

SVENSK STANDARD

SS-EN 13129:2016



Fastställt/Approved: 2016-08-30
Publicerad/Published: 2016-09-06
Utgåva/Edition: 2
Språk/Language: engelska/English
ICS: 45.020; 45.060.20

Järnvägar – Luftkonditionering i rälsfordon för fjärrtrafik – Komfortparametrar och typprovning

Railway applications – Air conditioning for main line rolling stock – Comfort parameters and type tests

This preview is downloaded from www.sis.se. Buy the entire standard via <https://www.sis.se/std-8022161>

Standarder får världen att fungera

SIS (Swedish Standards Institute) är en fristående ideell förening med medlemmar från både privat och offentlig sektor. Vi är en del av det europeiska och globala nätverk som utarbetar internationella standarder. Standarder är dokumenterad kunskap utvecklad av framstående aktörer inom industri, näringsliv och samhälle och befrämjar handel över gränser, bidrar till att processer och produkter blir säkrare samt effektiviserar din verksamhet.

Delta och påverka

Som medlem i SIS har du möjlighet att påverka framtida standarder inom ditt område på nationell, europeisk och global nivå. Du får samtidigt tillgång till tidig information om utvecklingen inom din bransch.

Ta del av det färdiga arbetet

Vi erbjuder våra kunder allt som rör standarder och deras tillämpning. Hos oss kan du köpa alla publikationer du behöver – allt från enskilda standarder, tekniska rapporter och standardpaket till handböcker och onlinetjänster. Genom vår webbtjänst e-nav får du tillgång till ett lättnavigerat bibliotek där alla standarder som är aktuella för ditt företag finns tillgängliga. Standarder och handböcker är källor till kunskap. Vi säljer dem.

Utveckla din kompetens och lyckas bättre i ditt arbete

Hos SIS kan du gå öppna eller företagsinterna utbildningar kring innehåll och tillämpning av standarder. Genom vår närhet till den internationella utvecklingen och ISO får du rätt kunskap i rätt tid, direkt från källan. Med vår kunskap om standarders möjligheter hjälper vi våra kunder att skapa verklig nytta och lönsamhet i sina verksamheter.

Vill du veta mer om SIS eller hur standarder kan effektivisera din verksamhet är du välkommen in på www.sis.se eller ta kontakt med oss på tel 08-555 523 00.



Standards make the world go round

SIS (Swedish Standards Institute) is an independent non-profit organisation with members from both the private and public sectors. We are part of the European and global network that draws up international standards. Standards consist of documented knowledge developed by prominent actors within the industry, business world and society. They promote cross-border trade, they help to make processes and products safer and they streamline your organisation.

Take part and have influence

As a member of SIS you will have the possibility to participate in standardization activities on national, European and global level. The membership in SIS will give you the opportunity to influence future standards and gain access to early stage information about developments within your field.

Get to know the finished work

We offer our customers everything in connection with standards and their application. You can purchase all the publications you need from us - everything from individual standards, technical reports and standard packages through to manuals and online services. Our web service e-nav gives you access to an easy-to-navigate library where all standards that are relevant to your company are available. Standards and manuals are sources of knowledge. We sell them.

Increase understanding and improve perception

With SIS you can undergo either shared or in-house training in the content and application of standards. Thanks to our proximity to international development and ISO you receive the right knowledge at the right time, direct from the source. With our knowledge about the potential of standards, we assist our customers in creating tangible benefit and profitability in their organisations.

If you want to know more about SIS, or how standards can streamline your organisation, please visit www.sis.se or contact us on phone +46 (0)8-555 523 00



Europastandarden EN 13129:2016 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN 13129:2016.

Denna standard ersätter SS-EN 13129-1, utgåva 1 och SS-EN 13129-2:2004, utgåva 1.

The European Standard EN 13129:2016 has the status of a Swedish Standard. This document contains the official English version of EN 13129:2016.

This standard supersedes the Swedish Standard SS-EN 13129-1, edition 1 and SS-EN 13129-2:2004, edition 1.

© Copyright/Upphovsrätten till denna produkt tillhör SIS, Swedish Standards Institute, Stockholm, Sverige. Användningen av denna produkt regleras av slutanvändarlicensen som återfinns i denna produkt, se standardens sista sidor.

© Copyright SIS, Swedish Standards Institute, Stockholm, Sweden. All rights reserved. The use of this product is governed by the end-user licence for this product. You will find the licence in the end of this document.

Uppllysningar om sakinnehållet i standarden lämnas av SIS, Swedish Standards Institute, telefon 08-555 520 00. Standarder kan beställas hos SIS Förlag AB som även lämnar allmänna uppllysningar om svensk och utländsk standard.

