SIST

SLOVENSKI STANDARD
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Železniške naprave - Preskušanje voznih karakteristik pri prevzemu železniških vozil - Tovorni vagoni - Pogoji za opustitev preskusne vožnje, ki jo je treba izvesti skladno z določili standarda EN 14363

Railway applications - Testing for the acceptance of running characteristics of railway vehicles - Freight wagons - Conditions for dispensation of freight wagons with defined characteristics from on-track tests according to EN 14363

Bahnanwendungen - Prüfung für die fahrtechnische Zulassung von Eisenbahnfahrzeugen - Güterwagen - Bedingungen für Güterwagen mit definierten Eigenschaften zur Befreiung von Streckenfahrversuchen nach EN 14363

Applications ferroviaires - Essais en vue de l'homologation du comportement dynamique des véhicules ferroviaires - Wagons - Conditions pour la dispense des wagons avec caractéristiques definies concernant les essais en ligne selon EN 14363

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

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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.

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Foreword

This document (prEN 16235:2011) 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 Directive 2008/57/EC.

For relationship with EU Directive 2008/57/EC, see informative Annex ZA, which is an integral part of this document.

NOTE This draft is planned to become an amendment of EN 14363 which shall be integrated in the next revision.

Introduction

EN 14363 defines the requirements that a railway vehicle shall achieve with respect to running behaviour. The approval process in accordance with EN 14363, including the dispensation defined in this standard is illustrated in normative Annex B (flow chart).

It is recognised that experience has demonstrated that running gear fitted to wagons that operate safely can also be fitted to other wagons which are within certain design limits. These other wagons will also operate safely without the need to undergo track testing. This experience is based on the characteristics of track design, track maintenance and vehicle maintenance in the European network since 1998. This document defines the process to determine the conditions under which such dispensation from testing can be given for a vehicle defined by the running gear and its relevant parameters together with the associated parameter limits of wagon bodies.

Vehicles for the transport of freight on the railway have historically been subject to standardisation. Very early common items like wheels, buffers, draw gear etc were developed as standardised components to fulfil safety requirements, for achieving ease of repair and maintenance for international traffic and low cost. Freight wagons have a wide range of applications and consequently the parameters will vary. In the UIC work for the standardisation and interchange of freight wagons certain processes for acceptance with respect to running characteristics evolved and these were formalised in UIC 432 and UIC 572 among others. The principles of this standard are similar to the intention of these two leaflets.

NOTE Vehicles accepted through the UIC process were also accepted for RIV (Regolamento Internazionale Veicoli) service, i.e. international interchange between the RIV railways. This was replaced by the General Contract of Use for Wagons (GCU) agreement on 1st July 2006. Following the Directive 2001/16/EC the Conventional Rail Technical Specification for Interoperability for Freight Wagons (CR TSI WAG) was elaborated, which contains interoperability requirements for freight wagons.

The following principles apply to the use of this standard:

1) The railway system requires comprehensive technical rules in order to ensure an acceptable interaction of vehicle and track.

2) New railway vehicles shall be approved (in the UIC 432 the term homologated is used) before being placed into service in accordance with numerous national and international regulations. In addition, existing approval shall be checked when operating conditions are extended. The approval is based on test results, calculations and/or comparisons with existing vehicles in order to achieve a safety level according to the recognised standards and regulations.

3) 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.

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

This standard does not prevent the use of the principles laid down applying to other types of rolling stock.

This standard can be used for international, multilateral and national purposes.

1 Scope

This document defines the process to determine the conditions under which dispensation from on-track testing according to EN 14363, Clause 5 can be given. In its application this document specifies the means by which dispensation from on-track tests is possible.

This standard is subordinate to EN 14363.

This document is not limited to any type of freight vehicle, however certain types, which have been previously accepted under the auspices of UIC are considered have a continuing dispensation from on-track testing. These freight vehicles are detailed within this document.

The dispensation conditions described in this document apply to all freight vehicles used in international, multilateral or national rail freight transportation, which operate without restriction on standard gauge tracks (1 435 mm). The various rail-inclinations used in Europe (1:20, 1:40 and 1:30) are covered by the conditions for dispensation.

This standard only contains requirements for characteristics related to the requirements in EN 14363, Clause 5.

