

## Railtoepassingen. Elektromagnetische compatibiliteit. Deel 5: Voedingsinstallaties voor vaste opstellingen

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

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## Nederlands voorwoord

Voor de in deze norm vermelde andere normen bestaan in Nederland de volgende equivalenten:

<u>Vermelde norm:</u>	<u>Nederlandse norm:</u>	<u>Titel:</u>
EN 50081-1	NEN-EN 50081-1	Elektromagnetische compatibiliteit. Algemene emissie-norm. Deel 1: Huishoudelijke, handels- en licht-industriële omgeving
EN 50081-2:1994	NEN-EN 50081-2:1994	Elektromagnetische compatibiliteit. Algemene emissie-norm. Deel 2: Industriële omgeving
prEN 50082-1:1995	ontw.NEN-EN 50082-1:1995	Elektromagnetische compatibiliteit. Algemene immuni-teitsnorm. Deel 1: Huishoudelijke, handels- en licht-in-dustriële omgeving
EN 50082-2	NEN-EN 50082-2	Elektromagnetische compatibiliteit. Algemene immuni-teitsnorm. Deel 2: Industriële omgeving
EN 50022	NEN-EN 55022	Grenswaarden en meetmethoden van radiostoringsken-merken van gegevensverwerkende apparatuur
ENV 50121-1	NVN-ENV 50121-1	Railtoepassingen. Elektromagnetische compatibiliteit. Deel 1: Algemeen
ENV 50121-4	NVN-ENV 50121-4	Railtoepassingen. Elektromagnetische compatibiliteit. Deel 4: Emissie en immuniteit van signalerings- en telecommunicatie-apparatuur
CISPR 16-1 IEC 50(161)	NEN 10050(161)	- Internationale elektrotechnische woordenlijst. Hoofdstuk 161: Elektromagnetische compatibiliteit

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

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European Committee for Electrotechnical Standardization  
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Europäisches Komitee für Elektrotechnische Normung

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

## Foreword

This European Prestandard was prepared by Technical Committee CENELEC TC9X, Electrical and electronic applications for railways, in accordance with the decision taken by CLC/TC9X 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 is informative and annexes B and C are normative.

Preview

**Contents**

		2
Foreword		4
Introduction		5
1	Scope	6
2	Normative references	7
3	Definitions	7
4	Performance criteria	7
5	Immunity tests and limits	8
6	Emission tests and limits	10
7	Fixed power supplies on railway property which are not used for railway traction purposes	10
8	Underground substations	12
Tables		18
Annex A (informative)	Values of emission	21
Annex B (informative)	Test for immunity against induced voltage	22
Annex C (normative)	Method of measurement of emission	

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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.

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## 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 IEC (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.

**3.4 railway substation:** An installation the main function of which is to supply a contact line system at which the voltage of a primary supply system, and in some cases the frequency, is transformed to the voltage and frequency of the contact line.

**3.5 railway feeder lines:** Conductors running parallel to, and within the boundary of, the railway which supply power to only the railway but are not energised at railway system voltage.

### 4 Performance criteria

The variety and diversity of the apparatus within the scope of this document makes it difficult to define precise criteria for the evaluation of the immunity test results. Three general levels of performance are therefore used, as defined in prEN 50082-1:1995. The texts of these criteria are given in ENV 50121-1.

### 5 Immunity tests and limits

The immunity test requirements for apparatus covered by this European Prestandard are given on a port by port basis in tables 1 to 6.

Tests shall be conducted in a well-defined and reproducible manner. The tests shall be carried out as single tests in sequence. The sequence of testing is optional.

The description of the tests, the test generator, the test methods, and the test set-up are given in the basic standards which are referred to in tables 1 to 6 except test 3.4 which is to be applied to ports for process measurement and control where the cables leave the substation boundary. This uses the Common Mode Voltage test as specified in ENV 50121-4, and annex B shows one form of circuit which may be used for this test.

This test is required for ports which are connected to conductors which run parallel to the railway installation, because power frequency voltages are induced into these conductors.

The contents of the basic standards are not repeated here, however modifications or additional information needed for the practical application of the tests are given in this European Prestandard.

It is recognised that some relevant apparatus cannot be tested by this method due to considerations such as size. For this type of apparatus, tests shall be defined that reproduce an equivalent noise input to the apparatus

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