Information about the content of the standard is available from the Swedish Standards Institute (SIS), telephone +46 8 555 520 00. Standards may be ordered from SIS Förlag AB, who can also provide general information about Swedish and foreign standards.

Denna standard är framtagen av kommittén för Järnvägar, SIS/TK 254.

Har du synpunkter på innehållet i den här standarden, vill du delta i ett kommande revideringsarbete eller vara med och ta fram andra standarder inom området? Gå in på www.sis.se - där hittar du mer information.

EUROPEAN STANDARD

EN 13129

NORME EUROPÉENNE

EUROPÄISCHE NORM

August 2016

ICS 45.060.20

Supersedes EN 13129-1:2002, EN 13129-2:2004

English Version

Railway applications - Air conditioning for main line rolling stock - Comfort parameters and type tests

Applications ferroviaires - Conditionnement de l'air
pour matériel roulant grandes lignes - Paramètres de
bien-être et essais de type

Bahnanwendungen - Luftbehandlung in
Schienenfahrzeugen des Fernverkehrs -
Behaglichkeitsparameter und Typprüfung

This European Standard was approved by CEN on 19 May 2016.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN 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 CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

Page

European foreword.....	5
1 Scope	6
2 Normative references	6
3 Terms and definitions	6
4 Compliance with the standard.....	12
5 Comfort parameters.....	13
6 Quality limits	13
7 Service conditions.....	14
7.1 Exterior conditions.....	14
7.1.1 Design conditions.....	14
7.1.2 Extreme conditions	15
7.2 Interior conditions	15
8 Performance of the heating and cooling installations.....	16
8.1 Preheating	16
8.2 Heating.....	16
8.3 Precooling.....	16
8.4 Cooling.....	16
8.5 Stand by operation.....	17
8.6 Door opening sequence	17
8.7 Degraded mode operation	17
9 Control.....	17
9.1 General.....	17
9.2 Interior temperature setting	17
9.3 Quality of regulation	18
9.3.1 General.....	18
9.3.2 Changing the interior temperature setting	18
9.3.3 Changing test parameter(s).....	19
9.3.4 Stabilized conditions.....	20
10 Comfort conditions to be respected	22
10.1 Parameters in the comfort envelope	22
10.1.1 Temperatures in the comfort zones	22
10.1.2 Temperatures of the surfaces surrounding the comfort envelope.....	23
10.1.3 Humidity of the air.....	24
10.1.4 Air speed.....	25
10.1.5 Air quality	26
10.2 Parameters in the annex areas.....	28
10.3 Interior parameters in the catering service areas (galley zone)	29
10.4 Limits of temperature values.....	29
11 Supplementary requirements	30
11.1 Heat transfer coefficient.....	30
11.2 Solar factor (<i>g</i>) of the windows	30
11.3 Cleaning of air conditioning installation	30

12	Air movement tests	30
12.1	Air flow tests at standstill	30
12.1.1	Test conditions	30
12.1.2	Air flow rates	30
12.1.3	Visualization of the air flow direction	31
12.2	Air flow tests when driving	31
12.3	Air speed tests	31
12.3.1	Critical air speed	31
12.3.2	Measurement of air speed during the climatic tests	31
13	Climatic tests	31
13.1	General remarks	31
13.2	Preheating test	32
13.3	Precooling test	32
13.4	Regulation tests	32
13.4.1	Steady-state tests	32
13.4.2	Intermediate tests	33
13.4.3	Tests for typical daily profiles	33
13.5	Functionality tests	33
14	Supplementary tests	34
14.1	Determination of the heat transfer coefficient	34
14.1.1	Purpose of the test	34
14.1.2	Calculation	34
14.1.3	Procedure	34
14.2	Thermography	35
15	Methods of measurement – Measuring instruments	35
15.1	General remarks	35
15.2	Temperatures	35
15.2.1	Air temperature	35
15.2.2	Surface temperatures	35
15.3	Relative humidity	35
15.4	Air speed	35
15.5	Airflow rate	35
15.6	Simulated speed of the vehicle	35
15.7	Equivalent solar energy	36
15.8	Energy consumption and power rating	36
16	Characteristics of the test equipment	36
16.1	General remarks	36
16.2	Occupation	36
16.3	Temperature and uniformity of the climatic chamber	36
16.4	Relative humidity	36
16.5	Simulation of wind speed	36
16.6	Equivalent solar energy	37
17	Distribution of measuring points	37
17.1	Distribution of sensors in the vehicle	37
17.1.1	Comfort envelope temperature measuring points	37
17.1.2	Surface temperature measuring points	37
17.1.3	Supply air outlet temperature measuring points	38
17.1.4	Comfort envelope air speed measuring points	38
17.1.5	Comfort envelope relative humidity measuring points	38
17.2	Climatic chamber sensors distribution	38
Annex A (informative)	Grouping of countries in climatic zones	39