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, *Railway applications — Testing for the acceptance of running characteristics of railway vehicles — Testing of running behaviour and stationary tests*

EN 15551, *Railway applications — Railway rolling stock — Buffers*

EN 15566, *Railway applications — Railway rolling stock — Draw gear and screw coupling*

3 Terms and definitions

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

3.1
freight wagon with standardised characteristics according to this standard
freight wagon consisting of a car body with parameters in a defined range and equipped with a standardised running gear according to this standard

3.2
established running gear according to this standard
running gear that has been previously homologated under auspices of UIC. Clause 5 of this standard is in place for the declaration of conformity

3.3
standardised running gear according to this standard
running gear, bogie or single axle suspension system, which ensures compliance with the requirements of EN 14363, Clause 5 for a vehicle that has car body parameters in a defined range

3.4
declaration of conformity according to this standard
declaration containing all necessary information for the description of a proven configuration according to Clause 4 of this standard consisting of

— a description of the standardised running gear. The relevant parameters and the proven range of them are defined in the homologation file for the standardised running gear

— the range of applicable parameters of the vehicle body

— the applicable operating conditions

3.5
homologation file
contains the relevant parameters and their allowed modification range for standardised running gear according to this standard, based on the assessment according to the requirements in Clause 4 of this standard

3.6
bogies of Y 25 - family
are defined by

— a torsional elastic frame, consisting of two side beams with or without head beam

— spring suspension with two sets of helical springs (a set may also consist of one spring) per axle box

— a lateral and vertical dry friction damping depending on part of the vertical load supported by the axle box

— a wheelset guiding with a maximum allowed nominal lateral displacement of ± 10 mm

and called Y 21, Y 23, Y25, Y27, Y31, Y33 and Y37

3.7
two axle steering axle bogie family
are defined by

— a stiff frame, consisting of two side beams with a head beam

— a leafspring mounted in links guiding the axle

— a nominal longitudinal clearance of ± 6mm

— a nominal lateral clearance of ± 23 mm and

and called for example DB 65, LHB 82, WU 83, Talbot U

3.7
mass distribution coefficient

$$\Phi = \frac{\sqrt{\frac{I_{zz}^*}{m^*}}}{2a^*} = i_{zz}^*/2a^* \text{ with}$$

I_{zz}^* – moment of inertia of the car body relative to the vertical axis through the centre of gravity of the car body

i_{zz}^* – radius of inertia of the car body relative to the vertical axis through the centre of gravity of the car body

m^* – mass of the car body

$2a^*$ - wheelbase

3.8

coefficient of height of centre of gravity $\chi = Q_0\left[1 + 2{,}3h_{cg}\frac{I_{adm}}{(2b_A)^2}\right]$ **with**

Q_0 - static wheel load in kN

h_g – height of c.o.g.

l_{adm} – admissible cant deficiency

$2b_A$ - lateral distance between the contact points of wheels (approximately 1 500 mm for standard gauge)

3.9
safety factor
lowest ratio between limit value and estimated value of all running safety parameters for all test zones and test conditions expressed as follows

$\lambda = min(x_{lim}/X(PA)_{max}, y_{lim}/Y(PA)_{max}, ...)$

This shall be done for the assessment values

ΣY, Y/Q for normal measuring method and

H, ÿ⁺, $\ddot{y}_S^*$ and $\ddot{z}_S^*$ for simplified measuring method.

κ for vehicles intended to operate with higher cant deficiency than 165mm and assessed with the normal measuring method.

3.10
factor for track loading parameters
the lowest ratio between limit value and estimated value of maximum and quasi-static wheel load is expressed as follows:

$\lambda' = min(Q_{qst,lim}/Q_{qst}; Q_{lim}/Q_{max})$

This parameter is only applicable for freight vehicles with static axle loads higher than 225 kN up to 250 kN

4 Acceptance process to achieve a standardised running gear status

4.1 General

Vehicles with parameters within a defined range and equipped with a standardised running gear have dispensation from on-track testing according to EN 14363.

A standardised running gear according to this standard shall be certified in a declaration of conformity with this Standard. For this purpose on-track tests according to EN 14363, Clause 5 shall be carried out with two different vehicles. If both vehicles pass the tests described in 4.2, the running gear shall be certified as standardised running gear in a declaration of conformity with this standard that contains the parameter range described in 4.3 to 4.5.

NOTE This procedure applies only to the on-track tests as required in the relevant clauses of EN 14363 (Clause 5). It does not give approval for safety against derailment on twisted track (4.1) and under longitudinal compressive forces in S-shaped curves (4.2).

