

## **Railway applications - Fixed installations - Electronic power converters for substations**

Railway applications - Fixed installations - Electronic power converters for substations

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN 50328:2003 sisaldab Euroopa standardi EN 50328:2003 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 08.05.2003 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN 50328:2003 consists of the English text of the European standard EN 50328:2003.</p> <p>This document is endorsed on 08.05.2003 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
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<p><b>Käsitlusala:</b></p> <p>This European Standard specifies the requirements for the performance of all fixed installations electronic power converters, using controllable and/or non-controllable electronic valves, intended for traction power supply. The devices can be controlled by means of current, voltage or light. Non-bistable devices are assumed to be operated in the switched mode.</p>	<p><b>Scope:</b></p> <p>This European Standard specifies the requirements for the performance of all fixed installations electronic power converters, using controllable and/or non-controllable electronic valves, intended for traction power supply. The devices can be controlled by means of current, voltage or light. Non-bistable devices are assumed to be operated in the switched mode.</p>
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**ICS** 29.020, 29.200

**Võtmesõnad:** buildings, electric converters, power supplies, rack railways, railroad vehicles, specifications, testing conditions, testing voltages, traction network, tramway systems, transformers, trolley coaches, underground railways, urban railways, valve devices, valves, voltage

EUROPEAN STANDARD

**EN 50328**

NORME EUROPÉENNE

EUROPÄISCHE NORM

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ICS 29.200; 29.280

Partly supersedes EN 60146-1-1:1993

English version

**Railway applications -  
Fixed installations -  
Electronic power converters for substations**

Applications ferroviaires -  
Installations fixes -  
Convertisseurs électroniques  
de puissance pour sous-stations

Bahnanwendungen -  
Ortsfeste Anlagen -  
Leistungselektronische Stromrichter  
für Unterwerke

This European Standard was approved by CENELEC on 2002-09-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

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**CENELEC**

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

**Central Secretariat: rue de Stassart 35, B - 1050 Brussels**

## Foreword

This European Standard was prepared by SC 9XC, Electric supply and earthing systems for public transport equipment and ancillary apparatus (fixed installations) of Technical Committee CENELEC TC 9X, Electrical and electronic applications for railways.

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50328 on 2002-09-01.

This European Standard supersedes EN 60146-1-1:1993 for the specific products concerning railway applications as mentioned in the scope of this standard.

The following dates were fixed:

- latest date by which the EN has to be implemented  
at national level by publication of an identical  
national standard or by endorsement (dop) 2003-09-01
- latest date by which the national standards conflicting  
with the EN have to be withdrawn (dow) 2005-09-01

Annexes designated "informative" are given for information only.  
In this standard, Annexes A, B and C are informative.

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## **Introduction**

Semiconductor 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 variation and the peculiar characteristics of the load.

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

Converter transformers for fixed installations of railway applications are covered by EN 50329.

Harmonization of the rated values and tests of the whole converter group are covered by EN 50327.

## 1 General

### 1.1 Scope

This European Standard specifies the requirements for the performance of all fixed installations electronic power converters, using controllable and/or non-controllable electronic valves, intended for traction power supply.

The devices can be controlled by means of current, voltage or light. Non-bistable devices are assumed to be operated in the switched mode.

This European Standard applies to fixed installations of following electric traction systems:

- railways,
- guided mass transport systems such as: tramways, light rail systems, elevated and underground railways, mountain railways, trolleybusses.

This European Standard does not apply to

- cranes, transportable platforms and similar transportation equipment on rails,
- suspended cable cars,
- funicular railways.

This European Standard applies to diode rectifiers, controlled rectifiers, inverters and frequency converters.

The equipment covered in this European Standard is the converter itself.

### 1.2 Normative references

This European Standard incorporates by dated or undated reference provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed below. For dated references, subsequent amendments or revisions of any of these publications apply to this European Standard only when incorporated into it by amendment or revision. For undated references, the latest edition of the publication referred to applies (including amendments).

EN 50121 Series	2000	Railway applications - Electromagnetic compatibility
EN 50123-7-1	2003	Railway applications - Fixed installations - D.C. switchgear Part 7-1: Measurement, control and protection devices for specific use in d.c. traction systems - Application guide
EN 50124-1	2001	Railway applications - Insulation coordination Part 1: Basic requirements - Clearances and creepage distances for all electrical and electronic equipment
EN 50163	1995	Railway applications - Supply voltages of traction systems
EN 50327	2003	Railway applications - Fixed installations - Harmonisation of the rated values for converter groups and tests on converter groups
EN 50329	2003	Railway applications - Fixed installations - Traction transformers
EN 60529	1991	Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989)
EN 60721	Series	Classification of environmental conditions (IEC 60721 series)



EN 61000-2-4	1994	Electromagnetic compatibility (EMC) - Part 2-4: Environment - Compatibility levels in industrial plants for low-frequency conducted disturbances (IEC 61000-2-4:1994 + corr. August 1994)
IEC 60050-551	1998	International Electrotechnical Vocabulary Chapter 551: Power Electronics
IEC 60050-811	1991	International Electrotechnical Vocabulary Chapter 811: Electric traction
IEC 60146-1-2	1991	Semiconductor converters - General requirements and line commutated converters - Part 1-2: Application guide
IEC 61000-2-12 <sup>1)</sup>		Electromagnetic compatibility (EMC) - Part 2-12: Environment - Compatibility levels for low-frequency conducted disturbances and signalling in public medium voltage power supply systems

### 1.3 Classification of traction supply power converters and valve

#### 1.3.1 Types of traction supply power converters

- A) a.c. to d.c. conversion:
  - 1) diode rectifier;
  - 2) controlled rectifier.
- B) d.c. to a.c. conversion:
  - 1) inverter.
- C) a.c. to a.c. conversion:
  - 1) direct frequency converter;
  - 2) d.c. link frequency converter:
    - i) supply side;
    - ii) traction side.

#### 1.3.2 Purpose of conversion

A converter changes or controls one or more characteristics such as

- 1) frequency (including zero frequency),
- 2) voltage,
- 3) number of phases,
- 4) flow of reactive power,
- 5) quality of load power.

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<sup>1)</sup> To be published.