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KERE PURUNEMISKINDLUSE NÕUDED

Railway applications - Crashworthiness requirements  
for rail vehicles

## EESTI STANDARDI EESSÕNA

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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.
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ICS 45.060.01

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English Version

## Railway applications - Crashworthiness requirements for rail vehicles

Applications ferroviaires - Exigences de sécurité contre collision pour véhicules ferroviaires

Bahnanwendungen - Anforderungen für die Kollisionssicherheit von Schienenfahrzeugen

This European Standard was approved by CEN on 10 February 2020.

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

<b>Contents</b>	<b>Page</b>
<b>European foreword</b> .....	<b>5</b>
<b>Introduction</b> .....	<b>7</b>
<b>1 Scope</b> .....	<b>8</b>
<b>2 Normative references</b> .....	<b>8</b>
<b>3 Terms and definitions</b> .....	<b>8</b>
<b>4 Crashworthiness design of rail vehicle structures</b> .....	<b>10</b>
4.1 General principles.....	10
4.2 Crashworthiness design objectives .....	11
4.3 Rail vehicle crashworthiness assessment process.....	11
<b>5 Crashworthiness assessment requirements</b> .....	<b>11</b>
5.1 Crashworthiness design categories of rail vehicles.....	11
5.2 Train assessment methods .....	12
5.2.1 Complete train set method .....	12
5.2.2 Reference train method .....	13
5.2.3 Summary of train assessment methods .....	13
5.3 Design collision scenarios.....	13
5.4 Assessment of design collision scenarios .....	14
5.4.1 General.....	14
5.4.2 Design collision scenario for category C-I.....	15
5.4.3 Design collision scenario for category C-II.....	15
5.4.4 Design collision scenario for category C-III.....	15
5.4.5 Design collision scenario for category C-IV .....	16
5.4.6 Summary of design collision scenarios .....	16
<b>6 Structural passive safety design requirements</b> .....	<b>18</b>
6.1 Assessment requirements for design collision scenarios .....	18
6.1.1 General.....	18
6.1.2 Explanatory notes (informative) .....	18
6.2 Overriding.....	19
6.2.1 Requirements .....	19
6.2.2 Explanatory notes (informative) .....	19
6.3 Survival space, intrusion and egress.....	20
6.3.1 General requirements .....	20
6.3.2 Survival space requirements for passenger areas .....	20
6.3.3 Driver's cab survival space requirements.....	21
6.3.4 Explanatory notes (informative) .....	21
6.3.5 Definition of driver's seat survival space envelopes.....	22
6.4 Deceleration limit/collision pulse .....	25
6.4.1 Requirement .....	25
6.4.2 Explanatory notes (informative) .....	26
6.5 Obstacle deflector .....	26
6.5.1 Requirement .....	26
6.5.2 Explanatory notes (informative) .....	29
6.6 Lifeguards .....	30
6.6.1 Requirement .....	30

6.6.2	Explanatory notes (informative) .....	30
7	Validation of crashworthiness.....	30
7.1	Validation programme .....	30
7.2	Combined validation programme .....	31
7.2.1	Step 1: Test of energy absorbing devices and crumple zones.....	31
7.2.2	Step 2: Test Calibration of the numerical model.....	31
7.2.3	Step 3: Numerical simulation of the design collision scenarios.....	31
7.3	Reduced validation programme .....	32
7.4	Conformity assessment.....	32
Annex A	(informative) Parameters of design collision scenarios.....	33
A.1	Introduction .....	33
A.2	Determining the design collision scenarios for collision risks which differ from the normal European operations.....	34
A.2.1	Design collision scenarios.....	34
A.2.2	Risk analysis.....	34
A.2.3	Factors to be considered in the risk assessment .....	35
A.2.4	Collisions following derailment.....	35
A.2.5	Bibliography of relevant accident information.....	36
Annex B	(normative) Requirements of a validation programme .....	37
B.1	Test specifications .....	37
B.1.1	Test programme .....	37
B.1.2	Acceptance criteria for calibration/validation tests.....	37
B.2	Numerical simulations .....	38
B.2.1	Numerical model validation.....	38
B.2.2	Simulation modelling.....	38
Annex C	(normative) Reference obstacle definitions.....	40
C.1	80 t wagon with side buffers .....	40
C.2	80 t wagon with heavy duty coupler.....	41
C.3	129 t regional train.....	43
C.4	Level crossing 15 t deformable obstacle.....	44
C.5	Urban road traffic 3 t rigid corner collision obstacle.....	46
C.6	Urban road traffic 7,5 t obstacle .....	47
Annex D	(normative) Reference train definitions .....	50
D.1	Reference trains for locomotive, power head, driving trailer and coach design .....	50
D.2	Locomotive design .....	50
D.3	Power head and driving trailer design.....	50
D.4	Coach design.....	51
D.5	Coach design limited to specific leading vehicles.....	52
Annex E	(informative) Migration rule for this European Standard .....	54

<b>Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 2016/797/EU aimed to be covered .....</b>	<b>55</b>
<b>Bibliography.....</b>	<b>57</b>

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## European foreword

This document (EN 15227:2020) 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 October 2020, and conflicting national standards shall be withdrawn at the latest by October 2020.