4.2 Test requirements

4.2.1 Test extent

The tests shall be performed for the same intended operating conditions (V_{adm} and I_{adm}) with two wagons with body parameters within the ranges defined in Table 1 as follows:

— one wagon of short running gear distance and

— one wagon of long running gear distance.

NOTE 1 For the purposes of assessment of running behaviour a typical loading condition shall be tested. It is not necessary to test the worst possible density of the load using the maximum axle load and filling the whole loading gauge.

Table 1 — Body parameters

		2-axle wagons		Bogie wagons	
		Short test wagon	Long test wagon	Short test wagon	Long test wagon
Running gear distance	$2a^*$ [a] [m]	≤ 7	≥ 9	≤ 7	≥ 13
Acceptable range of torsional stiffness	c_t^* [kNmm²/rad]	$0{,}5 \times 10^{10}$ ... 8×10^{10}	$0{,}5 \times 10^{10}$ ... 8×10^{10}	$0{,}5 \times 10^{10}$ ... 8×10^{10}	$0{,}5 \times 10^{10}$ ... 8×10^{10}

[a] 2a* is the distance between wheelsets for 2-axle wagons or the distance between bogies for bogie wagons and ct* is the vehicle body torsional stiffness coefficient.

The tests shall be carried out according to the complete procedure in EN 14363, Clause 5.

In addition, for 2 axle wagons for speeds ≥ 100 km/h shall be tested in loaded condition also in sections of test zone 2 with clearances given by a gauge ≥ 1 450 mm in combination with wheelsets having distances between active faces at the minimum operation limit.

NOTE 2 It is desirable to perform such tests based on measurements of lateral acceleration, if it can be shown that a relationship exists between accelerations and the sum of the guiding forces and a related limit value was established.

NOTE 3 This requirement is intended to be shifted to the test conditions in EN 14363.

4.2.2 Certification

The compliance of new types of bogies/running gear with the requirements of this standard shall be documented in the declaration of conformity with this standard. This declaration shall include

— an unequivocal and unique name for the running gear

— range of parameters of the running gear (see 4.3)

— detailed technical description of the interface between car body and running gear (see 4.4)

— range of parameters of car bodies to be used together with the running gear (see 4.5)

— wear limits which are essential to sustain an acceptable running behaviour (maintenance rules are outside the scope of this document)

Examples for such information can be found in Annex C to Annex L, where these are given for already accepted running gear.

4.3 Range of running gear parameters for dispensation from on-track tests

The functional details of the running gear relevant to the running behaviour during on-track tests according to EN 14363 shall be specified in the acceptance process. Table 2 and Table 3 give an indication of which parameter shall be available for acceptance purposes. In addition the following shall be specified:

— admissible speed V_{adm}

— admissible cant deficiency I_{adm}

Following successful testing according to 4.2 the acceptable parameter variation range for a dispensation from on-track tests is given by the range between the nominal tested parameters and extended where applicable as specified in Table 2 and Table 3 for single-axle running gear and bogies. All parameters given in these tables are nominal values. The upper limit of the acceptable range depends on the maximum tested value of the respective parameter, the lower limit on the minimum tested value.

To extend the applicable parameter range of a standardised running gear, test results of a third tested vehicle outside the previously tested range shall be used.

Table 2 — Accepted ranges of parameters for a single axle running gear which was tested successful according to 4.2

Nominal parameter		Min	Max
maximum axle load	P	-	P_{tested}
vertical eigenfrequency (see Annex C)	ν_z	0,9 $\nu_{z,tested}$ in load range	1,12 $\nu_{z,tested}$ in load range
vertical damping		tested characteristics	tested characteristics
lateral suspension characteristics		tested characteristics	tested characteristics
wheel diameter	D	D_{tested} –90 mm	D_{tested} +90 mm

Table 3 — Accepted ranges of parameters for a bogie which was tested successful according to 4.2

Nominal parameter		Minimum	Maximum
Maximum axle load	P_{max}	-	1,05 · $P_{max,tested}$
Bogie axle distance (between outer axles of the bogie)	$2a^+$	$2a^+_{tested}$	$2a^+_{tested}$ + 0,2 m
Vertical eigenfrequency (see Annex C)	ν_z	0,90 · $\nu_{z,tested}$ in load range	1,12 · $\nu_{z,tested}$ in load range
Vertical Damping		Tested characteristics	Tested characteristics

