
Železniške naprave - Preskušanje voznih karakteristik pri prevzemu železniških vozil s sistemom za kompenzacijo primanjkljaja nadvišanja in/ali vozil, namenjenih za vožnjo pri večjem primanjkljaju nadvišanja, kot je naveden v EN 14363:2005, dodatek G

Railway applications - Testing for the acceptance of running characteristics of railway vehicles with cant deficiency compensation system and/or vehicles intended to operate with higher cant deficiency than stated in EN 14363:2005, Annex G

iTeh STANDARD PREVIEW

Bahnanwendungen - Fahrtechnische Prüfung für die fahrtechnische Zulassung mit Kompensation für Überhöhungsfehlbetrag, um mit höherem Fehlbetrag als in EN 14363:2005, Anhang G zu fahren [SIST EN 15686:2011](#)

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Applications ferroviaires - Essais en vue de l'homologation du comportement dynamique des véhicules ferroviaires avec système de compensation et/ou véhicules désignés pour circuler avec une insuffisance de dévers plus élevée que définie en EN 14363:2005, Annexe G

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45.060.01 Železniška vozila na splošno Railway rolling stock in general

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EUROPEAN STANDARD

EN 15686

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Railway applications - Testing for the acceptance of running characteristics of railway vehicles with cant deficiency compensation system and/or vehicles intended to operate with higher cant deficiency than stated in EN 14363:2005, Annex G

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Foreword

This document (EN 15686:2010) 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of an identical text or by endorsement, at the latest by November 2010, and conflicting national standards shall be withdrawn at the latest by November 2010.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

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 2008/57/EC.

For relationship with EU Directives, see informative Annex ZA, which is an integral part of this document.

It is intended the requirements of this European Standard will be incorporated into EN 14363 when it is revised.

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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

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Introduction

This European Standard 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 requirements of this European Standard in a revision of EN 14363.

The establishment of this European Standard 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.

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

NOTE This European Standard 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 European Standard specifies 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.

In most cases the procedure is the same as defined in EN 14363, only the differences for the special case are listed.

The testing of the running characteristics applies principally to all vehicles used in public transport 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 European Standard.

The testing of running characteristics is part of the test for the acceptance of running characteristics 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 to be used under a vehicle body of another design, this is considered to be a design modification. The procedure as described in 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, variations may be authorized from the defined conditions. Permissible deviations are indicated in this European Standard.

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.

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2 Normative references

The following referenced document is 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 given in EN 14363:2005 apply.

4 Stationary tests

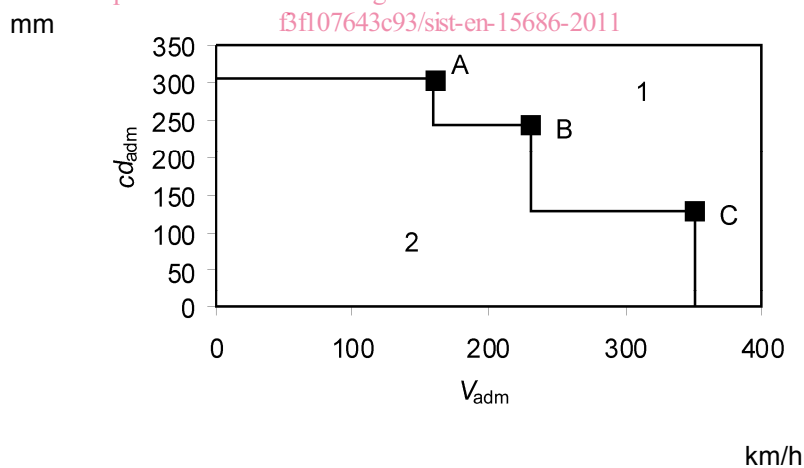
For stationary tests the requirements of EN 14363 shall apply.

5 On-track tests

5.1 General

When planning on-track tests the operational limiting parameters V_{adm} and cd_{adm} for the vehicle have to be selected. The chosen values determine the future use of the vehicle.

It can be necessary to test a vehicle for more than one combination of V_{adm} and cd_{adm} as shown in Figure 1. Point A, point B and point C are related to the different test conditions.



Key

- 1 vehicle not homologated
- 2 vehicle homologated

Figure 1 — Example of limiting operating conditions achieved during on-track testing

NOTE 1 For convenience it is recommended to use standardised values for cd_{adm} of 275 mm or 300 mm for acceptance. Using values equal to or higher than the maximum limiting values stated in FprEN 13803-1 will give the least restrictions for future operation. For national operation, other values of operational parameters can be a better choice.

NOTE 2 It is not necessary for acceptance to distinguish between admissible cant deficiencies which differ by no more than 2 %.

NOTE 3 Reasons for limiting operating conditions could be restricted capabilities of vehicle design or restricted availability of suitable test tracks.

The homologated operation conditions shall be documented in the test report.

For the acceptance of a vehicle within the scope of this European Standard the following modification of the procedure defined in EN 14363 shall be respected:

- for speeds of at least 200 km/h and non-conventional cant deficiencies an additional test zone with curve radii between 600 m and 900 m shall be included¹⁾;
- for the assessment of the running safety the overturning value η is used as additional parameter. A special assessment method for the estimated maximum value of this parameter is defined;
- the simplified measuring methods are only applicable for extensions of acceptance without extension of cant deficiency;
- for the transition curves the results shall be presented depending on three types of transition curves.

