



# SLOVENSKI STANDARD

## oSIST prEN 15687:2007

01-september-2007

---

Railway applications - Testing for the acceptance of running characteristics of freight vehicles with static wheel loads higher than 112,5 kN up to 125 kN

Railway applications - Testing for the acceptance of running characteristics of freight vehicles with static wheel loads higher than 112,5 kN up to 125 kN

Bahnanwendungen - Fahrtechnische Prüfung für die fahrtechnische Zulassung von Güterfahrzeugen mit statischer Radlast über 112,5 kN bis zu 125 kN

Applications ferroviaires - Essais en vue de l'homologation du comportement dynamique des véhicules de fret avec des charges de roue statiques comprises entre 112,5 kN et 125 kN

<https://standards.iteh.ai/catalog/standards/sist/2a2223de-0515-4032-8560-1abd1cf634dc/osist-pren-15687-2007>

**Ta slovenski standard je istoveten z: prEN 15687**

---

**ICS:**

45.060.20      Železniški vagoni      Trailing stock

**oSIST prEN 15687:2007**

**en**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[oSIST prEN 15687:2007](https://standards.iteh.ai/catalog/standards/sist/2a2223de-0515-4032-8560-1abd1cf634dc/osist-pren-15687-2007)

<https://standards.iteh.ai/catalog/standards/sist/2a2223de-0515-4032-8560-1abd1cf634dc/osist-pren-15687-2007>

May 2007

---

ICS 45.060.20

English Version

## Railway applications - Testing for the acceptance of running characteristics of freight vehicles with static wheel loads higher than 112,5 kN up to 125 kN

Applications ferroviaires - Essais en vue de l'homologation du comportement dynamique des véhicules de fret avec des charges de roue statiques comprises entre 112,5 kN et 125 kN

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 256.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN 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 Management Centre has the same status as the official versions.

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

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

**Warning** : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.



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

**Management Centre: rue de Stassart, 36 B-1050 Brussels**

# Contents

Page

Foreword.....	3
Introduction .....	4
1 Scope .....	5
2 Normative references .....	6
3 Terms and definitions .....	6
4 Stationary tests .....	6
5 On-track tests.....	6
5.1 General.....	6
5.2 Type of on-track test and measuring method.....	6
5.2.1 Choice of on-track test type .....	7
5.2.2 Choice of measuring method .....	9
5.3 Assessment, limit and measuring values .....	12
5.4 Performing 'on-track' tests .....	12
5.5 Test evaluation.....	15
5.6 Documentation of results .....	15
Annex A (normative) Operational parameters .....	16
Annex B (normative) Symbols .....	17
Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 96/48/EC of 23 July 1996 on the Interoperability of the trans-European high-speed rail system, as amended by Directive 2004/50/EC .....	18
Annex ZB (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 2001/16/EC of the European Parliament and of the Council of 19 March 2001 on the interoperability of the trans-European conventional rail system, as amended by Directive 2004/50/EC.....	19
Bibliography .....	20

iteh STANDARD PREVIEW  
(standards.iteh.ai)

## Foreword

This document (prEN 15687:2007) has been prepared by Technical Committee CEN/TC 256 "Railway applications", the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

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 Directives.

For relationship with EU Directive(s), see informative Annex ZA and ZB, which are an integral part of this document.

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:

- Council Directive 96/48/EC of 23 July 1996 on the Interoperability of the trans-European high-speed rail system, as amended by Directive 2004/50/EC <sup>1)</sup>
- Directive 2001/16/EC of the European Parliament and of the Council of 19 March 2001 on the interoperability of the trans-European conventional rail system, as amended by Directive 2004/50/EC <sup>2)</sup>

**(standards.iteh.ai)**

[oSIST prEN 15687:2007  
https://standards.iteh.ai/catalog/standards/sist/2a2223de-0515-4032-8560-1abd1cf634dc/osist-pren-15687-2007](https://standards.iteh.ai/catalog/standards/sist/2a2223de-0515-4032-8560-1abd1cf634dc/osist-pren-15687-2007)

---

1) Official Journal of the European Communities No L 235/6 of 17.09.96

2) Official Journal of the European Communities No L 110 of 20.04.2001

## Introduction

This document covers the on-track testing for acceptance of the running characteristics of railway vehicles equipped with a cant deficiency compensation system and/or vehicles intended to operate with a higher cant deficiency than stated in EN 14363:2005, Annex G. It was established by Working Group 10 Vehicle/Track Interaction of CEN Technical Committee 256 Railway Applications as a supplement to EN 14363, which is related to the acceptance of railway vehicles with conventional curve speeds. It is foreseen to implement the regulations of this standard in a revision of EN 14363.

