

RAUDTEEALASED RAKENDUSED. RAUDTEEEVEEREMI  
TELJEKOORMUST JA INFRASTRUKTUURI ÜHILDUVUST  
REGULEERIVAD RAUDTEELÕIKUDE KATEGOORIAD

Railway applications - Line categories for managing the  
interface between load limits of vehicles and  
infrastructure

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

See Eesti standard EVS-EN 15528:2021 sisaldab Euroopa standardi EN 15528:2021 ingliskeelset teksti.	This Estonian standard EVS-EN 15528:2021 consists of the English text of the European standard EN 15528:2021.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 01.12.2021.	Date of Availability of the European standard is 01.12.2021.
Standard on kättesaadav Eesti Standardimis- ja Akrediteerimiskeskusest.	The standard is available from the Estonian Centre for Standardisation and Accreditation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile [standardiosakond@evs.ee](mailto:standardiosakond@evs.ee).

ICS 03.220.30, 45.060.20

**Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardimis- ja Akrediteerimiskeskusele**

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardimis- ja Akrediteerimiskeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autoriõiguse kaitse kohta, võtke palun ühendust Eesti Standardimis- ja Akrediteerimiskeskusega: Koduleht [www.evs.ee](http://www.evs.ee); telefon 605 5050; e-post [info@evs.ee](mailto:info@evs.ee)

**The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation and Accreditation**

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation and Accreditation.

If you have any questions about standards copyright protection, please contact the Estonian Centre for Standardisation and Accreditation: Homepage [www.evs.ee](http://www.evs.ee); phone +372 605 5050; e-mail [info@evs.ee](mailto:info@evs.ee)

English Version

## Railway applications - Line categories for managing the interface between load limits of vehicles and infrastructure

Applications ferroviaires - Catégories de ligne pour la gestion des interfaces entre limites de charges des véhicules et de l'infrastructure

Bahnwendungen - Streckenklassen zur Behandlung der Schnittstelle zwischen Lastgrenzen der Fahrzeuge und Infrastruktur

This European Standard was approved by CEN on 30 August 2021.

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, Turkey 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

# Contents

Page

<b>European foreword</b>	<b>3</b>
<b>Introduction</b>	<b>4</b>
<b>1 Scope</b>	<b>5</b>
<b>2 Normative references</b>	<b>6</b>
<b>3 Terms, definitions, symbols and abbreviated terms</b>	<b>6</b>
<b>4 Classification system</b>	<b>10</b>
<b>5 Classification of infrastructure</b>	<b>12</b>
<b>6 Categorization of vehicles</b>	<b>14</b>
<b>7 Static compatibility of the interface between vehicle and infrastructure</b>	<b>22</b>
<b>Annex A (normative) Reference wagons and load models representing the line categories</b>	<b>24</b>
<b>Annex B (informative) Flow chart: Classification of infrastructure and categorization of vehicles</b>	<b>29</b>
<b>Annex C (informative) Speeds which do not require dynamic compatibility checks</b>	<b>30</b>
<b>Annex D (informative) Methods used to determine the load carrying capacity of existing structures</b>	<b>32</b>
<b>Annex E (informative) Application of line classification result</b>	<b>33</b>
<b>Annex F (informative) Comparison of RA classification with line categories</b>	<b>35</b>
<b>Annex G (informative) Example of calculation methodology</b>	<b>36</b>
<b>Annex H (informative) Maximum permissible axle load <math>P</math> – Wagons with two 2-axle bogies</b>	<b>42</b>
<b>Annex I (informative) Maximum permissible axle load <math>P</math> – Wagons with two 3-axle bogies</b>	<b>45</b>
<b>Annex J (informative) Line categories of 6-axle locomotives</b>	<b>48</b>
<b>Annex K (informative) L4 locomotive classes (4-axle locomotives)</b>	<b>49</b>
<b>Annex L (informative) L6 locomotive classes (6-axle locomotives)</b>	<b>50</b>
<b>Annex M (informative) Weight note for locomotives</b>	<b>52</b>
<b>Annex N (informative) Geometric train parameters</b>	<b>55</b>
<b>Annex O (informative) Categorization of MUs by parameter check Identification of line category by maximum axle load</b>	<b>57</b>
<b>Annex P (informative) Guidance for tabling light rail MUs into line category a10, a12 or a14</b>	<b>64</b>
<b>Bibliography</b>	<b>73</b>

## European foreword

This document (EN 15528:2021) has been prepared by Technical Committee CEN/TC 256 “Railway application”, 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 June 2022, and conflicting national standards shall be withdrawn at the latest by June 2022.