The symbols of quantities and characteristics used in Clause 5 are defined in Annex F of EN 14363:2005.

5.2 Type of on-track test and measuring method

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5.2.1 Choice of on-track test type

In principle the same procedure as defined in EN 14363:2005, 5.2.1 shall be applied.

For the extension of an acceptance state, Annex A gives the conditions for dispensation or application of partial on-track tests. They are depending on the test methods of the initial and the new acceptance as well as on the results achieved during the initial acceptance and the modifications of relevant parameters.

NOTE The conditions for the choice of on-track test type for an extension of an acceptance state are slightly different from EN 14363. They are based on the process described in UIC 518:2009. WG 10 intends to modify EN 14363 accordingly during its revision.

5.2.2 Choice of measuring method

In principle the same procedure as defined in EN 14363:2005, 5.2.2 shall be applied.

For the extension of an acceptance state, Annex A gives the conditions by the use of one of the simplified measuring methods including the indication of required axle box force measurement. They are depending on the test methods of the initial and the new acceptance as well as on the results achieved during the initial acceptance and the modifications of relevant parameters.

1) If a vehicle is tested for high values of cd_{adm} according to the test zones defined in EN14363, the track sections with curve radii between 600 m and 900 m are excluded from the assessment, because test zone 2 requires testing in the area of permissible speed and permissible cant deficiency.

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NOTE The conditions for the choice of measuring method for an extension of an acceptance state are slightly different from EN 14363. They are based on the process described in UIC 518:2009. It is intended to modify EN 14363 accordingly at its next revision.

5.3 Assessment, limit and measuring values**5.3.1 Assessment values**

The assessment values for vehicles with special equipment for the negotiation of curves are the same as defined in EN 14363. Additionally in the normal measuring method the overturning criterion:

$$K = \frac{\sum_{bogie} Q_{jA} - \sum_{bogie} Q_{jB}}{\sum_{bogie} Q_{jA} + \sum_{bogie} Q_{jB}}$$

for each bogie where wheel-rail forces are measured shall be evaluated as parameter of running safety.

Signal processing of that quantity is presented in 5.5.7.

5.3.2 Limit values

All limit values of EN 14363 are also applied to vehicles with special equipment for the negotiation of curves.

In addition for the normal measuring method the limit for the overturning criterion:

$$|K|_{lim} = 1,0$$

shall be respected.

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5.3.3 Measured values and measuring points

The same regulations as defined in EN 14363 shall be applied.

5.4 Performing on-track tests**5.4.1 Test conditions**

The requirements of EN 14363 shall be fulfilled.

NOTE As well as for all other parameters of EN 14363 the evaluation of overturning risk does not consider the effect of side wind. Weather conditions during test runs will be such that the wind does not significantly influence the test results.

5.4.2 Test zones

The test zones for vehicles with special equipment for the negotiation of curves are fundamentally the same as in EN 14363, but an additional test zone 2a for curve radii between 600 m and 900 m is defined, when the maximum speed of the vehicle V_{adm} is at least 190 km/h.

5.4.3 Test vehicle

The requirements of EN 14363 shall be fulfilled. In addition to the tests defined in 5.4.3.4 of EN 14363:2005 failure tests on an active tilt system and its active sub-systems (for instance an integrated hold-off device) shall be carried out on track as follows:

— the main failures of the tilting system, as identified by the risk analysis, shall be tested;

- the test shall be done in a full curve section and with a cant deficiency as close as possible to cd_{adm} . The vehicle shall be in a normal load condition. When each defined failure mode is tested, safety quantities ΣY_{2m} , Y/Q_{2m} and κ shall be measured and calculated, then the maximum value shall be compared to the corresponding limit values. No statistical processing of the measured quantities is to be carried out;
- the test curve is chosen in the radius group with the smallest margin from the standpoint of the safety criteria;
- the test shall be carried out in left and right hand curves.

If the failure may result in a sustained downgraded condition, additional verification may be needed. The extent of the test procedure shall be defined by reference to the risk analysis.

5.4.4 Test tracks

The requirements of EN 14363 shall be fulfilled.

5.4.5 Track sections

5.4.5.1 Full curve sections

The requirements for vehicles with special equipment for the negotiation of curves are fundamentally the same as in EN 14363. For the additional test zone 2a with medium radius curves ($600 \text{ m} < R \leq 900 \text{ m}$) the following requirements shall be fulfilled when testing a vehicle for a maximum speed V_{adm} which is at least 190 km/h:

Table 1 shows the additional requirements for this radii class.

Table 1 — Test conditions for track sections in curves

Test characteristic	Test zone			
	2	2a ^b 600 m < R ≤ 900 m	3 400 m ≤ R ≤ 600 m	4 250 m ≤ R < 400 m
Length of track section L_{ts} ^a	see EN 14363	250 m	see EN 14363	see EN 14363
a) $V \leq 140 \text{ km/h}$		25		
b) $140 \text{ km/h} < V \leq 220 \text{ km/h}$				
c) $V > 220 \text{ km/h}$				
Minimal number of track sections $n_{ts,min}$		not defined		
Minimal total length of track sections $\Sigma L_{ts,min}$		not defined		
Mean value of curve radius of all track sections R_{mwa}		not defined		

^a Tolerance for the length of the individual track section: $\pm 20 \%$.

^b The requirements of this subsection shall apply only when the maximum speed V_{adm} is at least 190 km/h.