



DPC: 20/30403669 DC

BSI Group Headquarters

389 Chiswick High Road London W4 4AL

Tel: +44 (0)20 8996 9000

Fax: +44 (0)20 8996 7400

www.bsigroup.com

Date: 10 April 2020

Origin: International

Latest date for receipt of comments: 03 June 2020

Project No. 2019/03005

Responsible committee: GEL/9 Railway Electrotechnical Applications

Interested committees:

Title: Draft BS IEC 62590-1 Railway applications – Fixed installations – Electronic Power Converters. Part 1: General requirements.

Please notify the secretary if you are aware of any keywords that might assist in classifying or identifying the standard or if the content of this standard

- i) has any issues related to 3rd party IPR, patent or copyright
- ii) affects other national standard(s)
- iii) requires additional national guidance or information

WARNING: THIS IS A DRAFT AND MUST NOT BE REGARDED OR USED AS A BRITISH STANDARD. THIS DRAFT IS NOT CURRENT BEYOND 03 June 2020

This draft is issued to allow comments from interested parties; all comments will be given consideration prior to publication. No acknowledgement will normally be sent. **See overleaf for information on the submission of comments.**

No copying is allowed, in any form, without prior written permission from BSI except as permitted under the Copyright, Designs and Patent Act 1988 or for circulation within a nominating organization for briefing purposes. Electronic circulation is limited to dissemination by e-mail within such an organization by committee members.

Further copies of this draft may be purchased from BSI Shop <http://shop.bsigroup.com> or from BSI Customer Services, Tel: +44(0) 20 8996 9001 or email cservices@bsigroup.com. British, International and foreign standards are also available from BSI Customer Services.

Information on the co-operating organizations represented on the committees referenced above may be obtained from <https://standardsdevelopment.bsigroup.com/>.

Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

Submission of Comments

- **Annotated drafts are not acceptable and will be rejected.**
- All comments should be submitted online at <https://standardsdevelopment.bsigroup.com/>. You will need to register in order to comment.

Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
------------------	------------------------

1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/Figure/ Table/Note	Type of comment	Commend (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	

PROJECT NUMBER: IEC 62590-1 ED1	
DATE OF CIRCULATION: 2020-04-10	CLOSING DATE FOR COMMENTS: 2020-07-03
SUPERSEDES DOCUMENTS: 9/2518/NP, 9/2551/RVN	

IEC TC 9 : ELECTRICAL EQUIPMENT AND SYSTEMS FOR RAILWAYS	
SECRETARIAT: France	SECRETARY: Mr Denis MIGLIANICO
OF INTEREST TO THE FOLLOWING COMMITTEES:	PROPOSED HORIZONTAL STANDARD: ☐ Other TC/SCs are requested to indicate their interest, if any, in this CD to the secretary.
FUNCTIONS CONCERNED: ☐ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☐ SAFETY	

This document is still under study and subject to change. It should not be used for reference purposes.

Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

TITLE: Railway applications – Fixed installations – Electronic Power Converters – Part 1: General requirements
--

NOTE FROM TC/SC OFFICERS:

CONTENTS

1	Scope.....	7
2	Normative references	7
3	Terms and definitions	7
3.1	Electrical Circuits	8
3.2	Semiconductor devices and combinations	10
3.3	Rated values	12
3.4	Electromagnetic compatibility and harmonic distortion	13
3.5	Cooling.....	14
4	Symbols and abbreviated terms.....	14
4.1	Principal letter symbols	14
4.2	Abbreviated Terms	14
5	System Configurations.....	14
5.1	General	14
5.1.1	Basic Configurations.....	15
5.1.2	Converter Types	15
5.2	Components of an electronic power converter group:	16
5.3	Types of converters.....	16
5.3.1	3AC to DC and vice versa.....	16
5.3.2	DC converters	16
5.3.3	3AC to 1AC	17
5.3.4	1AC to 1AC	17
5.3.5	1AC	17
5.4	Auxiliaries	17
5.5	Insulation coordination	17
5.5.1	Electric traction system	17
5.5.2	High voltage power system.....	18
5.5.3	Special power system.....	18
6	Design and Installation	18
6.1	General	18
6.2	Climatic conditions	18
6.2.1	General	18
6.2.2	Storage	18
6.2.3	Transportation and Handling.....	19
6.2.4	Operation including off-load periods	19
6.2.5	Dust and solid particles content.....	19
6.2.6	Vibrations	19
6.3	Voltage conditions	19
6.4	Frequency conditions	19
6.5	Harmonics in connected systems	19
6.6	Load requirements	20
6.6.1	General	20
6.6.2	Duty class	20
6.6.3	Load Cycles	21
6.7	Short circuit requirements	21

