



SLOVENSKI STANDARD

SIST EN 50125-1:2001

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Železniške naprave – Okoljski pogoji za opremo – 1. del: Oprema na voznih sredstvih

Railway applications - Environmental conditions for equipment -- Part 1: Equipment on board rolling stock

Bahnanwendungen - Umweltbedingungen für Betriebsmittel -- Teil 1: Betriebsmittel auf Bahnfahrzeugen

Applications ferroviaires - Conditions d'environnement pour le matériel -- Partie 1: Equipement embarqué du matériel roulant

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EUROPEAN STANDARD
NORME EUROPÉENNE
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English version

**Railway applications - Environmental conditions for equipment
Part 1: Equipment on board rolling stock**

Applications ferroviaires - Conditions
d'environnement pour le matériel
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matériel roulant

Bahnanwendungen
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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

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

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

Foreword

This European Standard was prepared by SC 9XB, Electromechanical material on board rolling stock, of Technical Committee CENELEC TC9X, Electrical and electronic applications for railways.

The text of the draft was submitted to the formal vote and was approved by CENELEC as EN 50125-1 on 1999-08-01.

The following dates were fixed:

- latest date by which the European Standard has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2000-05-01
- latest date by which the national standards conflicting with the European Standard have to be withdrawn (dow) 2002-05-01

Annexes designated "informative" are given for information only.
In this standard, annexes A and B are informative.

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1 Scope

This standard intends to define environmental conditions within Europe.

NOTE: It can also be applied elsewhere by agreement.

The scope of this standard covers the use of on board electrical, electromechanical and electronic equipment for rolling stock, for the following parameters: Altitude, Temperature, Humidity, Air movement, Rain, Snow and hail, Ice, Solar radiation, Lightning, Pollution, Vibrations and shocks, Electromagnetic interference environment, Acoustic noise environment, Supply system characteristics.

In particular the standard defines:

- interface conditions between the vehicle and its environment;
- general environmental rules for the equipment of rolling stock, especially for the main sub-systems (level 3 - defined by R009-003 of a vehicle (cubicles, cabling, large components, etc.).

In this respect it gives general guidance in order to allow the fairness of bid assessments in the process of European Projects.

The defined environmental conditions are considered as normal in service; occasionally more severe conditions may be specified.

Microclimates surrounding components may be defined by relevant product standards or by special requirements.

This standard is not intended to apply to cranes, mining vehicles, cable cars.

Passenger effects on the equipment and equipment effect on the passengers are not considered in this standard.

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2 Normative references

This European Standard incorporates, by dated or undated references, provisions from other publications. These normative references are cited at the appropriate place 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.

ENV 50121	series	Railway applications - Electromagnetic compatibility
EN 50124-2	1999	Railway applications - Insulation coordination Part 2: Overvoltages and related protection
EN 50163	1995	Railway applications - Supply voltages of traction systems
EN 60529	1991	Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989)
EN 60721-1	1995	Classification of environmental conditions - Part 1: Environmental parameters and their severities (IEC 60721-1:1990 + A1:1992)
EN 60721-3-0	1993	Part 3: Classification of groups of environmental parameters and their severities - Introduction (IEC 60721-3-0:1984 + A1:1987)
EN 60721-3-5	1997	Section 5: Ground vehicle installations (IEC 60721-3-5:1997)
EN 61373	1999	Railway applications - Rolling stock equipment - Shock and vibration tests (IEC 61373:1999)
HD 478.2.1 S1	1989	Classification of environmental conditions - Part 2: Environmental conditions appearing in nature - Section 1: Temperature and humidity (IEC 60721-2-1:1982 + A1:1987)
HD 478.2.2 S1	1990	Section 2: Precipitation and wind (IEC 60721-2-2:1988)

HD 478.2.3 S1	1990	Section 3: Air pressure (IEC 60721-2-3:1987)
HD 478.2.7 S1	1990	Section 7: Fauna and flora (IEC 60721-2-7:1987)
R009-003	1998	Railway applications - Guide to the specification of a guided transport system

3 Definitions

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

- 3.1 **environmental conditions:** Physical, chemical or biological condition, external to a product to which it is subjected at a certain time.
- 3.2 **vehicle compartment:** Compartment of vehicles in which people may enter during normal operation.
- 3.3 **vehicle cubicle:** Any enclosure for housing of mechanical, electrical and/or electronic equipment.
- 3.4 **environmental parameters:** One or more physical, chemical or biological properties characterising an environmental factor (e.g. temperature, acceleration).