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 has been prepared under a Standardization Request given to CEN by the European Commission and the European Free Trade Association.

This document supersedes EN 15528:2015.

Significant technical changes between this document and EN 15528:2015 are:

- All information about dynamic compatibility was deleted including Annexes C, D, E and P (in future part of a TR prepared by TC250/SC1/WG 3/ TG DIBRST);
- For coaches and multiple units an additional categorization is introduced for different values of standing passengers per m<sup>2</sup> in the load case Design mass with exceptional payload (MXD) according to EN 15663:2017+A1:2018;
- Clarification of the informative character of Annex C (Annex F in the previous version) about speeds which do not require additional dynamic compatibility checks.

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

According to the CEN-CENELEC Internal Regulations, the national standards organisations 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, Turkey and the United Kingdom.

## Introduction

The existing European heavy rail system (see EN 17343:2020) consists of elements designed for varying historical requirements. Most civil engineering elements of the heavy rail system were built before the introduction of the Technical Specifications for Interoperability (TSIs) and the Eurocodes for the design of structures.

This document specifies a line classification system to manage the interface between the load limits for rail vehicles and the payload limits for freight wagons and the vertical load carrying capacity of a line.

The line classification system takes into account parameters such as:

- axle load ( $P$ );
- geometrical aspects relating to the spacing of axles;
- mass per unit length ( $p$ );
- speed;

and provides a transparent method for determining whether the vertical loading characteristics of vehicles are compatible with the load carrying capacity of lines on the network.

The line classification system utilizes a suite of line categories specified in this standard by a load model.

# 1 Scope

This document is applicable to the lines with standard track gauge (1 435 mm) and wider track gauges of the heavy rail system<sup>1</sup> and the vehicles that are operated on these lines. This includes machines used for construction, maintenance, inspection, repair and renewal when they are operated in running mode, but not, when they are in working or travelling mode.

This document specifies methods of classification of existing and new lines of the heavy rail system and the categorization of rail vehicles.

This document gives guidance to a reliable and established management of the interface between rail vehicles and the heavy rail network and does not impose any requirements on either vehicles or infrastructure.

The application of this document enables to ensure the static route compatibility between a rail vehicle and the heavy rail network with respect to the vertical load carrying capacity.

It contains requirements relevant to:

- classification of the vertical load carrying capacity of lines of the heavy rail network;
- allocation of rail vehicles to line categories (categorization);
- determination of payload limits of freight wagons.

This document does not apply to:

- assessments of compatibility based on the parameter axle load alone;
- compatibility checks for cases where an additional dynamic analysis is required (for example according to EN 1991-2);
- requirements relating to the maximum total mass or maximum length of a train;
- the system used in Great Britain, where all lines and vehicles are classified in accordance with the RA (Route Availability) System. A guide to the equivalent line categories in accordance with this European Standard is given in Annex F;
- the publication of line categories.

The requirements of this document do not replace any regulations related to running behaviour of vehicles described by the assessment quantities for running safety, track loading and ride characteristics (see EN 14363).

---

<sup>1</sup> According to a note in EN 17343:2020, the heavy rail system “has typically an infrastructure which is designed for an axle load of at least 17 t”. This European standard covers also parts of the networks with lower load capacities.

## 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.

EN 1991-2, *Eurocode 1: Actions on structures - Part 2: Traffic loads on bridges*

EN 15663:2017+A1:2018, *Railway applications - Vehicle reference masses*

EN 15877-1, *Railway applications - Marking on railway vehicles - Part 1: Freight wagons*

## 3 Terms, definitions, symbols and abbreviated terms

### 3.1 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:

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

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

#### 3.1.1

##### **associated maximum speed**

local maximum speed for which the line category is valid

#### 3.1.2

##### **axle load**

**$P$**

sum of the static vertical wheel forces exerted on the track through a wheelset or a pair of independent wheels divided by  $g$

Note 1 to entry: In this standard “load” and “force” are described with units of “mass” (kg or t).

#### 3.1.3

##### **axle spacing**

design values of the distances between the centres of adjacent axles

#### 3.1.4

##### **bending moment**

designation of an internal moment (e.g. in kNm) of a beam as used in structural design

#### 3.1.5

##### **categorisation of vehicles**

statement of the vertical loading characteristics of a heavy rail vehicle, according to the combination of axle loads and axle spacing, by allocation of a line category

#### 3.1.6

##### **classification of infrastructure**

statement of the load carrying capacity of infrastructure on a line by allocation of a line category and related speed information