2: Self-commutated semiconductor converters including direct d.c. converters*

IEC 60617, *Graphical symbols for diagrams*, available at <http://std.iec.ch/iec60617>.

IEC 60850, *Railway applications - Supply voltages of traction systems*

IEC 62590-2-1:2025, *Railway applications - Fixed installations - Electronic Power Converters - Part 2-1: DC traction applications - Uncontrolled rectifiers*

IEC 62924, *Railway applications - Fixed installations - Stationary energy storage system for DC traction systems*
