SLOVENSKI STANDARD
SIST EN 16404:2014

01-maj-2014

Železniške naprave - Zahteve za ponovno utirjenje in obnovitev železniških vozil

Railway applications - Re-railing and recovery requirements for railway vehicles

Bahnanwendungen - Anforderungen für das Aufgleisen und Bergen von Schienenfahrzeugen

Applications ferroviaires - Exigences relatives au réenraillement et au rétablissement de véhicules ferroviaires

Ta slovenski standard je istoveten z: EN 16404:2014

ICS:

45.060.01	Železniška vozila na splošno	Railway rolling stock in general

SIST EN 16404:2014 **en,fr**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 16404

February 2014

ICS 45.060.01

English Version

Railway applications - Re-railing and recovery requirements for railway vehicles

Applications ferroviaires - Exigences relatives au réenraillement et au rétablissement de véhicules ferroviaires

Bahnanwendungen - Anforderungen für das Aufgleisen und Bergen von Schienenfahrzeugen

This European Standard was approved by CEN on 9 November 2013.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, 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: Avenue Marnix 17, B-1000 Brussels

Ref. No. EN 16404:2014 E

Contents

Page

Foreword

This document (EN 16404:2014) 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 August 2014, and conflicting national standards shall be withdrawn at the latest by August 2014.

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 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.

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

Introduction

Rail vehicles are designed so that re-railing and recovery operations after a derailment or accident can be safely undertaken without exposing persons to undue risk during lifting and jacking operations.

For rolling stock of interoperable trains there is a need to define common requirements in terms of lifting and jacking operations, equipment space envelopes and lifting accessories.

Foreseeable factors that can influence a re-railing or recovery operation include:

— final vehicle position relative to the track;

— weight transfer due to final vehicle orientation (inclination or roll);

— vehicle load, possible overloading or uneven loading;

— load movement or shifting;

— embedding in ground;

— sinking of jacks (soft ground);

— structural distortion/damage;

— jerking or snatching of lifting equipment.

The majority of these factors cannot be quantified either in advance or during a recovery operation and therefore precise requirements cannot be set out in this European Standard and accordingly design scenarios are used. The resulting requirements together with competent persons undertaking the re-railing or recovery operation using the documentation specified are considered to be sufficient to ensure that the overall objectives are satisfied.

1 Scope

This European Standard is applicable to all railway vehicles that will operate under the Interoperability Directives taking into consideration the recommendations given in Annex E on the application of the standard (migration rule).

Rolling stock of the following types are excluded from the scope of this European Standard:

— metros, tramways, and other light rail vehicles;

— vehicles for the operation of local, urban or suburban passenger services on networks that are functionally separate from the rest of the railway system;

— vehicles exclusively used on privately owned railway infrastructure that exist solely for use by the owner for its own freight operations;

— vehicles reserved for a strictly local, historical or touristic use.

On track machines are in the scope of this European Standard only when in transport (running) configuration on their own rail wheels, either self-propelled or hauled.

However, the requirements may be appropriate for other applications that have similar operational conditions. It specifies the principles and processes to be followed to achieve satisfactory arrangements for re-railing or recovery of railway vehicles and to validate the design against the relevant performance and safety requirements.

The interface between the re-railing and recovery equipment and vehicle structure is considered as the interface between the jack contact faces or the lifting bracket contact areas. The structural requirements for the vehicle structures are set out in EN 12663-1 and EN 12663-2.

