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

**Part 1:  
Terms and definitions**

**iTeh STANDARD PREVIEW**  
*Applications ferroviaires — Systèmes de chauffage, ventilation et  
climatisation pour le matériel roulant —  
Partie 1: Termes et définitions*  
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## 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](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

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For an explanation on 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 the following URL: [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html). (standards.iteh.ai)

This document was prepared by Technical Committee ISO/TC 269, *Railway applications*, Subcommittee SC 2, *Rolling stock*. ISO 19659-1:2017

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

## Introduction

The ISO 19659 series defines terms, thermal comfort, energy efficiency and system installation of heating, ventilation and air conditioning (HVAC) for rolling stock.

The purpose of this document is to standardize the terms, definitions, symbols and abbreviated terms used throughout trains systems for the cooling, heating and internal air circulation that are commonly known as heating, ventilation and air conditioning (HVAC). These can be broken down into multiples of these functions and as an example, ventilation and air conditioning (VAC), etc.

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

## Part 1: Terms and definitions

### 1 Scope

This document is applicable to rail vehicles and specifies the terms, definitions, symbols and abbreviated terms to be used in the ISO 19659 series, heating, ventilation and air conditioning for rolling stock.

### 2 Normative references

There are no normative references in this document.

### 3 Terms and definitions

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

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

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

#### 3.1 HVAC system

##### 3.1.1 Function

###### 3.1.1.1 cooling

process which enables the interior temperature to be lowered or maintained

###### 3.1.1.2 pre-cooling

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

###### 3.1.1.3 dehumidification

process which removes water vapour from air to reduce the absolute humidity

[SOURCE: ISO/TR 16344:2012, 2.1.32, modified — “relative humidity” has been changed to “absolute humidity”.]

###### 3.1.1.4 heating

process which enables the interior temperature to be raised or maintained

###### 3.1.1.5 pre-heating

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

**3.1.1.6**

**supplementary heating**

additional *heating* (3.1.1.4) which provides support for the HVAC system

Note 1 to entry: This can also be referred to as “auxiliary heating”.

**3.1.1.7**

**ventilation**

movement of fresh (outside) air to and/or recirculating air in an enclosed space

**3.1.1.8**

**natural air ventilation**

air circulation generated without a mechanical action

**3.1.1.9**

**forced air ventilation**

air circulation generated by a mechanical action

**3.1.1.10**

**emergency ventilation**

*ventilation* (3.1.1.7) if main power source has failed

**3.1.1.11**

**filtering**

process which removes particles from the air

**3.1.1.12**

**purifying**

process which removes non-particulate contaminants from the air

Note 1 to entry: Odours and pathogens are examples of non-particulate contaminants from the air.

**3.1.1.13**

**heat recovery**

process which transfers heat (latent/sensible) between *fresh air* (3.4.1) and *exhaust air* (3.4.10)

**3.1.2 Position**

**3.1.2.1**

**centralized system**

system which consists of one set of *HVAC unit* (3.1.3.1) per car

**3.1.2.2**

**decentralized system**

system which consists of two or more sets of *HVAC unit* (3.1.3.1) per car

Note 1 to entry: This can also be referred to as “dispersed system”.

**3.1.3 Equipment**

**3.1.3.1**

**HVAC unit**

unit intended for *cooling* (3.1.1.1) and/or *dehumidification* (3.1.1.3) and/or *heating* (3.1.1.4), and/or *ventilation* (3.1.1.7)

**3.1.3.2**

**controller unit**

unit which operates the HVAC system in a predetermined behaviour while exchanging data with external devices



**3.1.3.3****cooling unit**

system which provides *cooling* (3.1.1.1)

Note 1 to entry: See [Figure 2](#) to [Figure 5](#).

**3.1.3.4****heating unit**

system which provides *heating* (3.1.1.4)

Note 1 to entry: See [Figure 2](#) to [Figure 5](#).

**3.1.3.5****supplementary heater**

heater that carries out a *heating* (3.1.1.4) function in a decentralized manner either associated with *forced air ventilation* (3.1.1.9) or not

Note 1 to entry: This can also be referred to as “auxiliary heater”.

Note 2 to entry: This can include floor heater, roof heater, body side heater, entrance heater, duct heater, etc.

Note 3 to entry: See [Figure 5](#).

**3.1.3.6****total heat exchanger**

device using temperature and humidity difference to recover energy

**3.1.3.7****ventilation unit**

system ensuring *ventilation* (3.1.1.7)

Note 1 to entry: See [Figure 3](#).

