

Railway applications — Fixed installations —

Part 2: Protective provisions against the effects of stray currents caused by d.c. traction systems

The European Standard EN 50122-2:1998, with the incorporation of amendment A1:2002, has the status of a British Standard

ICS 29.120.50; 29.280

National foreword

This British Standard is the English language version of EN 50122-2:1998, including Corrigendum August 2001 and amendment A1:2002.

The UK participation in its preparation was entrusted by Technical Committee GEL/9, Railway electrotechnical applications, to Subcommittee GEL/9/3, Fixed equipment, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

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Summary of pages

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English version

Railway applications — Fixed installations — Part 2: Protective provisions against the effects of stray currents caused by d.c. traction systems

(includes amendment A1:2002)

Applications ferroviaires —
Installations fixes —
Partie 2: Mesures de protection contre les effets
des courants vagabonds issus de la traction
électrique à courant continu
(inclut l'amendement A1:2002)

Bahnanwendungen — Ortsfeste Anlagen —
Teil 2: Schutzmaßnahmen gegen die
Auswirkungen von Streuströmen verursacht
durch Gleichstrombahnen
(enthält Änderung A1:2002)

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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 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 50122-2 on 1998-04-01.

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) 1999-03-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1999-03-01

Foreword to amendment A1

This amendment to the 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.

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1 Scope

This standard specifies requirements for protective provisions against the effects of stray currents which result from the operation of d.c. traction systems.

As experience for several decades has not shown evident corrosion effects from a.c. traction systems and actual investigations are not completed, this standard only deals with stray currents flowing from a d.c. traction system.

This standard applies to all metallic fixed installations which form part of the traction system, and also to any other metallic components located in any position in the earth, which may carry stray currents resulting from the operation of the railway system.

This standard applies to all new electrification of a d.c. railway system. The principles may also be applied to existing electrified systems where it is necessary to consider the effects of stray currents.

The range of application includes:

- railways;
- guided mass transport systems such as:
tramways, elevated and underground railways, mountain railways, trolleybus systems and magnetic levitated systems;
- material transportation systems.

This standard does not apply to:

- a) mine traction systems in underground mines;
- b) cranes, transportable platforms and similar transportation equipment on rails, temporary structures (e.g. exhibition structures) in so far as these are not supplied directly from the contact line system and are not endangered by the traction power supply system;
- c) suspended cable cars;
- d) funicular railways;
- e) maintenance work.

2 Normative references

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

EN 12954¹⁾, *Cathodic protections of buried or immersed metallic structures — General principles*.

EN 50122-1, *Railway applications — Fixed installations — Part 1: Protective provisions relating to electrical safety and earthing*.

IEC 60050(826), *International Electrotechnical Vocabulary — Chapter 826: Electrical installations of buildings*.

3 Definitions

For the purposes of this standard, the following definitions apply.

3.1

stray current

a current which follows paths other than the intended paths

3.2

stray current zone

zone in which currents may be exchanged between a d.c. traction system and metallic structures or earth

NOTE Such a stray current zone may extend over a distance of a few kilometres.

¹⁾ In preparation.

3.3

corrosion

the chemical or electrochemical reaction of a metal with its environment, resulting in its progressive degradation or destruction

NOTE This standard deals with corrosion by electrochemical reaction.

3.4

cathodic protection

a method to protect a metal from corrosive attack by causing a direct current to flow from its electrolytic environment into the entire metal surface

3.4.1

polarized electric drainage; polarized drainage

a form of drainage of stray currents in which the connection between a protected structure and a traction system includes a unidirectional device or devices such as rectifier or a relay and contactor

3.4.2

forced drainage

a form of drainage in which the connection between a protected structure and a traction system includes an independent source of direct current

3.4.3

impressed current installation

a rectifier or other d.c. source supplying direct current to a protected structure in order to achieve the necessary protection potential

3.5

protection potential

the more negative level to which the potential of a metallic structure, with respect to a specified reference electrode in an electrolytic environment, has to be depressed in order to effect cathodic protection of the structure

3.6

return circuit

all conductors which form the intended path for the traction return current and the current under fault conditions

NOTE The conductors may be for example:

- running rails;
- return conductor rails;
- return conductors;
- return cables.

3.7

track return system

a system in which the running rails form a part of the return circuit

3.8

return conductor

conductor, which parallels the track and which is connected to the running rails at periodic intervals

3.9

return conductor rail

a conductor rail used instead of the running rails for the traction return current

3.10

return cable

an insulated return conductor forming part of the return circuit and connecting the rest of the return circuit to the substation

3.11**return cable busbar**

a busbar in substations at which return cables terminate

3.12**d.c. (traction) substation**

an installation the main function of which is to supply a contact line system, at which the voltage of a primary supply system, is converted to the voltage of the contact line

3.13**traction return current**

the sum of the traction currents returning to the supply source

NOTE The supply source may be a regenerating vehicle.

3.14**rail joint bond**

a conductor ensuring the electrical continuity of a rail at a joint

3.15**insulated rail joint**

a mechanical rail joint which longitudinally separates the rail electrically

3.16**rail-to-rail cross bond**

an electrical bond that interconnects the running rails of the same track

3.17**track-to-track cross bond**

an electrical bond that interconnects tracks

3.18**earth**

the conductive mass of the earth, whose electric potential at any point is conventionally taken as zero [IEC 50, 826-04-01]

3.19**earth electrode**

a conductive part or a group of conductive parts in intimate contact with and providing an electrical connection with earth [IEC 50, 826-04-02]

3.20**tunnel earth**

the electrical interconnection of the reinforcing rods of reinforced concrete tunnels, and in the case of other modes of construction, the conductive interconnection of the metallic parts of the tunnel

3.21**structure earth**

the electrical interconnection of the reinforcing rods of structures, and in the case of other modes of construction, the conductive interconnection of the metallic parts. Examples are reinforced railway structures such as bridges, viaducts and reinforced trackbed

3.22**rail to earth resistance**

the electrical resistance between the running rails and the earth

NOTE 1 For d.c. traction systems in tunnels the measurement is made between the running rails and tunnel earth.

NOTE 2 In this standard the rail to earth resistance refers to a single-track installation, unless otherwise explicitly specified.

3.23**conductance per unit length**

the reciprocal value of the rail to earth resistance per unit of length

NOTE In this standard the conductance per unit length refers to a single-track installation, unless otherwise explicitly specified.