NOTE Railway vehicles that will operate under the Interoperability Directives correspond to the categories L, P-I, P-II, F-I and F-II defined in EN 12663–1.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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, *Railway applications - Structural requirements of railway vehicle bodies - Part 1: Locomotives and passenger rolling stock (and alternative method for freight wagons)*

EN 12663-2, *Railway applications - Structural requirements of railway vehicle bodies - Part 2: Freight wagons*

EN 13155, *Cranes - Safety - Non-fixed load lifting attachments*

EN 15663, *Railway applications - Definition of vehicle reference masses*

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

EN 15877-2, *Railway applications - Markings of railway vehicles - Part 2: External markings on coaches, motive power units, locomotives and on track machines*

EN 22768-1:1993, *General tolerances - Part 1: Tolerances for linear and angular dimensions without individual tolerance indications (ISO 2768-1:1989)*

3 Terms and Definitions

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

3.1
articulated vehicle with shared running gear
system of articulation where each vehicle has its own secondary suspension but shares running gear (often referred to as Jacobs bogies)

Note 1 to entry: Typically each car body is supported at 4 points. Trains made up of vehicles of this type are a particular type of fixed formation train.

3.2
articulated vehicles with three point support
system of articulation where each vehicle has one bogie complete with its own secondary suspension and at the other end a single point connection to the adjacent vehicle in the train

Note 1 to entry: Trains made up of vehicles of this type are a particular type of fixed formation train.

3.3
fixed formation
train formation that can only be reconfigured in a workshop environment

Note 1 to entry: A fixed formation train can be made up of either articulated or otherwise conventional vehicles.

3.4
jacking
action of raising a vehicle or part of a vehicle by pushing upwards from underneath using appropriate equipment such as jacks

3.5
lifting
action of raising a vehicle or part of a vehicle by pulling upwards from above using appropriate equipment such as cranes

3.6
lifting/jacking point
particular points provided on the car body and/or running gear to position or locate lifting devices to raise or lower a vehicle using either cranes or jacks

3.7
lifting bracket
removable item of equipment that provides the functionality of a lifting/jacking point when attached to the vehicle using a lifting pocket

3.8
lifting pocket
recess or other interface on the vehicle structure intended for the attachment of a lifting bracket

Note 1 to entry: This item interfaces with a lifting bracket to form a lifting/jacking point.

3.9
On Track Machines (OTM)
mobile railway infrastructure construction and maintenance equipment

3.10
re-railing
operation consisting of raising and translating a derailed railway vehicle in order to put it back on the rails

Note 1 to entry: This operation is carried out at the site of the incident, by means of rescue equipment used by specialist rescue teams.

3.11
re-railing beam
beam that can be placed transversally beneath a derailed vehicle that can be used to support and traverse re-railing equipment (jacks) and thereby translate the vehicle as part of a re-railing operation

3.12
re-railing position
location on the underframe where there is sufficient clearance for a re-railing beam, roller carriages and jacks to be located to permit re-railing in a single operation

Note 1 to entry: This is termed ‘re-railing place’ in WAG TSI.

3.13
recovery
process of clearing the railway line of a vehicle that has been immobilized as a result of collision, derailment, accident or other incident

3.14
running gear
wheelsets, bogies and associated suspension components

Note 1 to entry: For this standard, running gear denotes wheelsets and suspension elements which have significant additional movement relative to the vehicle car body and may therefore require securing.

3.15
single end lift
vehicle lifting activity where the lifting equipment is employed at one end of a railway vehicle with the other end remaining supported by a bogie/wheelset in contact with the rails or ground

3.16
support point
designated points on a vehicle which are suitable for supporting the vehicle during or after a lifting/jacking operation

Note 1 to entry: Support points can be either lifting/jacking points or other points designated for the purpose.

3.17
vehicle end
any longitudinal position between the centre of the vehicle and the end of the vehicle

3.18
wheelskate
device for rescuing vehicles where a wheelset is not fit to rotate, by lifting the affected wheelset and providing an alternative means of support and guidance in order to facilitate movement to a repair location

4 Requirements for the re-railing and recovery of rail vehicles

4.1 General requirements for all vehicles

It shall be possible to safely lift or jack a vehicle for re-railing or recovery purposes (following a derailment or some other accident or incident) using designated lifting/jacking points.

