# SLOVENSKI STANDARD
# SIST EN ISO 19659-4:2026

**01-junij-2026**

---

**Železniške naprave - Ogrevalni, prezračevalni in klimatski sistemi za vozna sredstva - 4. del: Konstrukcijski parametri, preskusni in kontrolni elementi za enoto HVAC (ISO 19659-4:2026)**

Railway applications - Heating, ventilation and air conditioning systems for rolling stock - Part 4: Design parameters, test and inspection items for the HVAC unit (ISO 19659-4:2026)

Bahnanwendungen - Heizung, Lüftung und Klimatisierung von Schienenfahrzeugen - Teil 4: Grundlegende Konstruktionsparameter, Messungen und Prüfungen für die HLK□Einheit (ISO 19659-4:2026)



Applications ferroviaires - Systèmes de chauffage, ventilation et climatisation pour le matériel roulan - Partie 4: Paramètres de conception, éléments d'essai et d'inspection pour l'unité HVAC (ISO 19659-4:2026)

**Ta slovenski standard je istoveten z:** **EN ISO 19659-4:2026**

---

**ICS:**

| | | |
|---|---|---|
| 45.060.01 | Železniška vozila na splošno | Railway rolling stock in general |

**SIST EN ISO 19659-4:2026** **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

# EN ISO 19659-4

April 2026

ICS 45.060.01

English Version

# Railway applications - Heating, ventilation and air conditioning systems for rolling stock - Part 4: Design parameters, and test and inspection items for the HVAC unit (ISO 19659-4:2026)

Applications ferroviaires - Systèmes de chauffage, ventilation et climatisation pour le matériel roulant - Partie 4: Paramètres de conception et éléments d'essai et d'inspection pour l'unité HVAC (ISO 19659-4:2026)

Bahnanwendungen - Heizung, Lüftung und Klimatisierung von Schienenfahrzeugen - Teil 4: Grundlegende Auslegungsparameter, Messungen und Prüfungen für die HLK-Einheit (ISO 19659-4:2026)

This European Standard was approved by CEN on 27 January 2026.

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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and United Kingdom.

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

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**



Ref. No. EN ISO 19659-4:2026 E

## Contents

Page

## European foreword

This document (EN ISO 19659-4:2026) has been prepared by Technical Committee ISO/TC 269 "Railway applications" in collaboration with 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 October 2026, and conflicting national standards shall be withdrawn at the latest by October 2026.

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.

Any feedback and questions on this document should be directed to the users’ national standards body/national committee. A complete listing of these bodies can be found on the CEN website.

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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.



## Endorsement notice

The text of ISO 19659-4:2026 has been approved by CEN as EN ISO 19659-4:2026 without any modification.

International Standard

ISO 19659-4

First edition
2026-04

# Railway applications — Heating, ventilation and air conditioning systems for rolling stock —

# Part 4: Design parameters, and test and inspection items for the HVAC unit

*Applications ferroviaires — Systèmes de chauffage, ventilation et climatisation pour le matériel roulant —*

*Partie 4: Paramètres de conception et éléments d'essai et d'inspection pour l'unité HVAC*



Reference number
ISO 19659-4:2026(en)

**COPYRIGHT PROTECTED DOCUMENT**



ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

# Contents

Page

# Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.



This document was prepared by Technical Committee ISO/TC 269, *Railway applications*, Subcommittee SC 2, *Rolling stock*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 256, *Railway applications*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).



A list of all parts in the ISO 19659 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

# Introduction

Since the heating, ventilation and air conditioning (HVAC) unit is one of the main components of the HVAC system, its quality and performance is a key issue to improve thermal comfort and energy efficiency for rolling stock.

The purpose is:

— to develop a common International Standard for the validation of a HVAC unit,

— to establish methodologies and requirements on a component basis to demonstrate conformity with the technical specifications of the HVAC unit,

— to establish a clear scope of responsibility in case performance issues occur after mounting the HVAC unit on the rolling stock.

The justification is:

— currently, there is no common International Standard for the validation of a HVAC unit;

— generally, existing national and regional HVAC unit standards are designed for air-conditioning systems in buildings; there only a few standards for rolling stock;

— therefore, there is a need to unify the methodologies of the HVAC unit standards into one single document;

— this will not affect any existing national or regional standard.

# Railway applications — Heating, ventilation and air conditioning systems for rolling stock —

# Part 4: Design parameters, and test and inspection items for the HVAC unit

## 1 Scope

This document specifies requirements and guidelines for:

— the design parameters to be provided to the heating, ventilation and air conditioning (HVAC) unit manufacturer by the rolling stock manufacturer ("Customer") and the railway operator,

— the test and inspection items, requirements and methods used by the HVAC unit manufacturer to verify that the HVAC unit conforms with the design parameters.