Annex B (normative) Calculation method of the overall conformity level CL	40
Annex C (normative) Tests for verification of comfort parameters	43
Annex D (normative) Equivalent solar energy (Simulation of solar exposure)	53
Annex E (normative) Location of the measuring points used for the determination of the mean interior temperature in the comfort envelope (T_{im}), horizontal range of the extreme interior air temperatures and the measuring point location in the local annexes	54
Annex F (normative) Location of the measuring points used for the determination of the vertical ranges of the extreme interior air temperatures and relative humidity across the comfort envelope	56
Annex G (normative) Location of the measuring points used for the determination of the variation of internal temperatures within the comfort envelope	58
Annex H (informative) Location of the sensors in the climatic chamber	60
Annex I (normative) Typical daily profiles	61
Annex J (normative) Heat emission per person	73
Annex K (informative) Abbreviations	75
K.1 Surface temperatures: $T_{s_Range_Surface}$ concerned	75
K.2 Airflow: $\dot{V}_{Type\ of\ airflo}$	75
K.3 Range of temperature: $\Delta T_{Mode_Location}$	75
K.4 Gradients: $\Delta T_{Type\ of\ gradient_Range_Location}$	76
K.5 Others	76
Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 2008/57/EC	77
Bibliography	79

European foreword

This document (EN 13129:2016) 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 February 2017, and conflicting national standards shall be withdrawn at the latest by February 2017.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 13129-1:2002 and EN 13129-2:2004.

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 2008/57/EC.

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

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This European Standard establishes comfort parameters of air conditioning for passenger compartments or saloons of railway vehicles (single level or double-decker). These comfort parameters apply in a similar way to the areas reserved for train staff.

The European Standard also specifies conditions, performance values and the comfort parameter measurement methods for compartments or saloons.

This European Standard is applicable to main line rail vehicles. It does not apply to suburban vehicles, metros, tramways and driver's cabs.

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 cited edition applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN ISO 7726:2001, *Ergonomics of the thermal environment - Instruments for measuring physical quantities (ISO 7726:1998)*

3 Terms and definitions

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

3.1

comfort

agreeable sensation perceived by a person concerning his or her 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 temperatures to be raised without the presence of passengers

3.6

precooling

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

3.7

heating

process which enables the interior temperatures to be raised or maintained

3.8**cooling**

process which enables the interior temperatures to be lowered or maintained

3.9**dehumidification**

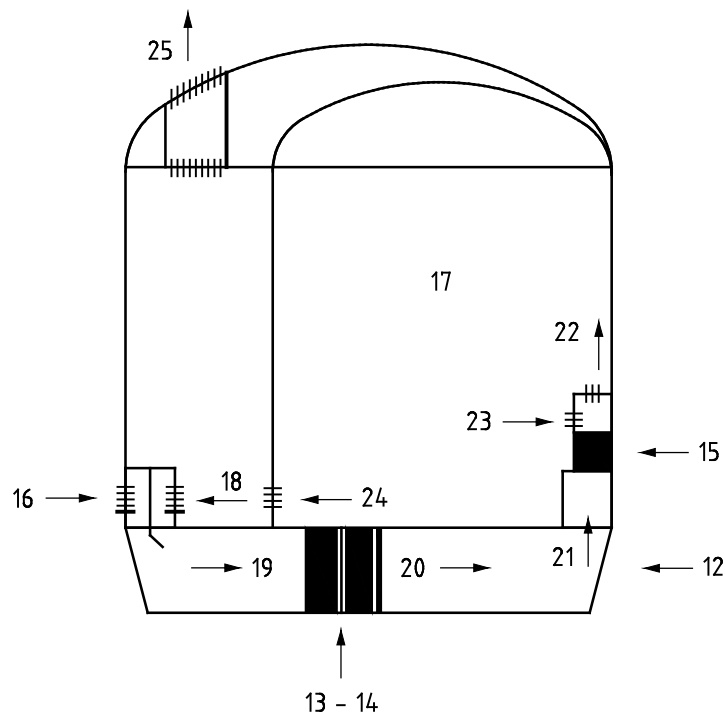
process which reduces the absolute humidity of the interior air

3.10**air conditioning device**

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

3.11**heating and ventilation device**

device which includes ventilation and heating



NOTE The numbers correspond to the following definitions.

Figure 1 — Diagram explaining certain railway terms

Note 1 to entry: This representation is only given as an example and does not prejudice the design of the installation.

3.12**air handling unit**

group of components designed to move, filter and/or mix, heat and/or cool the air

Note 1 to entry: See Figure 1, No 12.

3.13**cooling unit**

system that carries out the cooling function in a centralized and/or decentralized manner

Note 1 to entry: See Figure 1, No 13.