The establishment of this document was based on existing rules, practices and procedures. The following principles were applied:

- 1) The railway system requires comprehensive technical rules in order to ensure an acceptable interaction of vehicle and track.
- 2) Due to the numerous national and international regulations new railway vehicles had to be tested and homologated before putting them into service. In addition, existing acceptance had to be checked when operating conditions were extended.
- 3) In view of the increasing significance of international traffic, in particular of high speed traffic, the standardization of existing regulations is required. In some cases, additional rules are required as well. An update of existing regulations is also needed due to the considerable progress achieved in the field of railway-specific methods for measuring, evaluation and data processing.
- 4) It is of particular importance that the existing level of safety and reliability is not compromised even when changes in design and operating practices are demanded, e.g. by the introduction of higher speeds, higher wheel forces, etc.

This document takes account of the present state of the art which is generally applicable for test procedures and the evaluation of 'on-track' tests.

This document is derived in essential parts from UIC 518-1 which has not yet been fully validated by experience.

The Working Group is aware that the combination of the test conditions is not always achievable. In some cases, the existing regulations may require exceptions for which justification will be provided to the acceptance body. In this event, the conditions which are not fulfilled will be identified.

The Working Group expects that existing shortcomings will be recognized in further investigations and during frequent application of the rules.

## 1 Scope

This document regulates the testing for acceptance of the running characteristics of freight vehicles with static wheel loads higher than 112,5 kN and up to 125 kN.

All requirements of EN 14363 are applicable with some adaptations concerning:

- the conditions of line tests ,
- limit values for some assessment quantities.

Only differences for the special cases are listed.

The testing of the running characteristics applies principally to all freight vehicles, which operate without restriction on standard gauge tracks (1 435 mm).

NOTE 1 The testing of the running characteristics of:

- railways with different track layout ,
- railways with non-standard gauge tracks

can be conducted by analogy with this document.

The testing of running characteristics is part of the type testing of vehicles which

- are newly developed ,
- have had relevant design modifications, or
- have changes in their operating regimes.

The testing and acceptance of running characteristics refers to the complete vehicle including the running gear. If a running gear, which has already been tested and accepted, is used under a vehicle body of another design, this is considered a design modification. The procedure as described in EN 14363:2005, 5.2 is used.

NOTE 2 In addition to the testing of running characteristics for the acceptance of vehicles, the regulations can be generally applied in other technical tasks, e.g.:

- the checking for compliance against development contracts ;
- the optimization of components, vehicles or running gear ;
- the testing of influences, influencing parameters and relationships of dependence ;
- the monitoring of track or vehicles in operational use .

The application of the full method and the stated limit values reflects (unrestricted) international operation.

Testing for acceptance of vehicles is based on some reference conditions of track. If these are not respected on certain lines, appropriate measures will be taken (speed modifications, additional tests, etc.).

For national or multinational operations the infrastructure managers concerned may authorize variations to the defined conditions. Permissible deviations are indicated in this document.

It is allowed to deviate from the rules laid down if evidence can be furnished that safety is at least the equivalent to that ensured by complying with these rules.

## 2 Normative references

The following referenced documents are indispensable for the application 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 14363:2005, *Railway applications - Testing for the acceptance of running characteristics of railway vehicles - Testing of running behaviour and stationary tests*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions in EN 14363 apply.

## 4 Stationary tests

For stationary tests the requirements of EN 14363 shall apply.

## 5 On-track tests

### 5.1 General

For the acceptance of a freight vehicle with static wheel loads higher than 112,5 kN and up to 125 kN the following modifications of the procedure defined in EN 14363 shall be respected:

- The simplified measuring methods are only applicable for extensions of acceptance without extension of cant deficiency. Especially the operation conditions of freight wagons with axle loads  $\leq 22,5$  kN with higher cant deficiency (and speed) require also tests according to EN 14363 with the full test procedure and the normal measuring method.
- The admissible cant deficiency and speed are lower than for the axle loads defined in EN 14363.
- For the track loading parameters  $Q_{qst}$  and  $Q$  new limit values are defined under defined conditions of track design.
- For extensions of acceptance the choice of the on-track test type and the measuring method is depending on a new defined parameter  $\lambda$  of the laden vehicle respecting the wheel loading of the outer rail in curves due to the height of the centre of gravity (see Tables 1 to 3).
- Extensions of acceptance require compliance to a newly defined safety factor of the track loading parameters  $\lambda$ .