This document is applicable to HVAC units for the passenger area and driver's cabs in urban (metro, tramway), suburban, regional and main line vehicles.



## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3743-1, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering methods for small movable sources in reverberant fields — Part 1: Comparison method for a hard-walled test room*

ISO 3743-2, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Engineering methods for small, movable sources in reverberant fields — Part 2: Methods for special reverberation test rooms*

ISO 3744, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering methods for an essentially free field over a reflecting plane*

ISO 3745, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Precision methods for anechoic rooms and hemi-anechoic rooms*

ISO 3746, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Survey method using an enveloping measurement surface over a reflecting plane*

ISO 3747, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering/survey methods for use in situ in a reverberant environment*

ISO 9614-2, *Acoustics — Determination of sound power levels of noise sources using sound intensity — Part 2: Measurement by scanning*

ISO 19659-1, *Railway applications — Heating, ventilation and air conditioning systems for rolling stock — Part 1: Terms and definitions*

ISO 19659-2, *Railway applications — Heating, ventilation and air conditioning systems for rolling stock — Part 2: Thermal comfort*

ISO 19659-3, *Railway applications — Heating, ventilation and air conditioning systems for rolling stock — Part 3: Energy efficiency*

IEC 60077-1, *Railway applications — Electric equipment for rolling stock — Part 1: General service conditions and general rules*

IEC 60077-2, *Railway applications — Electric equipment for rolling stock — Part 2: Electrotechnical components — General rules*

IEC 61373, *Railway applications — Rolling stock equipment — Shock and vibration tests*

IEC 62236-3-2, *Railway applications — Electromagnetic compatibility — Part 3-2: Rolling stock — Apparatus*

# 3 Terms, definitions and abbreviated terms

## 3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 19659-1 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/



## 3.2 Abbreviated terms

For the purposes of this document, the abbreviated terms given in ISO 19659-1 and the following apply.

| | |
|---|---|
| AC | Alternating current |
| CMM | Coordinate measuring machine |
| DB | Dry bulb |
| DC | Direct current |
| EMC | Electromagnetic compatibility |
| FEM | Finite element method |
| FFT | Fast Fourier transform |
| FST | Fire, smoke and toxicity |
| GWP | Global warming potential |
| HF | High frequency |
| HVAC | Heating, ventilation and air conditioning |
| LED | Light emitting diode |
| PTC | Positive temperature coefficient |
| PTU | Portable testing unit |
| RMS | Root mean square |

| | |
|---|---|
| RPM | Revolutions per minute |
| TCMS | Train control monitor system |
| VOC | Volatile organic compounds |
| WB | Wet bulb |

# 4 Prerequisites (design parameters) for the HVAC unit

## 4.1 General

The design parameters shall be clearly specified in the technical specification so that the HVAC unit manufacturer can design and build the HVAC unit to meet the customers' requirements.

This clause gives an overview of the design parameters that should be specified as good engineering practice including the parameters to calculate the total annual energy consumption and the total annual energy efficiency of the HVAC unit. The latter is important, as in most cases, after the traction system, the HVAC system is the second largest power consumer on the train.

## 4.2 Design parameters to be provided to the HVAC unit manufacturer

### 4.2.1 HVAC unit installation requirements

As a minimum, the following design parameters shall be provided:

— the type of the railway vehicle (high speed, commuter, Cat. 1, Cat. 2, Cat. 3 in ISO 19659-2),

— the type of the HVAC unit (compact, split in ISO 19659-1),

— HVAC unit location (roof mounted, roof embedded, ceiling mounted, on floor mounted, under floor mounted in ISO 19659-1),

— the number of the HVAC units per railway vehicle.



These design parameters are summarized in Table A.1.

### 4.2.2 Air flow requirements

#### 4.2.2.1 Air volume flow rates

The following design parameters shall be considered for air flow requirements:

a) fresh air volume flow rate:

   — fresh air volume flow rate per person depending on operating conditions as specified in relevant national or regional standard or in its absence ISO 19659-2,

   — number of passengers (normal and maximum);

   NOTE In case the free cooling mode is required, the fresh air volume flow rate can be higher. The free cooling mode is specified in ISO 19659-1.

b) supply air volume flow rate based on following heat gains:

   — heat transfer (including glazing),

   — heat emission from person specified in ISO 19659-2,

   — fresh air (specified in ISO 19659-1) (ventilation),