Table 3 *(continued)*

Nominal parameter		Minimum	Maximum
Axle guiding longitudinal		Tested characteristics	Tested characteristics
Axle guiding lateral		Tested characteristics	Tested characteristics
Lateral secondary suspension characteristics		Tested characteristics	Tested characteristics
Yaw resistance of bogie[a]	M^*_z	$0{,}80 \cdot M^*_{z,tested}$	$1{,}20 \cdot M^*_{z,tested}$
Moment of inertia of whole bogie (around z-axis)	I^*_{zz}	0	$1{,}10 \quad I^*_{zz,tested}$
Wheel diameter	D	D_{tested} –90 mm	D_{tested} +90 mm
Nominal height of centre pivot	h_{cp}	$h_{cP,tested}$ – 150 mm	$h_{cP,tested}$ + 50 mm

[a] For a friction based yaw resistance torque measured at two specified loads typical for empty and loaded condition. For other systems, appropriate parameters shall be used to control stability and safety against derailment in empty condition and maximum guiding force in loaded conditions.

4.4 Description of the interface running gear / car body

A description of the physical interface between running gear and car body shall include:

— the yaw characteristics of the running gear;

— range of vertical characteristics of side bearers (if applicable);

— range of characteristics of secondary suspension (stiffnesses, hysteresis/damping)(if applicable).

4.5 Range of vehicle body parameters for dispensation from on-track tests

The functional details of the vehicle body relevant to the running behaviour during on-track tests according to EN 14363 shall be specified in the acceptance process. Table 4 gives an indication of which parameter shall be available for acceptance purposes.

Following successful testing according to 4.2 the acceptable parameter variation range for a dispensation from on-track tests is given by the range between the nominal tested parameters and extended where applicable as specified in Table 4. All parameters given in this table are nominal values. The upper limit of the acceptable range depends on the maximum tested value of the respective parameter, the lower limit on the minimum tested value.

To extend the applicable vehicle parameter range of a standardised running gear, test results of a third tested vehicle outside the previously tested range shall be used.

Table 4 — Accepted parameters for vehicles (included articulated wagons and permanently coupled units) equipped with a running gear which was tested successfully according to 4.2

		Min	Max
Distance between wheelsets (non bogie vehicles)	$2a^*$	Lowest value of 6 m and $2a^*_{tested}$	Highest value of 10 m and $2a^*_{tested}$
Distance between bogies (bogie vehicles)	$2a^*$	Lowest value of 6,5 m and $2a^*_{tested}$	$2a^*_{tested}$ + 3 m
Centre of gravity height of empty wagon	h_{cg}	0	$1,2 \cdot h_{cg,empty,tested,max}$
Coefficient of height of centre of gravity - loaded vehicle [a]	χ	0	$\chi_{loaded,tested,max}$ *(1+0,8(λ'-1)) with λ' – factor for track loading parameters (see 3.10)
Torsional constant per car body	c_t^*	> 0,5 10^{10} kNmm²/rad	'-
Mean axle load of the tare wagon (non-bogie wagon)	$P_{mean,tare}$	Smallest value of 5,75 t and $P_{mean,tare,tested}$	-
Mean axle load of the tare wagon (bogie wagon)	$P_{mean,tare}$	Smallest value of 4 t and $P_{mean,tare,tested}$	-
Maximum axle load	P	-	$1,05 \cdot P_{tested}$
Mass distribution coefficient (empty and loaded vehicle)	Φ	0	$1,2 \cdot \Phi_{tested}$

[a] for evaluation of χ: admissible cant deficiency I_{adm} of 130 mm for axle loads ≤ 225 kN and 100 mm for axle loads> 225 kN and up to 250 kN.

5 Established running gear

5.1 General

Vehicles with parameters within a defined range and equipped with an established running gear have dispensation from on-track testing according to EN 14363.

Established running gear according to this standard was previously homologated under auspices of UIC. This clause replaces the declaration of conformity with this standard as required in Clause 4 for dispensation of on-track tests for a new running gear design.

In the following clauses the requirements for the components, operational and design requirements from the point of view of running dynamics are defined for the established running gear in the main text and normative Annexes. Several existing versions of accepted components fulfilling the normative requirements are given in informative Annexes.

5.2 Wagons with single axle running gear

5.2.1 General

Three different types of single axle running gear are established:

— double link suspension;