### 5.2 Type of on-track test and measuring method

For the acceptance of a new freight vehicle with  $112,5 \text{ kN} < Q_0 \leq 125 \text{ kN}$  and operational parameters according to Annex A the complete on-track test combined with the normal measuring method is required; the simplified method is not applicable.

For the extension of an acceptance due to changes of design parameters or operation conditions a dispensation from on-track tests or a partial on-track test with the normal or a simplified measuring method can be applied depending on the test results of the accepted vehicle and on the range of changes of relevant parameters.



NOTE The latter case is possible only if the reference vehicle has already been accepted according to the normal measuring method. Otherwise a new acceptance is necessary.

The extension procedure referred to here is applicable only if  $cd_{adm} \leq cd_{adm, acceptance}$ .

If  $cd_{adm} > cd_{adm, acceptance}$ , the full procedure and the normal measuring method shall be applied.

NOTE Tests for wheel loads  $> 112,5$  kN do not cover wheel loads  $\leq 112,5$  kN due to the different operational parameters  $V$  and  $cd$  according to Annex A and EN 14363:2005, Annex G.

In this standard a new parameter  $\chi$  represents a theoretical estimation of  $Q_{qst}$  depending on the height of centre of gravity and the permissible cant deficiency.

### 5.2.1 Choice of on-track test type

The fundamental conditions for freight wagons with  $112,5 \text{ kN} < Q_0 \leq 125 \text{ kN}$  and operational parameters according to Annex A are the same as in EN 14363 with the following differences:

- a partial on-track test or a dispensation from on-track tests for the extension of an acceptance state is only possible if in addition to the requirements of EN 14363;
- the condition for the track loading factor  $\lambda' \geq 1,0$  (see 0) has been respected as well as the condition for the safety factor  $\lambda \geq 1,1$  (see Figure 13 in EN 14363:2005);
- the variation range of vehicle parameters is within the range shown in Table 1 of this standard.

iTech STANDARD PREVIEW  
(standards.iteh.ai)

[oSIST prEN 15687:2007](https://standards.iteh.ai/catalog/standards/sist/2a2223de-0515-4032-8560-1abd1cf634dc/osist-pren-15687-2007)

<https://standards.iteh.ai/catalog/standards/sist/2a2223de-0515-4032-8560-1abd1cf634dc/osist-pren-15687-2007>

**Table 1 — Conditions for dispense of tests and application of partial 'on-track' tests (see EN 14363:2005, Figure 13) in case of  $\lambda \geq 1,1$  and  $\lambda' \geq 1,0$**