Requirements for the provision or type of lifting/jacking points for maintenance purposes are outside the scope of this European Standard though the same locations can be used for both purposes, subject to the respective design criteria being satisfied.

4.2 Required lifting and jacking operations

4.2.1 Lifting and jacking operations for all rail vehicles

Rail vehicles shall be designed for:

— lifting either end of a rail vehicle with the other end supported by the vehicle suspension, or in the case of articulated vehicles, depending on the system of articulation used, possibly supported by an adjacent vehicle;

— lifting of the complete vehicle.

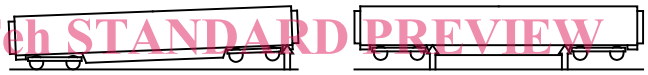

Figure 1 — Conventional vehicles: single end and full vehicle lifting

It shall be possible to lift a rail vehicle for re-railing or recovery purposes with the running gear secured to the car body (see 5.5).

For re-railing or recovery, it shall be possible to raise or lower a vehicle end or a complete vehicle using only jacking equipment (and lifting brackets if these are required).

NOTE For re-railing and recovery operations, lifting/jacking is undertaken by designated personnel who are trained and qualified by knowledge and practical experience to enable the re-railing and recovery operations to be carried out in accordance with the re-railing and recovery instructions for the vehicle (see Clause 8).

4.2.2 Lifting and jacking operations for articulated vehicles and/or fixed formations

For articulated vehicles and/or fixed formations it shall be possible to simultaneously lift the end or ends of adjacent vehicles in order to achieve the objectives set out above for lifting vehicles (see Figure 2 and Figure 3). Any restrictions or particular requirements shall be included in the recovery documentation (see Clause 8).

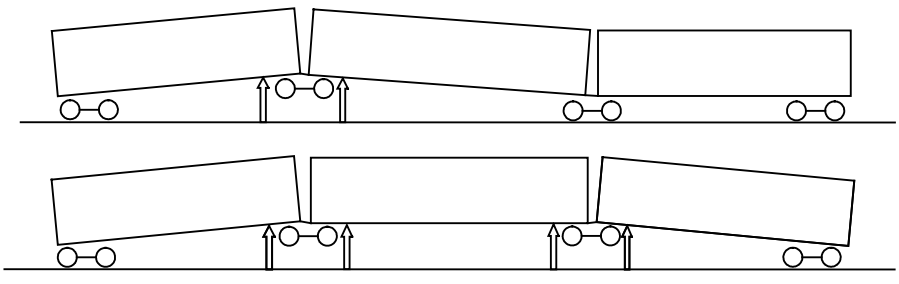

Figure 2 — Articulated vehicles with shared running gear: single end and full vehicle lifting

For articulated vehicles with three point support it is permissible for lifting loads to be transferred to an adjacent vehicle through the articulation joint, for example as indicated in Figure 3.

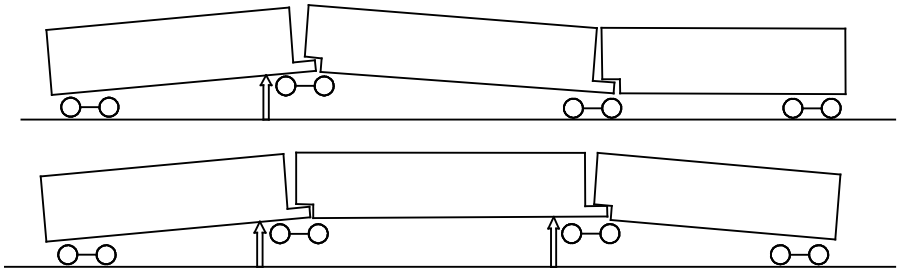

Figure 3 — Articulated vehicles with three point support: single end and full vehicle lifting

4.2.3 Provision of lifting/jacking points

Lifting/jacking points for re-railing and recovery shall be provided by

— the provision of dedicated lifting/jacking points for re-railing and recovery,

and/or

— the use of lifting/jacking points which are also intended for maintenance purposes,

and/or

— removable lifting brackets with compatible attachment points or lifting pockets.

