

Railway applications — Electromagnetic compatibility —

Part 5: Fixed power supply installations

ICS 29.020; 45.020

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Committees responsible for this Draft for Development

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- British Cable Makers Confederation
- Confederation of Passenger Transport UK
- Docklands Light Railway
- Federation of the Electronics Industry
- Health and Safety Executive
- London Underground Ltd.
- Power Supply Manufacturers' Association — PSMA (BEAMA Ltd.)
- Railtrack
- Railway Industry Association

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National foreword

This Draft for Development has been prepared by Technical Committee PEL/9 and is the English language version of European Prestandard ENV 50121-5:1996 *Railway applications — Electromagnetic compatibility — Part 5: Fixed power supply installations*, published by the European Committee for Electrotechnical Standardization (CENELEC).

Cross-references

Publication referred to	Corresponding British Standard
	BS EN 50081 <i>Electromagnetic compatibility. Generic emission standard</i>
EN 50081-1:1992	BS EN 50081-1:1992 <i>Residual, commercial and light industry</i>
EN 50081-2:1993	BS EN 50081-2:1994 <i>Industrial environment</i>
	BS EN 50082 <i>Electromagnetic compatibility. Generic immunity standard</i>
EN 50082-2:1995	BS EN 50082-2:1995 <i>Industrial environment</i>
EN 55022:1994	BS EN 55022:1995 <i>Limits and methods of measurement of radio disturbance characteristics of information technology equipment</i>
	DD ENV 50121 <i>Railway applications — Electromagnetic compatibility</i>
ENV 50121-1:1996	DD ENV 50121-1:1996 <i>General</i>
ENV 50121-4:1996	DD ENV 50121-4:1996 <i>Emission and immunity of the signalling and telecommunications apparatus</i>
IEC 50(161):1990	BS 4727 <i>Glossary of electrotechnical, power telecommunication, electronics, lighting and colour terms</i>
	Part 1 <i>Terms common to power, telecommunications and electronics</i>
	Group 09:1991 <i>Electromagnetic compatibility</i>

This Document is being issued in the Draft for Development series of publications and is of a provisional nature. It should be applied on this provisional basis so that information and experience of its practical application may be obtained.

Comments arising from the use of this Draft for Development are requested so that UK experience can be reported to the European organization responsible for its conversion to a European Standard. A review of this publication will be initiated 2 years after its publication by the European organization so that a decision can be taken on its status at the end of its three-year life. The commencement of the review period will be notified by an announcement in *BSI News*.

According to the replies received by the end of the review period, the responsible BSI Committee will decide whether to support the conversion into a European Standard, to extend the life of the prestandard or to withdraw it. Comments should be sent in writing to the Secretary of BSI Technical Committee PEL/9 at 389 Chiswick High Road, London W4 4AL giving the document reference and clause number and proposing, where possible, an appropriate revision of the text.

This publication is not to be regarded as a British Standard.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the ENV title page, pages 2 to 20, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

ICS 29.020; 29.280; 45.020

Descriptors: Railway fixed equipment, electric power supply, electric equipment, electronic components, radio disturbances, electromagnetic compatibility, tests, limits

English version

Railway applications — Electromagnetic compatibility Part 5: Fixed power supply installations

Applications ferroviaires —
Compatibilité électromagnétique
Partie 5: Installations fixes d'énergie de
traction

Bahnanwendungen —
Elektromagnetische Verträglichkeit
Teil 5: Ortsfeste
Bahn-Energieversorgungsanlagen

This European Prestandard (ENV) was approved by CENELEC on 1995-12-11 as a prospective standard for provisional application. The period of validity of this ENV is limited initially to three years. After two years the members of CENELEC will be requested to submit their comments, particularly on the question whether the ENV can be converted into a European Standard (EN).

CENELEC members are required to announce the existence of this ENV in the same way as for an EN and to make the ENV available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the ENV) until the final decision about the possible conversion of the ENV into an EN is reached.

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CENELEC

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

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Foreword

This European Prestandard was prepared by Technical Committee CENELEC TC 9X, Electrical and electronic applications for railways, in accordance with the decision taken by CLC/TC 9X at its 11th meeting on 1995-05-12/13.

The text of the draft was submitted to the formal vote and was approved by CENELEC as ENV 50121-5 on 1995-12-11.

The following date was fixed:

- latest date by which the existence of the ENV has to be announced at national level (doa) 1996-01-15

This European Prestandard is to be used in conjunction with one or several specific European Prestandards listed in the scope.

Annexes designated “normative” are part of the body of this Prestandard. Annexes designated “informative” are given only for information. In this Prestandard, Annex A and Annex B are informative and Annex C is normative.

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Introduction

This European Prestandard has been prepared to provide one means of complying with the requirements of the Electromagnetic Compatibility (EMC) Directive.

The requirements of this Prestandard have been specified so as to ensure a level of electromagnetic emission which will cause minimal disturbance to other equipment. The levels, however, do not cover the following cases:

- a) where the probability of an occurrence likely to produce emissions in excess of those which would normally be experienced is extremely low
- b) where highly susceptible apparatus will be used in close proximity of the equipment covered by this European Prestandard, in which case further additional precautionary measures may have to be taken.

The emission limits given are on the basis that the equipment of the product family range is installed in outdoor dedicated areas and is not connected to a Low Voltage system.

1 Scope

1.1 General

To establish European Standards for emission and immunity aspects of apparatus used in fixed railway power installations, and for the systems and installations themselves.

This European Prestandard applies to emission and immunity aspects of EMC for electrical and electronic apparatus and components intended for use in railway fixed installations associated with power supply. This includes the power feed to the apparatus, the apparatus itself with its protective control circuits, conductors at railway system voltage but not carrying current (e.g. overhead contact lines), trackside items such as feeder lines, switching stations, power autotransformers, booster transformers, substation power switchgear and power switchgear to other longitudinal and local supplies.

Filters are not included in this European Prestandard since each site has special requirements. Filters would normally have separate enclosures with separate rules for access. If electromagnetic limits are required, these will appear in the specification.

Tests for ports connected to cables associated with communication links used for system control and data acquisition (such as SCADA systems), are taken from ENV 50121-4.

The frequency range covered is from d.c. to 400 GHz. At present testing is defined only up to 1 000 MHz. Not treated in this Part are coupling phenomena at frequencies below 9 kHz to other parallel conductors from both Power Supply Lines inside the railway boundary, and from conductors at railway system voltage.

National variations to this European Prestandard may exist provided they fulfil all the following conditions:

- they shall only apply to minor routes or well-localised areas;
- they are not likely to give advantage to local manufacturers at the time of European tenders;
- they do not involve European traffic.

In that case, they are considered de facto as special national conditions.

The objective of this European Prestandard is to define limits and test methods for electromagnetic emissions and immunity requirements in relation to continuous and transient radiated disturbances.

These limits and tests represent essential EMC requirements. Limits are set for:

- a) the emission from the supply system at the substation and at items which are along and beside the track for the purpose of supplying, controlling or regulating the power supply.

Emission levels have been selected sufficiently low to ensure good operation of reasonably immune equipment in the vicinity of the railway and sufficiently high to be met by economically designed apparatus and components under normal service conditions.

- b) the immunity levels which need to be met by apparatus operating as part of the power supply system.

By their nature, the high power elements of fixed installations usually are immune against electromagnetic disturbances. Thus, immunity requirements have been set only for electronic apparatus in substations, control cubicles etc.

The levels do not cover extreme cases which may occur with an extremely low probability in any given location.

The immunity levels are more severe than the Industrial Generic Standard because the environment has a greater concentration of power than most industrial sites and there are a relatively high number of disconnections due to short-circuits of the railway conductor line.

1.2 Apparatus within scope

Limits related to the EMC are given between items of apparatus which are situated

- a) within the boundary of a substation which delivers electric power to a railway;
- b) beside the track for the purpose of controlling or regulating the railway power supply, including power factor correction and filtering;
- c) along the track for the purpose of delivering electrical power to the railway other than by means of the conductors used for contact current collection, and associated return conductors. Included are high voltage feeder systems within the boundary of the railway which supply substations at which the voltage is reduced to the railway system voltage;
- d) beside the track for controlling or regulating electric power supplies for ancillary railway uses. This category includes power supplies to marshalling yards, maintenance depots and stations.

2 Normative references

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

EN 50081-1, *Electromagnetic compatibility — Generic emission standard — Part 1: Residential, commercial and light industry.*

EN 50081-2:1994, *Part 2: Industrial environment.*

prEN 50082-1:1995, *Electromagnetic compatibility — Generic immunity standard — Part 1: Residential, commercial and light industry.*

EN 50082-2, *Part 2: Industrial environment.*

EN 55022, *Limits and methods of measurement of radio interference characteristics of Information technology equipment (CISPR 22).*

ENV 50121-1, *Railway applications — Electromagnetic compatibility — Part 1: General.*

ENV 50121-4, *Railway applications — Electromagnetic compatibility — Part 4: Emission and immunity of the signalling and telecommunications apparatus.*

CISPR 16-1, *Specification for radio disturbance and immunity measuring apparatus and methods — Part 1: Radio disturbance and immunity measuring apparatus.*

IEC 50(161), *International Electrotechnical Vocabulary — Chapter 161: Electromagnetic compatibility.*

3 Definitions

For the purposes of this European Prestandard the definitions related to EMC and to relevant phenomena may be found in the EEC EMC Directive 89/336/EEC, Chapter 161 of the IEV (IEC 50) and in IEC and CISPR Publications. The definitions stated in the EMC Directive take precedence.

3.1 apparatus

an electric or electronic product with an intrinsic function intended for implementation into a fixed railway installation, which can be placed on the market as a single unit

3.2 environment

the surrounding objects or region which may influence the behaviour of the system and or may be influenced by the system

3.3 external interface

the boundary where a system interacts with any other or where a system interacts with its environment