Modified parameter	Dispensation from on-track test	Application of partial 'on-track' test
	Freight stock with axle loads more than 22,5 t and up to 25 t	Freight stock with axle loads more than 22,5 t and up to 25 t
<b>Operational parameters</b>		
Increase of maximum permissible vehicle speed	--- <sup>b</sup>	0 km/h to + 20 km/h
Increase of permissible cant deficiency	--- <sup>b</sup>	--- <sup>b</sup>
<b>Vehicle parameters</b>		
Distance between bogie centres	-15 % to +A <sup>a</sup> for $2a^x \geq 9 \text{ m}^e$ -5 % to +A <sup>a</sup> for $2a^x < 9 \text{ m}^e$	-30 % to +A <sup>a</sup> for $2a^x \geq 9 \text{ m}$ -10 % to +A <sup>a</sup> for $2a^x < 9 \text{ m}$
Vehicle wheel base (2-axle vehicle)	-15 % to +A <sup>a</sup> for $2a^x \geq 8 \text{ m}^e$ -5 % to +A <sup>a</sup> for $2a^x < 8 \text{ m}^e$	-30 % to +A <sup>a</sup> for $2a^x \geq 8 \text{ m}$ -10 % to +A <sup>a</sup> for $2a^x < 8 \text{ m}$
Centre of gravity height – empty vehicle	-100 % to +20 %	-100 % to A <sup>a</sup>
$\chi$ – loaded vehicle <sup>g, h</sup>	-100 % to +0,8 ( $\lambda'-1$ ) 100 %	-100 % to +0,8 ( $\lambda'-1$ ) 100 %
Moment of inertia of vehicle body (around z-axis) for non-bogied wagons	-100 % to +10 % <sup>d</sup>	-100 % to +10 % <sup>d</sup>
Torsional stiffness coefficient $c_t^x \leq 3 \times 10^{10} \text{ kNmm}^2/\text{rad}^e$	-66 % to +200 %	-66 % to +200 %
Torsional stiffness coefficient $c_t^x > 3 \times 10^{10} \text{ kNmm}^2/\text{rad}^e$	-50 % to +A <sup>a</sup>	-50 % to +A <sup>a</sup>
Vehicle tare for vehicles with tare mass $\geq 12 \text{ t}$ (non-bogied wagons) or 16 t (bogied wagons) <sup>f</sup>	-15 % to +A <sup>a</sup>	-30 % to +A <sup>a</sup>
Maximum static wheel force (vehicles with $2Q_0 \leq 250 \text{ kN}$ ) <sup>f</sup>	-100 % to +5 %	-100 % to +10 %
<b>Bogie parameters</b>		
Bogie wheel base	0 % to +10 %	-10 % to +20 %
Nominal wheel diameter	-10 % to +15 %	--- <sup>c</sup>
Stiffness of primary vertical suspension (vehicles with two suspension levels)	0 % to +25 %	--- <sup>c</sup>
Stiffness of secondary vertical suspension (total stiffness at vehicles with one suspension level)	0 % to +25 %	--- <sup>c</sup>
Lower transitional loads	-5 % to 0 %	--- <sup>c</sup>
Axle guiding: Stiffness	--- <sup>b</sup>	--- <sup>c</sup>
Axle guiding: Damping, clearances, etc.	--- <sup>b</sup>	--- <sup>c</sup>

Table 1 (continued)

	Dispensation from on-track test	Application of partial 'on-track' test
Rotational torque of bogie	-20 % to +20 %	--- <sup>c</sup>
Moment of inertia of whole bogie (around z-axis)	-100 % to +10 %	-100 % to +20 %
Secondary lateral suspension (stiffness, damping, clearances, etc.)	--- <sup>b</sup>	--- <sup>c</sup>
<p>a No limitation from this document, there may be restrictions from other regulations</p> <p>b No dispensation from on-track tests</p> <p>c Complete on-track tests necessary</p> <p>d Only non-bogied vehicles</p> <p>e Initial value</p> <p>f Final value</p> <p>g <math>X = Q_0 \left[ 1 + 2,3h_g \frac{cd_{adm}}{2b_A} \right]</math> where</p> <p><math>Q_0</math> is static wheel load, in kN</p> <p><math>h_g</math> is height of centre of gravity relative to top of rail, in mm</p> <p><math>cd_{adm}</math> is admissible cant deficiency</p> <p><math>2b_A</math> is lateral distance between the contact points of wheels, in mm (approximately 1 500 mm for standard gauge)</p> <p>h <math>cd_{adm}</math> for evaluation of <math>\chi</math> 130 mm for axle loads <math>\leq 22,5</math> t and 100 mm for axle loads <math>&gt; 22,5</math> t and up to 25 t</p>		

### 5.2.2 Choice of measuring method [oSIST prEN 15687:2007](https://standards.iteh.ai/catalog/standards/sist/2a2223de-0515-4032-8560-labd1cf634dc/osist-pr-en-15687-2007)

[https://standards.iteh.ai/catalog/standards/sist/2a2223de-0515-4032-8560-](https://standards.iteh.ai/catalog/standards/sist/2a2223de-0515-4032-8560-labd1cf634dc/osist-pr-en-15687-2007)

The fundamental conditions for freight wagons with  $112,5 \text{ kN} < Q_0 \leq 125 \text{ kN}$  and operational parameters according to Annex A are the same as in EN 14363 with the following differences:

- One of the two simplified measuring methods for the extension of an acceptance state is only possible if in addition to the requirements of EN 14363
  - the condition for the track loading factor  $\lambda' \geq 1,0$  (see 0) has been respected as well as the condition for the safety factor  $\lambda \geq 1,1$  (see Figure 15 in EN 14363:2005);
  - the variation range of vehicle parameters is within the range shown in Table 2.