In all cases conformity with the requirements of this European Standard shall be demonstrated.

Permanent, built-in lifting/jacking points shall be provided on the rail vehicle except where it can be demonstrated that due to, for example, the vehicle bodyside profile and/or gauging restrictions the required access cannot be achieved without compromising other aspects of the vehicle design (see 5.1.3).

For heavy vehicles, for example locomotives or fully loaded freight vehicles, the vehicle should be lifted using the running gear supporting the car body instead of lifting the vehicle with the running gear suspended from the car body structure to avoid structural collapse or damage.

If permanent built-in lifting/jacking points for re-railing and recovery are not provided for some or all vehicle lifting positions, attachment points or lifting pockets shall be provided to allow removable lifting brackets to be fitted in accordance with the requirements of 5.4 and 6.4.

4.2.4 Requirements for marking and documentation

Each lifting/jacking point shall be marked in accordance with the requirements of Clause 7 to clearly identify the intended function or functions of the lifting/jacking point.

4.3 Vehicle masses for lifting and jacking

The minimum vehicle mass, denoted MV, shall be the design mass in working order as defined by EN 15663, less the mass of any staff.

The maximum vehicle mass, denoted MC, to be used to determine the loads used in the design of lifting/jacking points, shall be the design mass under normal payload for the vehicle as defined by EN 15663, less the mass of any passengers and staff.

NOTE 1 For passenger vehicles, as defined in EN 15663, luggage mass is included. It is assumed that for a recovery operation while the passengers and train crew will have been evacuated, all other items remain on the vehicle.

NOTE 2 For freight vehicles, as set out in EN 15663, the maximum vehicle mass is the vehicle mass in working order plus the maximum payload specified for the vehicle. For freight vehicles, staff and/or passenger masses are zero.

5 Design requirements for lifting and jacking points

5.1 Positioning of Lifting/Jacking Points

5.1.1 General requirements for lifting/jacking points

All lifting/jacking points placed along the vehicle car body sides or at the ends of the vehicle shall be arranged with a matching lifting/jacking point on the opposite side of the vehicle, i.e. arranged in pairs.

There shall be a minimum of four lifting/jacking points on the vehicle car body, arranged as two pairs, with at least one pair located at each vehicle end.

It is recommended that in the vicinity of each set of running gear two pairs of lifting/jacking points are provided.

Lifting/jacking points provided for a full vehicle lift shall also be suitable for single end lifting.

Pairs of lifting/jacking points shall be separated laterally by at least 860 mm.

For articulated vehicles at positions where the running gear is shared, recovery lifting/jacking points shall be arranged to allow adjacent vehicle ends to be lifted simultaneously.

For freight wagons constructed in accordance with Annex C of the Freight Wagons TSI, there shall be at least one re-railing position at each vehicle end, i.e. a pair of lifting/jacking points that comply with the requirements of 5.1.4.

For other freight wagons and other types of vehicle, there shall be at least one pair of lifting/jacking points at each vehicle end where running gear is attached which shall permit the use of re-railing beams (see 5.1.4). At these points the height of the lifting/jacking points shall lie within the range specified in 5.1.4. Elsewhere the heights of additional lifting/jacking points shall be part of the vehicle specification.

5.1.2 Longitudinal location of lifting/jacking points

Lifting/jacking points for re-railing and recovery shall be located longitudinally according to Figure 4:

— inboard or outboard of the running gear (zones 1 and 4 as shown in Figure 4),

or

— in a restricted zone, subject to satisfying the requirements of 5.1.3 and 5.1.4, at a position which is greater than or equal to 360 mm longitudinally from the centreline of a designated re-railing beam space envelope (zone 2 as shown in Figure 4).