EXAMPLE: The environmental factor 'vibration' is characterised by the parameters: type of vibration (sinusoidal, random), acceleration and frequency.

- 3.5 **severity of environmental parameters:** A value of each quantity characterising the environmental parameter.

EXAMPLE: The severity of sinusoidal vibration is defined by values of the acceleration (in m/s^2) and frequency (in Hz).

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4 Environmental conditions

4.1 General

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In the following clauses the environmental parameters are given at which the vehicle and its equipment shall function as specified.

In the text, normal environmental conditions are considered as being those of Europe. They are classified with a suffix 1, 2, 3, etc. and special conditions with a suffix X, Y, etc.

The purchaser shall specify clearly in his specification the class to consider, otherwise class with suffix 1 shall be assumed.

NOTE: Except otherwise stated in this document, general information is given by EN 60721-3-5, HD 478.2.1 S1, HD 478.2.2 S1, HD 478.2.3 S1 and HD 478.2.7 S1.

The severities specified are those which will have a low probability of being exceeded. All specified values are maximum or limiting values. These values may be reached, but do not occur permanently. Depending on the situation there may be different frequencies of occurrence related to a certain period of time. Such frequencies of occurrence have not been included in this standard, but should be considered for any environmental parameter. They should additionally be specified if applicable.

4.2 Altitude

The equipment shall perform as specified for the different classes of altitude range relative to sea level given in table 1.

Table 1: Classes of altitude range

Classes	Altitude range relative to sea level (m)
A 1	up to 1400
A 2	up to 1000
A X	more than 1400

Using AX class, the maximum altitude shall be specified by the purchaser.

Altitude is relevant, in particular for air pressure level and its consequence on cooling systems.

The air pressure shall be considered according to HD 478.2.3 S1.

Particular local air pressure conditions may exist due to the effects of wind, vehicle movement, fans, etc.. In this case, the relevant data will be exchanged between the appropriate interested parties engaged in the project.

4.3 Temperature

The equipment shall operate as specified for the different classes of temperatures given in table 2.

Table 2: Classes of air temperatures

Classes	(1)		(2)		(3)	
	Air temperature external to vehicle (°C)		Inside vehicle compartment temperature (°C)		Inside cubicle temperature (°C)	
T 1	-25	+40	-25	+50	-25	+70
T 2	-40	+35	-40	+45	-40	+65
T 3	-25	+45	-25	+55	-25	+70
T X	-40	+50	-40	+60	-40	+75

Class T1 of table 2 corresponds to class 5K2 of EN 60721-3-5.

Values given in columns (2) and (3) of table 2 are temperatures that the system or equipment designer is not allowed to exceed in a given part because too much power is dissipated with insufficient cooling. They are also temperatures which the equipment manufacturer shall take into account in the design.

A reference temperature of 25 °C is considered as being the permanent temperature for which the effects on the material ageing are equivalent to those of the climatic temperature during the lifetime.

The yearly average temperature for column (3) is conventionally taken as 45 °C for all classes (e.g. for reliability calculation).

When stated in product standards, particular requirements apply.

The temperatures inside vehicle and cubicle are values measured in free air out of the heat emitting elements.

If the equipment is to be installed in a controlled climatic environment, provided that the equipment is not required to operate outside of those conditions, the temperature range shall be agreed between purchaser and supplier.

It shall be taken into account that the external ambient air temperature in special locations such as near the ballast or over the roof may exceed the external open air temperature. In this case the temperature level to be considered shall be agreed between purchaser and supplier.

To ensure correct co-ordination of the temperature levels indicated in columns (1) to (3) in table 2 and verification of good thermal design of all installed equipment, the relevant data shall be exchanged between purchaser and supplier, such as:

- geometrical characteristics of sub-assemblies;
- localisation of the main heat emitting elements and their heat dissipation;
- thermal time profile;
- characteristics of the cooling system.

Deviation from the temperature table shall be subject to agreement between purchaser and supplier.

4.4 Humidity

The following external humidity levels shall be considered:

- yearly average: ≤ 75 % relative humidity;
- on 30 days in the year continuously: between 75 % and 95 % relative humidity;
- on the other days occasionally: between 95 % and 100 % relative humidity;
- maximum absolute humidity: 30 g/m³ occurring in tunnels.

An operationally caused infrequent and slight moisture condensation shall not lead to any malfunction or failure.

The psychometric charts of figures 1 and 2 give the ranges of variation of the relative humidity for the different temperature classes that will not be exceeded for more than 30 days per year:

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