SLOVENSKI STANDARD
SIST EN IEC 62590-2-1:2026

01-april-2026

Železniške naprave - Elektronski močnostni pretvorniki za fiksne postroje - 2-1. del: Enosmerni sistemi vleke - Nekrmiljeni usmerniki

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

Bahnanwendungen - Leistungselektronische Stromrichter für Ortsfeste Anlagen - Teil 2-1: Anwendungen der Gleichstrom-Zugförderung - Diodengleichrichter

Applications ferroviaires - Convertisseurs électroniques de puissance pour installations fixes - Partie 2-1: Applications de traction en courant continu - Redresseurs à diodes

Ta slovenski standard je istoveten z: **EN IEC 62590-2-1:2026**

ICS:

29.200	Usmerniki. Pretvorniki. Stabilizirano električno napajanje	Rectifiers. Convertors. Stabilized power supply
45.040	Materiali in deli za železniško tehniko	Materials and components for railway engineering

SIST EN IEC 62590-2-1:2026 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 62590-2-1

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English Version

Railway applications - Electronic power converters for fixed installations - Part 2-1: DC traction applications - Uncontrolled rectifiers (IEC 62590-2-1:2025)

Applications ferroviaires - Convertisseurs électroniques de puissance pour installations fixes - Partie 2-1: Applications de traction en courant continu - Redresseurs non commandés (IEC 62590-2-1:2025)

Bahnanwendungen - Leistungselektronische Stromrichter für Ortsfeste Anlagen - Teil 2-1: Anwendungen der Gleichstrom-Zugförderung - Unkontrollierte Gleichrichter (IEC 62590-2-1:2025)

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Ref. No. EN IEC 62590-2-1:2026 E

European foreword

The text of document 9/3224/FDIS, future edition 1 of IEC 62590-2-1, prepared by TC 9 "Electrical equipment and systems for railways" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62590-2-1:2026.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2027-02-28
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2029-02-28

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In the official version, for Bibliography, the following notes have to be added for the standard indicated:

IEC 60076 (series)	NOTE	Approved as EN 60076 (series)
IEC 60076-1	NOTE	Approved as EN 60076-1
IEC 60076-11	NOTE	Approved as EN IEC 60076-11
IEC 60146-1-1	NOTE	Approved as EN IEC 60146-1-1
IEC 60529	NOTE	Approved as EN 60529
IEC 60909-0:2016	NOTE	Approved as EN 60909-0:2016 (not modified)
IEC 61000-2-12	NOTE	Approved as EN 61000-2-12

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cencenelec.eu.

Publication	Year	Title	EN/HD	Year
IEC 62695	-	Railway applications - Fixed installations - Traction transformers	EN 50329	-
			+A1	2010
IEC 62590-1	2025	Railway applications - Electronic power converters for fixed installations - Part 1: General requirements	EN IEC 62590-1	2025

IEC 62590-2-1

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INTERNATIONAL STANDARD

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

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

FOREWORD

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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*

3 Terms, definitions, symbols and abbreviated terms

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

– IEC Electropedia: available at https://www.electropedia.org/

– ISO Online browsing platform: available at https://www.iso.org/obp

3.1 Terms and definitions

3.1.1
semiconductor device
device whose essential characteristics are due to the flow of charge carriers within a semiconductor

Note 1 to entry: The definition includes devices whose essential characteristics are only in part due to the flow of charge carriers in a semiconductor but that are considered as semiconductor devices for the purpose of specification.

[SOURCE: IEC 60050-521:2002, 521-04-01]

3.1.2
rectifier
AC/DC converter for rectification

[SOURCE: IEC 60050-551:1998, 551-12-07, modified – The figure has been omitted.]

3.1.3
rectifier diode assembly
valve device assembly for rectification

Note 1 to entry: Often the term rectifier is used instead of rectifier diode assembly.

3.1.4
ideal no-load direct voltage
U_{di}
theoretical no-load mean direct voltage of a converter assuming no reduction by phase control, no voltage drop in the assemblies, and no voltage rise at small loads

[SOURCE: IEC 60050-551:1998, 551-17-15, modified – “mean” has been added. “AC/DC” has been removed. “no threshold voltages of electronic valve devices” has been replaced with “no voltage drop in the assemblies.]

3.1.5
real no-load direct voltage
U_{d00}
actual mean direct voltage at zero direct current

[SOURCE: IEC 60050-551:1998, 551-17-19]

3.1.6
ideal crest no-load voltage
U_{iM}
crest value of the voltage, appearing between the end terminals of an arm neglecting internal and external voltage surge and voltage drops in valves, at no load

3.1.7
inherent voltage drop
direct voltage drop related to the ideal no load voltage excluding the effect of the 3AC system impedance

3.1.8
transition current
mean direct current of a converter connection when the direct current(s) of the commutation group(s) become(s) intermittent when decreasing the current

[SOURCE: IEC 60050-551:1998, 551-17-20]

3.1.9
leakage reactance of the primary winding
X_P
<of a three-winding transformer> difference between the mean of the short-circuit reactance values measured between the primary winding and each secondary winding and one half of the short-circuit reactance measured between the two secondary windings

3.1.10
leakage reactance of each of the secondary windings
X_{S1}, X_{S2}
<of a three-winding transformer> sum of the half difference of the short-circuit reactance values measured between the primary winding and each secondary winding and one half of the short-circuit reactance measured between the two secondary windings

3.1.11
reactance ratio
coupling factor
K
<of a three-winding transformer> ratio between the leakage reactance of the primary winding and the sum of the leakage reactances of the primary winding and secondary winding

Note 1 to entry: In case of a traction transformer with two secondary windings, used for a twelve-pulse converter, the reactance ratio is designed to have the same no-load secondary voltages and the same impedance between the primary winding and each secondary winding, in order to obtain an even sharing of the current on both bridges in case the DC outputs are paralleled. Then $X_{S1} = X_{S2} = X_S$ and $K = X_p / (X_S + X_p)$.

3.1.12
interphase transformer
electromagnetic device enabling the operation in parallel of two or more phase displaced commutating groups through inductive coupling between the windings placed on the same core

[SOURCE: IEC 60050-551:1998, 551-14-16]

3.1.13
rated 3AC voltage
rated voltage of the rectifier on the 3AC power network side

3.1.14
rated 3AC voltage of a rectifier diode assembly
highest value of the transformer traction side no-load voltage that a rectifier diode assembly is designed for

3.1.15
rated current
rated load
I_{Nd}

<of a rectifier> value of a DC current that a rectifier is designed for

Note 1 to entry: All rated values of the components are derived from this value.

Note 2 to entry: A rectifier can have a rated continuous load and rated currents in conjunction with a duty class.

3.1.16
rated power
<of a rectifier> rated direct current multiplied by DC voltage at rated current

3.1.17
rated AC short-circuit current
<of a rectifier diode assembly> short-circuit withstand current on the AC side of a rectifier diode assembly for every 3AC connection

Note 1 to entry: For a twelve-pulse connection the rated short-circuit current is applicable for each individual six-pulse diode assembly.

Note 2 to entry: It is an initial short-circuit current according to IEC 60909-0.

3.1.18
rated DC short-circuit current
<of a rectifier diode assembly> short-circuit withstand current on the DC side of a rectifier diode assembly