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 15227:2008+A1:2010.

This document has been prepared under a mandate given to CEN/CENELEC/ETSI by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive 2016/797/EU.

For relationship with EU Directive 2016/797/EU, see informative Annex ZA, which is an integral part of this document.

Additionally to a general editorial reordering of clauses and text the technical changes with respect to the previous edition are listed below:

- a) applicable vehicle types (1);
- b) modified definitions and examples for crashworthiness design categories (5.1);
- c) definition of train sets to be assessed (5.2);
- d) assessment of train set which is only operated in one direction (5.2);
- e) mandatory requirement of initial vertical offset for design collision scenario 1 for all crashworthiness design categories (5.4.1);
- f) new definition of collision mass in accordance with EN 15663 mass definitions (5.4.1);
- g) new requirements for locomotives with heavy duty couplers (5.4.2 and C.2);
- h) mandatory requirement for locomotives with centre cabs to fulfil design collision scenario 3 (5.4);
- i) additional design collision scenario for crashworthiness design category C-IV (5.4.5 and C.6);
- j) new requirement for support condition of side windows at vehicle ends (6.3.1);
- k) exclusion of gangways from survival space (6.3.2);
- l) mandatory requirement that the survival space for the driver shall be inside the cab (6.3.1);
- m) modified definition for driver’s seat survival space envelopes (6.3.5);
- n) elimination of deceleration limits for design collision scenario 3 (6.4.1);

- o) modified deceleration limits and modified deceleration assessment method for design collision scenarios 1 and 2 (6.4.1);
- p) modified requirement for obstacle deflectors with respect to gauge limits (6.5.1);
- q) new requirements for lifeguards (6.6);
- r) new requirement for tests of structures or components mounted at intermediate ends (B.1.1)
- s) modified obstacle geometry for design collision scenario 3 for crashworthiness design category C-III (C.3);
- t) modified reference train for coach design (D.4);
- u) new train definition for coach design limited to specific leading vehicles (D.5).
- v) alignment of terms and definitions to prEN 17343:2019.

If a vehicle has been successfully assessed using the previous edition of this standard, and the technical changes of the new edition of EN 15227 do not affect this assessment, the vehicle can be regarded to conform to the new standard. Otherwise, if the vehicle needs to be reassessed, it is sufficient to assess only the modified technical requirements and new requirements.

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



## Introduction

The objective of the passive safety requirements described in this European Standard is to reduce the consequences of collision accidents. The measures considered in this European Standard provide the means of protection when all possibilities of preventing an accident have failed. It provides a framework for determining the crash conditions that rail vehicle bodies can be designed to withstand, based on the most common collisions and associated risks.

This European Standard adds to the basic strength requirement defined in EN 12663-1:2010+A1:2014 by setting additional requirements for structural passive safety in order to increase occupant safety in case of collisions.

In the event of a collision, application of this European standard provides protection for the occupants of new designs of crashworthy vehicles through the preservation of structural integrity, reducing the risk of overriding and limiting decelerations. This protection does not extend to interactions between the occupants and the vehicle interior or to occupants of other rail vehicles, to other railway employees and customers who are not in vehicles, or to third parties.

## 1 Scope

This document specifies crashworthiness requirements applicable to new designs of:

- locomotives,
- driving vehicles operating in passenger and freight trains;
- passenger rail vehicles operating in passenger trains (such as trams, metros, mainline trains).

This document identifies common methods of providing passive safety that can be adapted to suit individual vehicle requirements.

This document specifies the characteristics of reference obstacle models for use with the design collision scenarios.

This document also specifies the requirements and methods for demonstrating that the passive safety objectives have been achieved by comparison with existing proven designs, numerical simulation, component or full-size tests, or a combination of all these methods.

## 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 12663-1:2010+A1:2014, *Railway applications - Structural requirements of railway vehicle bodies - Part 1: Locomotives and passenger rolling stock (and alternative method for freight wagons)*

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

prEN 17343:2019, *Railway applications — General terms and definitions*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in prEN 17343:2019 and the following 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

#### **active safety**

systems and measures which take actions that aim to prevent a collision occurring

### 3.2

#### **collision mass**

effective vehicle mass used for collision simulations

### 3.3

#### **collision speed**

$v_c$

velocity difference between trains or train and obstacle at the start of the collision