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**3.1.3.8****exhaust air fan****exhaust air unit**

device or unit providing the extraction of air by mechanical action to the outside

Note 1 to entry: See [Figure 4](#).

**3.1.3.9****supplementary fan**

device installed outside of *HVAC unit* (3.1.3.1) to move the air locally

Note 1 to entry: See [Figure 3](#).

**3.1.3.10****booster fan**

*supplementary fan* (3.1.3.9) used to compensate (part of) the pressure drop inside air ducts

**3.1.3.11****pressure protection device**

device providing protection against undue vehicle interior tympanic pressure variations caused by exterior pressure variations

**3.1.3.12****pressure protection fan**

device providing pressure protection while maintaining a certain degree of *ventilation* (3.1.1.7)

**3.1.3.13****ducting**

installations that guide air flows

**3.1.3.14**

**air diffuser**

device for blowing the air in one or more directions while reducing the air velocity

**3.1.3.15**

**air grille**

device that provides physical protection, yet allows air to pass through

**3.1.3.16**

**silencer**

device to reduce air borne noise

**3.1.4 Operation**

**3.1.4.1**

**automatic mode**

**automatic operating mode**

operating mode of control in which the HVAC system operates in accordance with the programme data until stopped by the programme or the operator

[SOURCE: ISO 13041-1:2004, 3.3.4, modified and adapted to HVAC system]

**3.1.4.2**

**cooling mode**

operating mode in which the *HVAC unit* ([3.1.3.1](#)) provides *cooling* ([3.1.1.1](#))

**3.1.4.3**

**forced cooling mode**

mode which manually operates *HVAC unit* ([3.1.3.1](#)) *cooling mode* ([3.1.4.2](#))

**3.1.4.4**

**pre-cooling mode**

mode which enables the interior temperature to be lowered (without the presence of passengers)

**3.1.4.5**

**free cooling mode**

operating mode in which the HVAC system provides *cooling* ([3.1.1.1](#)) by only introducing *fresh air* ([3.4.1](#))

**3.1.4.6**

**heating mode**

operating mode in which the HVAC system provides *heating* ([3.1.1.4](#))

**3.1.4.7**

**heat pump mode**

mode which can heat the interior by altering the heat emission and removal from the *heat exchangers* ([3.2.3.5](#)) by changing the *refrigerant* ([3.2.3.3](#)) flow

**3.1.4.8**

**forced heating mode**

mode which manually operates *HVAC unit* ([3.1.3.1](#)) *heating mode* ([3.1.4.6](#))

**3.1.4.9**

**pre-heating mode**

mode which enables the interior temperature to be raised (without the presence of passengers)

**3.1.4.10**

**ventilation mode**

mode which provides *ventilation* ([3.1.1.7](#)) only

**3.1.4.11****frost protection mode**

mode to raise temperatures and avoid interior freezing

**3.1.4.12****degraded mode**

operation of the HVAC system with defined limitations in performance

**3.1.4.13****power save mode**

mode which actively reduces its power consumption by allowing parameters to change

Note 1 to entry: Set point and *fresh air* (3.4.1) are examples of parameters.

**3.1.4.14****standby mode**

mode under which a predetermined interior temperature range is maintained during non-operational activity of the vehicle

**3.1.4.15****emergency mode**

mode which provides reduced *ventilation* (3.1.1.7), *heating* (3.1.1.4) and/or *cooling* (3.1.1.1) if the main power source has failed

**3.1.4.16****maintenance mode**

mode used for the purpose of maintenance activities which calls up automatic predefined testing

**3.1.4.17****test mode**

mode used for the purpose of test activities which calls up a specified routine or requires some specific testing during maintenance

**3.1.4.18****washing mode**

mode for external cleaning of train

**3.1.5 Performance****3.1.5.1****cooling capacity**

enthalpy reduction between the *fresh air* (3.4.1) and/or *return air* (3.4.11) on one hand and *primary air* (3.4.4) on the other hand in a defined interval of time

**3.1.5.2****pre-cooling time**

time needed for lowering the interior temperature to *pre-cooling* (3.1.1.2) set point

**3.1.5.3****heating capacity**

enthalpy elevation between the *fresh air* (3.4.1) and/or *return air* (3.4.11) on one hand and *primary air* (3.4.4) on the other hand which can be supported by the *supplementary heater* (3.1.3.5) in a defined interval of time

**3.1.5.4****pre-heating time**

time needed for increasing the interior temperature to *pre-heating* (3.1.1.5) set point