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ILNAS-EN 50388:2012

Railway Applications - Power supply and rolling stock - Technical criteria for the coordination between power supply (substation) and rolling stock to

Applications ferroviaires - Alimentation électrique et matériel roulant - Critères techniques pour la coordination entre le système d'alimentation (sous-station) et

Bahnanwendungen - Bahnenergieversorgung und Fahrzeuge - Technische Kriterien für die Koordination zwischen Anlagen der

03/2012

National Foreword

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EUROPEAN STANDARD **EN 50388**

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English version

Railway Applications - Power supply and rolling stock - Technical criteria for the coordination between power supply (substation) and rolling stock to achieve interoperability

Applications ferroviaires - Alimentation électrique et matériel roulant - Critères techniques pour la coordination entre le système d'alimentation (sous-station) et le matériel roulant pour réaliser l'interopérabilité

Bahnanwendungen - Bahnenergieversorgung und Fahrzeuge - Technische Kriterien für die Koordination zwischen Anlagen der Bahnenergieversorgung und Fahrzeugen zum Erreichen der Interoperabilität

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CENELEC

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

Management Centre: Avenue Marnix 17, B - 1000 Brussels

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Foreword

This document (EN 50388:2012) has been prepared by CLC/SC 9XC, "Electric supply and earthing systems for public transport equipment and ancillary apparatus (Fixed installations)", of Technical Committee CLC/TC 9X, "Electrical and electronic applications for railways". It also concerns the expertise of CLC/SC 9XB, "Electromechanical material on board of rolling stock".

The following dates are fixed:

• latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2013-02-13
• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	2015-02-13

This document supersedes EN 50388:2005 + corrigendum May 2010.

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This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For the relationship with EU Directive 2008/57/EC, see informative Annex ZZ, which is an integral part of this document.

For TSI lines, modification and amendments shall be made within a procedure which is related to the legal status of the HS and CR TSIs.

1 Scope

This European Standard establishes requirements for the compatibility of rolling stock with infrastructure particularly in relation to:

- co-ordination of protection principles between power supply and traction units, especially fault discrimination for short-circuits;
- co-ordination of installed power on the line and the power demand of trains;
- co-ordination of traction unit regenerative braking and power supply receptivity;
- co-ordination of harmonic behaviour.

This European Standard deals with the definition and quality requirements of the power supply at the interface between traction units and fixed installations.

This European Standard specifies the interface between rolling stock and electrical fixed installations for traction, in respect of the power supply system. The interaction between pantograph and overhead contact line is dealt with in EN 50367. The interaction with the “control-command” subsystem (especially signalling) is not dealt with in this standard.

Requirements are given for TSI lines (both high speed and conventional) and classical lines.

For classical lines, values, where given, are for the existing European networks. Furthermore the maximum values that are specified are applicable to the foreseen developments of the infrastructure of the Trans European rail networks.

The following electric traction systems are within scope:

- railways;
- guided mass transport systems that are integrated with railways;
- material transport systems that are integrated with railways.

This European Standard does not apply retrospectively to rolling stock already in service.

Information is given on electrification parameters such as to enable train operating companies to confirm, after consultation with the rolling stock manufacturers, that there will be no consequential disturbance on the electrification system.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 50122-2:2010, *Railway applications — Fixed installations — Electrical safety, earthing and the return circuit — Part 2: Provisions against the effects of stray currents caused by d.c. traction systems*

EN 50122-3:2010, *Railway applications — Fixed installations — Electrical safety, earthing and the return circuit — Part 3: Mutual Interaction of a.c. and d.c. traction systems*

EN 50123-1:2003, *Railway applications — Fixed installations — D.C. switchgear — Part 1: General*

EN 50163:2004 + A1:2007, *Railway applications — Supply voltages of traction systems*

EN 50367, *Railway applications — Current collection systems — Technical criteria for the interaction between pantograph and overhead line (to achieve free access)*

IEC 60050-811, *International Electrotechnical Vocabulary — Chapter 811: Electric traction*

3 Terms and definitions

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

3.1
abnormal operating conditions
either higher traffic loads or outage of power supply equipment outside the design standard

Note 1 to entry: Under these conditions, traffic may not operate to the design timetable.

3.2
classical line
existing line that is not subject to a renewal or upgrading project to bring it into compliance with a TSI

3.3
contact line
conductor system for supplying electric energy to vehicles through current-collecting equipment

[SOURCE: IEC 60050-811-33-01]

3.4
dimensioning train
train with the lowest mean useful voltage

3.5
infrastructure manager
body or undertaking that is responsible in particular for establishing and maintaining railway infrastructure

Note 1 to entry: This may also include the management of infrastructure control and safety systems. The functions of the infrastructure manager on a network or part of a network may be allocated to different bodies or undertakings.

Note 2 to entry: In TSI Energy, this body is referred to as the contracting or adjudicating entity.

3.6
maximum line speed
speed for which the line was approved for operation

3.7
mean useful voltage at the pantograph ($U_{\text{mean useful}}$)

3.7.1
$U_{\text{mean useful}}$ (zone)
voltage giving an indication of the quality of the power supply in a geographic zone during the peak traffic period in the timetable

3.7.2
$U_{\text{mean useful}}$ (train)
voltage identifying the dimensioning train and which enables the effect on its performance to be quantified

3.8
minimum possible headway
minimum interval at which trains can run as allowed by the signalling system

3.9
new element
new, rebuilt or modified traction-unit or power supply component (hardware or software) having a possible influence on the harmonic behaviour of the power supply system

Note 1 to entry: This new element may be integrated in an existing power supply network with traction units e.g. for fixed installation:

- transformer;
- HV cable;
- filters;
- converter.

3.10
normal operating conditions
traffic operating to the design timetable and train formation used for power supply fixed installation design

Note 1 to entry: Power supply equipment is operated according to standard design rules. Rules can vary depending on the infrastructure manager's policy.

3.11
overhead contact line
contact line placed above (or beside) the upper limit of the vehicle gauge and supplying vehicles with electric energy through roof–mounted current collection equipment

[SOURCE: IEC 60050-811-33-02]

3.12
power factor

$$\cos\varphi = \frac{active\ power\ of\ the\ fundamental\ wave}{apparent\ power\ of\ the\ fundamental\ wave}$$

Note 1 to entry: In this standard, only the fundamental wave is considered.

Note 2 to entry: This is also the displacement factor cos φ.

3.13
register of infrastructure
for TSI, a single document which compiles, for each section of line, the characteristics of the lines concerned in respect of all subsystems including fixed equipment

Note 1 to entry: The list of items included in the register is described in annexes of the TSI Energy.

3.14
rolling stock
general term covering all vehicles with or without motors

[SOURCE: IEC 60050-811-02-01]

3.15
separation or neutral section
section of a contact line provided with a sectioning point at each end to prevent successive electrical sections, differing in voltage, phase or frequency being connected together by the passage of current collectors

3.16
(traction) substation
installation, the main function of which is to supply a contact line system, at which the voltage of a primary supply system, and in certain cases the frequency, is converted to the voltage and frequency of the contact line

3.17
total power factor λ

$$\lambda = \frac{active\ power}{apparent\ power}$$

Note 1 to entry: Deformation factor υ: