



SLOVENSKI STANDARD
SIST EN 13129-1:2004

01-junij-2004

**Železniške naprave – Klimatske naprave v železniških vozilih za daljinski promet –
1. del: Parametri za določevanje udobja**

Railway applications - Air conditioning for main line rolling stock - Part 1: Comfort parameters

Bahnanwendungen - Luftbehandlung in Schienenfahrzeugen des Fernverkehrs - Teil 1: Behaglichkeitsparameter

Applications ferroviaires - Conditionnement de l'air pour matériel roulant grandes lignes -
Partie 1: Parametres de bien-etre

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EUROPEAN STANDARD
NORME EUROPÉENNE
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EN 13129-1

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Railway applications - Air conditioning for main line rolling stock - Part 1: Comfort parameters

Applications ferroviaires - Conditionnement de l'air pour
matériel roulant grandes lignes - Partie 1: Paramètres de
bien-être

Bahnwendungen - Luftbehandlung in
Schienenfahrzeugen des Fernverkehrs - Teil 1:
Behaglichkeitsparameter

This European Standard was approved by CEN on 29 September 2001.

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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 CEN member into its own language and notified to the Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (EN 13129:2002) has been prepared by Technical Committee CEN /TC 256, "Railway applications", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by March 2003, and conflicting national standards shall be withdrawn at the latest by March 2003.

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

— Council Directive 96/48/EC of 23 July 1996 on the Interoperability of the trans-European high-speed rail system¹⁾

For relationship with EU Directive(s), see informative annex ZA, which is an integral part of this document.

These series of European Standards "Railway applications — Air conditioning" include the following parts :

- EN 13129-1: Air conditioning for main line rolling stock — Part 1 : Comfort parameters
- prEN 13129-2: Air conditioning for main line rolling stock — Part 2 : Type tests
- prEN xxxxx-1 (WI 00256095): Air conditioning for urban and suburban rolling stock — Part 1: Comfort parameters²⁾
- prEN xxxxx-2 (WI 00256096): Air conditioning for urban and suburban rolling stock — Part 2: Type tests²⁾
- prEN xxxxx-1 (WI 00256097): Air conditioning for Driver's cab — Part 1 : Comfort parameters²⁾
- prEN xxxxx-2 (WI 00256098): Air conditioning for Driver's cab — Part 2: Type tests²⁾

The annexes A to F are normative.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this document: Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1) Official Journal of the European Communities No L 235/6 of 17.09.96

2) in preparation

EN 13129-1:2002 (E)**Introduction**

The object of this European Standard is to establish common comfort parameters for the European railways. It also specifies the performance of the air-conditioning installations.

1 Scope

This European Standard applies to main line rail vehicles which carry passengers with the exception of suburban vehicles, metros, tramways and driving cabs.

This European Standard establishes comfort parameters for compartments or saloons (double-decker or not).

These comfort parameters apply in a similar way to the areas reserved for train staff, with the exception of the catering service areas.

The conditions under which the physical parameters mentioned in this European Standard are measured are defined in prEN 13129-2.

2 Normative references

This European Standard incorporates by dated or undated reference, 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 (including amendments).

EN 779: *Particulate air filters for general ventilation — Requirements, testing, marking.*

ENV 12299: *Railway applications — Ride comfort for passengers — Measurement and evaluation.*

prEN 13129-2: *Railway applications — Air conditioning for main line rolling stock — Part 2: Type tests.*

3 Terms, definitions, symbols and abbreviations

For the purposes of this European Standard, the following definitions, symbols and abbreviations apply:

3.1**comfort**

agreeable sensation perceived by a person concerning his climatic environment

3.2**air conditioning installation**

equipment intended for ventilation and/or heating and/or cooling and/or filtration

3.3**forced air ventilation**

air circulation generated by a mechanical action

3.4**natural ventilation**

air circulation generated without mechanical action

3.5**preheating**

process which enables the interior temperature to be raised without the presence of passengers

3.6**precooling**

process which enables the interior temperature to be lowered without the presence of passengers

3.7**heating**

process which enables the interior temperature to be raised or maintained

3.8**cooling**

process which enables the interior temperature to be lowered or maintained

3.9**dehumidification**

process which reduces the content of water in the interior air

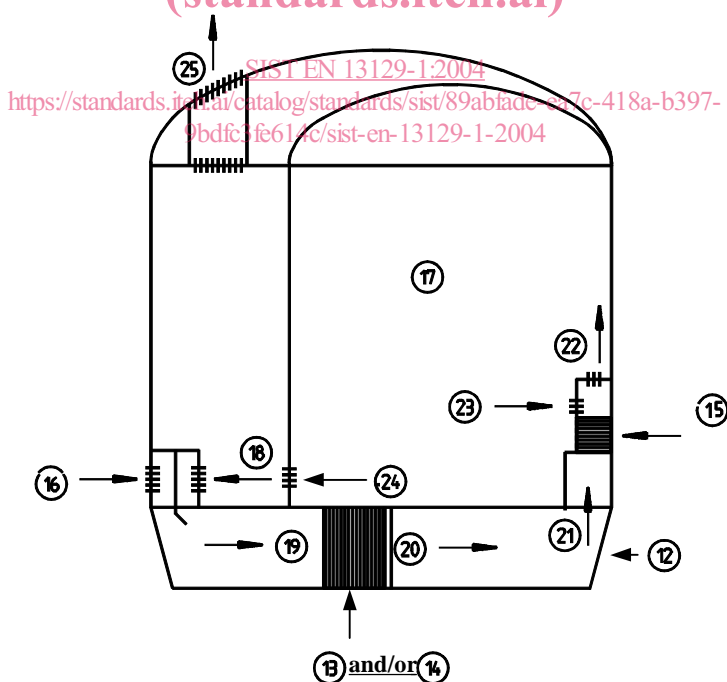
3.10**air conditioning**

system which includes ventilation, heating, cooling and/or dehumidification

3.11**heating and ventilation**

system which includes ventilation and heating

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This representation is only given as an example and does not prejudice the design of the installation.

Figure 1 — Diagram explaining certain railway terms

3.12**air handling unit**

group of components designed to move, filter and/or mix, heat and/or cool the air (see Figure 1, No 12)

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- 3.13
cooling unit**
system that carries out the cooling function in a centralised and/or decentralised manner (see Figure 1, No 13)
- 3.14
principal heating unit**
system that carries out the heating function in a centralised and/or decentralised manner with the use of heating elements associated or not with the forced air ventilation (see Figure 1, No 14)
- 3.15
auxiliary heating unit**
de-centralised heating element(s) for adding heat locally (see Figure 1, No 15)
- 3.16
outside air or fresh air**
air taken from outside (see Figure 1, No 16)
- 3.17
room air**
air contained in a specified space (see Figure 1, No 17)
- 3.18
recirculated air**
air taken from the interior of a specified space and re-used (see Figure 1, No 18)
- 3.19
mixed air**
combination of fresh air and recirculated air (see Figure 1, No 19)
- 3.20
treated (or conditioned) air**
air that may have been filtered and/or had energy exchanged as it passed through the air handling unit (see Figure 1, No 20)
- 3.21
primary air**
quantity of treated air entering the ducts (see Figure 1, No 21)
- 3.22
supply air**
treated air, that may be combined with some induced air, supplied to a specified space (see Figure 1, No 22)
- 3.23
induced air**
room air that is taken and re-used locally (see Figure 1, No 23)
- 3.24
transfer air**
air leaving a specified area (see Figure 1, No 24)
- 3.25
exhaust air**
air rejected outside the vehicle (see Figure 1, No 25)
- 3.26
real interior temperature (T_{ir})**
real temperature of the room air
- 3.27
interior temperature setting (T_{ic})**
theoretical temperature to be achieved by the room air

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3.28**mean interior temperature (T_{im})**

arithmetic mean of the interior temperatures measured 1,10 m above the floor as specified in the procedure described in prEN 13129-2

3.29**mean exterior temperature (T_{em})**

arithmetic mean of the exterior temperatures measured according to the procedure described in prEN 13129-2

3.30**comfort envelope**

compartment or saloon areas normally occupied by passengers

3.31**local annexes**

places where passengers stay temporarily

3.32**catering service area**

space or compartment reserved for staff specialising in the preparation and/or the sale of food

3.33**heat transfer coefficient (k)**

ratio between the density of the heat flow rate per unit of surface area and the prevailing difference in temperature (T_{im}) and (T_{em}) across the relevant walls of the vehicle.

NOTE 1 The coefficient k takes account of the efficiency of the insulation of the exterior walls and the effect of the infiltration of air caused by the non-airtightness of the vehicle in motion (doors, windows, various openings) and is applicable to all or part of the vehicle.

NOTE 2 This value is expressed in $W/m^2 K$.

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3.34**transmission factor for the windows (τ)**

ratio between the solar energy flow transmitted to the interior of the vehicle through the window and the flow incident

3.35**equivalent solar load**

total heat received by $1 m^2$ surface perpendicular to the radiation emitted by a luminous source (solar equivalent), when inclined at an angle of 30° to the horizontal

3.36**stabilised operation**

operation obtained when T_{im} is within the tolerance defined in 6.1.3

4 Comfort parameters

Outside the preconditioning periods, comfort is assessed :

- on the basis of environmental parameters such as :
 - air temperature according to Annex A,
 - air speed according to Annex B,
 - relative humidity according to Annex C,
 - temperature of the walls,

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- as a function of the heat released to the environment by a person who is moderately dressed and at rest according to Annex D,
- on the basis of the external climatic conditions which have an indirect effect.

The operation of the catering equipment shall not disturb the measured comfort parameters in the comfort envelopes.

5 External conditions**5.1 Normal external operating conditions**

The comfort conditions shall be satisfied between the limits of the external conditions given in Annexes E.1 and E.2.

5.2 Extreme external operating conditions

The installations shall be able to operate under extreme temperatures:

- 5 K below the minimum values and 5 K above the maximum values specified in Annex E,
- if they are placed under the underframe, 10 K above the maximum values specified in Annex E.

The interior conditions as defined in clause 6 are not contractual for these extreme conditions.

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6 Comfort conditions to be respected

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6.1 Temperatures in the comfort areas

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The control device as defined in clause 7 is in the mid position.

6.1.1 Interior temperature setting (Tic):

The contractual specifications shall define a regulation curve which shall be within the limits of the zone shown in Annex A.

6.1.2 Interior temperature setting (Tic) for vehicles without cooling:

These vehicles shall meet the conditions mentioned in 6.1.1 if the temperature of the exterior air enables this normal interior temperature setting to be achieved.

6.1.3 Range of the mean air interior temperature (Tim) with respect to the interior temperature setting (Tic):

This range shall not be greater than ± 1 K.

6.1.4 Range of the extreme air interior temperatures measured 1,10 m from the floor

This range shall not be greater than 2 K and 3 K for equivalent areas of couchette coaches and sleeping cars.

6.1.5 Range of the extreme interior air temperatures in a vertical section

This range shall not be greater than 3 K according to prEN 13129-2.

6.2 Temperatures in the annex areas

6.2.1 Mean temperature in the side corridor

This is the arithmetic mean of the temperatures measured 1,70 m from the floor according to prEN 13129-2.

- In heating, this temperature shall not be less than 6 K below the interior temperature setting (Tic) of the comfort areas.
- In cooling, this temperature shall not be more than 5 K above the interior temperature setting (Tic) of the comfort areas.

6.2.2 Mean temperature in the vestibules

This is the arithmetic mean of the temperatures measured 1,70 m from the floor according to prEN 13129-2.

- In heating, this temperature shall lie between + 10 ° C and the temperature setting (Tic) of the comfort areas
- In cooling, this temperature shall not be more than 9 K above the temperature setting, (Tic) of the comfort areas nor greater than +35 ° C.

In addition, the mean temperature shall always be greater than + 4 ° C at 0,10 m above the floor.

6.2.3 Interior temperature in the washrooms, WC's, telephone areas

The temperature measured at a point situated on the vertical geometric centre of the floor of these locations at a height of 1,10 m shall

- not be less than 6 K below the interior setting temperature (Tic) of the comfort areas in heating,
- not be more than 6 K above the interior setting temperature (Tic) of the comfort areas in cooling.

6.2.4 Interior temperature in the nursery

The temperature measured at a point situated on the vertical geometric centre above the floor at a height of 1,10 m shall

- not be less than the mean interior temperature (Tim) of the comfort envelopes,
- not be more than 4 K above the interior temperature setting (Tic) of the comfort envelopes.

6.3 Relative humidity of the air

Whatever the interior temperatures of comfort areas are, the relative humidity of the air shall be within the values in Annex C.

6.4 Temperatures of the surfaces surrounding the comfort envelope

The sub-clauses 6.4.1 to 6.4.3 refer to a stationary vehicle.

6.4.1 Walls and ceilings

In comparison with the mean interior temperature (Tim), the range of temperature of these interior surfaces shall not be greater than :

- 7 K for single level vehicles,
- 10 K for double decker vehicles.