IEC 62590-2-1

Edition 1.0 2025-12

INTERNATIONAL STANDARD

Railway applications - Electronic power converters for fixed installations - Part 2-1: DC traction applications - Uncontrolled rectifiers

ICS 45.060.01

ISBN 978-2-8327-0742-5

IEC 62590-2-1:2025-12(en)

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IEC Secretariat
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

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Railway applications - Electronic power converters for fixed installations - Part 2-1: DC traction applications - Uncontrolled rectifiers

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IEC 62590-2-1 has been prepared by IEC technical committee 9: Electrical equipment and systems for railways. It is an International Standard.

This first edition of IEC 62590-2-1, in conjunction with the other parts of the IEC 62590 series, cancels and replaces the first edition of IEC 62589 published in 2010 and the second edition of IEC 62590 published in 2019.

This document includes the following significant technical changes with respect to IEC 62589 and the former IEC 62590:

a) Reduction of the requirements for uncontrolled rectifiers only;
b) Interface model for the different systems connected;
c) Energy efficiency addressed.

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

Draft	Report on voting
9/3224/FDIS	9/3265/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 - Fixed installations - Electronic power converters*, 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– withdrawn, or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

Electronic power converters for traction power supply differ from other converters for industrial use due to special electrical service conditions and due to the large range of load variations and the peculiar characteristics of the load.

For these reasons IEC 60146-1-1 does not fully cover the requirements of railway applications and the decision was taken to have a specific standard for this use.

Uncontrolled rectifiers consist of a rectifier diode assembly and a transformer. Both fulfil common requirements. The transformer determines the voltage versus current characteristic.

Converter transformers for fixed installations of railway applications are covered by IEC 62695.

1 Scope

This part of IEC 62590 describes functions and working principles, specifies requirements, interfaces and test methods of uncontrolled rectifiers for DC electric traction power supply systems. Uncontrolled rectifiers connect a 3AC power network with a DC electric traction system with a unidirectional power flow using diode assemblies.

The coordination between the transformer and the rectifier diode assembly is included.

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

- railway networks;
- metropolitan transport networks including metros, tramways, trolleybuses and fully automated transport systems, magnetic levitated transport systems, 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 62695, *Railway applications - Fixed installations - Traction transformers*

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

Bibliography

IEC 60050-551, *International Electrotechnical Vocabulary (IEV) - Part 551: Power electronics*

IEC 60076 (all parts), *Power transformers*

IEC 60076-1, *Power transformers - Part 1: General*

IEC 60076-11, *Power transformers - Part 11: Dry-type transformers*

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

IEC TR 60146-1-2, *Semiconductor convertors - General requirements and line commutated convertors - Part 1-2: Application guidelines*

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

IEC 60909-0:2016*, Short-circuit currents in three-phase a.c. systems - Part 0: Calculation of currents*

IEC 61000-2-12, *Electromagnetic compatibility (EMC) - Part 2-12: Environment; Compatibility levels for low-frequency conducted disturbances and signalling in public medium-voltage power supply systems; Basic EMC Publication*

IEC 61992 (all parts), *Railway applications - Fixed installations - DC switchgear*

IEC 62236-5:2018, *Railway applications - Electromagnetic compatibility - Part 5: Emission and immunity of fixed power supply installations and apparatus*

CEN/TR 17833*, Railway applications - Guidance for the use of simulations - Guidance for the use of simulations to demonstrate compliance with technical and regulatory requirements and on the introduction and development of simulation requirements into standards*

IEEE Std C37.2, *Standard for Electrical Power System Device Function Numbers, Acronyms, and Contact Designations*

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