6.8	Cooling.....	21
6.8.1	Letter symbols to be used.....	21
6.8.2	Arrangement of letter symbols	21
6.9	Mechanical conditions	22
6.9.1	General	22
6.9.2	Earthing.....	22
6.9.3	Degree of protection	23
6.10	Failure modes	23
7	Tests.....	23
7.1	General	23
7.2	Type test	24
7.3	Routine test.....	24
7.4	Site test.....	24
7.5	Optional test.....	24
8	Marking	24
8.1	Rating plate.....	24
8.2	Main circuit terminals	24
Annex A	(informative)	25
Figure 1	– Basic configuration.....	15
Figure 2	– 3AC to DC converters	16
Figure 3	– DC converters	16
Figure 4	– Static frequency converter	17
Table 1	- Converter Types	15
Table 2	– Minimum insulation level	18
Table 3	– Standardized duty classes.....	20
Table 4	– Letter symbols for cooling mediums and heat transfer agents.....	21
Table 5	– Letter symbols for methods of circulation	21
Table 6	– Semiconductor device failure conditions	23

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**RAILWAY APPLICATIONS –
FIXED INSTALLATIONS –
ELECTRONIC POWER CONVERTERS
Part 1 GENERAL REQUIREMENTS**

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 62590 has been prepared by IEC technical committee 9: Electrical equipment and systems for railways.

The text of this standard is based on the following documents:

FDIS	Report on voting
9/XXXX/FDIS	9/XXXX/RVD

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

This document in conjunction with the other parts of IEC 62590 will replace the IEC 62589 and the former IEC 62590.

- a) Split into common requirements and special requirements for different converters
- b) Interface Model for the different Systems connected
- c) Split into circuits with their requirements like insulation coordination
- d) Energy efficiency addressed
- e) More to be added

1 INTRODUCTION

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

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

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

8 This standard defines common vocabulary and requirements. Other parts will cover different
9 applications.

- | | | |
|----|-----------|-------------------------------|
| 10 | 62590-1 | General requirements |
| 11 | 62590-2-1 | Diode rectifiers |
| 12 | 62590-2-2 | Controlled AC DC converters |
| 13 | 62590-3-1 | Electronic Power Compensators |
| 14 | 62590-3-2 | Frequency converters |

15

RAILWAY APPLICATIONS – FIXED INSTALLATIONS – ELECTRONIC POWER CONVERTERS Part 1 GENERAL REQUIREMENTS

1 Scope

This International Standard specifies the common requirements and definitions for all power converter applications in fixed installations for power supply of railway systems.

This 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, trolleybuses, electric trucks.

This Standard does not apply to

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

This Standard applies to AC/DC converters, DC converters and AC converters. Converters for improvement of power quality and for energy saving are included.

Converters connected to electric traction system feeding 3AC, 1AC or DC system for auxiliary purpose are not scope of this standard but some aspects may be used.

2 Normative references

The following referenced documents are indispensable for the application 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 60146 (all parts), *Semiconductor convertors*

IEC/TR 60146-1-2: Edition 5.0 2019, *Semiconductor convertors – General requirements and line commutated convertors – Part 1-2: Application guide*

3 Terms and definitions

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

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

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1 Electrical Circuits

3.1.1

electric traction system

railway electric distribution network used to provide energy for rolling stock