SLOVENSKI STANDARD
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Železniške naprave - Izvedbene zahteve za stopnice, ograje in dostop za osebje - 1. del: Potniški vagoni, prtljažni vagoni in lokomotive

Railway applications - Design requirements for steps, handrails and associated staff access - Part 1: Passenger vehicles, luggage vans and locomotives

Bahnanwendungen - Konstruktionsanforderungen an Tritte, Handgriffe und Zugänge für das Personal - Teil 1: Reisezugwagen, Gepäckwagen und Lokomotiven

Applications ferroviaires - Exigences pour la conception des marchepieds, poignées et accès destinés au personnel - Partie 1: Véhicules voyageurs, fourgons à bagages et locomotives

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Bahnanwendungen - Konstruktionsanforderungen an Tritte, Handgriffe und zugehörige Zugänge für das Personal - Teil 1: Personenfahrzeuge, Gepäckwagen und Lokomotiven

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Foreword

This document (EN 16116-1:2013) 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of an identical text or by endorsement, at the latest by March 2014, and conflicting national standards shall be withdrawn at the latest by March 2014.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.

This European standard is part of the series EN 16116, *Railway applications — Design requirements for steps, handrails and associated access for staff*, which consists of the following parts:

— *Part 1: Passenger vehicles, luggage vans and locomotives;*

— *Part 2: Freight wagons.*

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

Locomotives, luggage vans and passenger rolling stock are designed so that staff are not exposed to undue risk during coupling and access to the vehicle or to special equipment. It is therefore essential to define common requirements for rolling stock.

1 Scope

This European Standard specifies the minimum ergonomic and structural integrity requirements for steps and handrails used by railway staff to access passenger vehicles, luggage vans, locomotives and power units of rolling stock. It also applies to passenger-rated car carriers.

This European Standard defines the required spaces necessary for handling of screw couplings with side buffers, shunter handrails and shunter's stand. For staff access, it defines footsteps, handrails and their dimensions and free spaces. To fulfil the requirements for loads which are applied by the staff, it defines dimensions and requirements for materials or design loads.

It also defines the general requirements of steps and handrail for access to external equipment, for example windscreens, wipers or external lights.

This European Standard does not cover on track machines (mobile railway infrastructure construction and maintenance equipment) and tram-trains.

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 131 (all parts), *Ladders*

EN 10025-2:2004, *Hot rolled products of structural steels — Part 2: Technical delivery conditions for non-alloy structural steels*

EN 14752:2005, *Railway applications — Bodyside entrance systems*

EN 15085 (all parts), *Railway applications — Welding of railway vehicles and components*

EN 15273 (all parts), *Railway applications — Gauges*

EN 16116-2, *Railway applications — Design requirements for steps, handrails and associated staff access — Part 2: Freight wagons*

3 Terms and definitions

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

3.1
clearance
defined free space which is needed to ensure space for the correct functioning of, and safety when handling, devices

3.2
step
footstep with defined properties solely for staff use

3.3
shunter
shunting staff who couple and uncouple vehicles and direct movements

3.4
shunter's step
specific step used for the shunter's stand

3.5
handrail
handrail with defined properties solely for staff use

3.6
shunter handrail
specific handrail fitted at headstock under each buffer

3.7
shunter's stand
shunter's step in combination with handrail for the specific use of shunting staff to allow travel outside the vehicle during shunting

3.8
reserved spaces
defined free space which is needed to ensure safe working conditions for the shunting staff during coupling and uncoupling of screw couplings

3.9
safe working position
position for the shunter allowing sight for directing driving during shunting operations

Note 1 to entry: These positions may be:

— a shunter's stand,

— a platform,

— a step with a corresponding handrail,

— the driver's cab or

— vestibule of a passenger car with sight in the direction of travel.

4 General requirements for steps and handrails

Steps and handrails shall withstand the loads applied by staff.

For confidence in the safety of steps and handrails an appropriate stiffness should be provided. The corresponding stiffness criteria (permissible elastic deformation under load) for steps and handrails are optional and should be defined in the specification.

The following requirements shall be demonstrated by analyses or tests:

— steps used as a safe working position for the shunter shall be able to withstand separately acting forces of 2 kN vertically and 1,5 kN laterally or longitudinally, applied by staff at any point without causing permanent deformation to it or its fixings,

— other steps shall be capable of withstanding separately acting forces of 1,5 kN vertically and 1,5 kN laterally or longitudinally, applied by staff at any point without causing permanent deformation to it or its fixings,

— handrails shall be capable of withstanding a force applied by staff of 1,5 kN at any point in any direction without causing permanent deformation to it or its fixings.

When demonstrated by tests it is recommended that the component is preloaded to stabilise any residual stresses induced during manufacture and the maximum force is applied at least twice. The results of the final tests shall not show permanent deformations.

Handrails shall not have any sharp edges; where handrails have a rectangular section the corners shall be rounded. Unless otherwise specified in this standard, the cross sectional dimensions shall be:

— for round shape between 20 mm and 35 mm or

— for oval shape: minimum dimension of 12 mm thickness and 35 mm width and maximum dimension of 40 mm.

Unless otherwise specified in this standard, the handrails should have a minimum clearance of 100 mm that may be reduced to a minimum of 40 mm if necessary.

Steps and handrails used by staff shall be secured as follows:

— with positive locking or

— with bolts of adequate length and appropriate self-locking or

— with high-strength lock ring-bolts or

— welded into place in accordance with EN 15085.

All steps shall be made with a non slip surface and shall not have sharp edges causing obstacles for the shoes of the staff.

Steps or platforms used as a safe working position for the shunter, walkways and access steps to the platform and drivers cab at shunting powered units which could be covered with ice because they are not sheltered from weather conditions shall be made of metal gratings and fulfil the following criteria:

1) Resistance to friction:
The average value of the coefficient of friction measured in 3 directions (lengthwise, widthwise and diagonally) shall reach the following minimum values:

a) in dry and wet (water) condition: 0,65

b) in oiled condition: 0,30

Coefficient of friction values shall be ascertained by means of a 100 mm × 100 mm movable plate, on which a rubber pad with 80 shore hardness shall be glued; this plate shall be loaded with a weight of 75 kg. For the measurements carried out with water and oil, the grating shall be fully immersed.

2) Grating structure:
To ensure that the gratings are sufficiently well-adapted to winter conditions, a ratio of at least 50 % of “void” area to total area shall be observed. Only apertures that can be penetrated by a ball-shaped object with a diameter of 10 mm and have a minimum area of 400 mm^2 shall be taken into account to determine this ratio.

NOTE The “void” area is the free space afforded by the grating apertures in the vertical direction.

Examples which fulfil the above criteria are given in Annex A.

Other steps which are not sheltered from weather conditions should be sufficiently well-adapted to conditions in relation with their use.

All dimensions given in this standard with respect to top of rail shall be derived for vehicles in working order standing on a horizontal track.

5 Requirements for handling screw couplings with side buffers

5.1 General

Vehicles which have to be coupled to trains of variable consist by screw couplings shall provide:

— safe working positions for the shunter at each vehicle end fitted with screw couplings,

— a shunter handrail under each buffer and

— reserved spaces for safe operation by the shunter.

A safe working position shall be accessible from both sides of the vehicle from 200 mm below top of rail.

If defined in the specification, a safe working position for the shunter may be omitted on the vehicle (e.g. dining cars or sleeping cars with side end doors only on one vehicle end or according to national regulations). In this case other operational solutions shall allow shunting of such vehicles and this shall be defined in the specification.

On passenger coaches and luggage vans fitted with side end doors, where there are no outside handholds or steps for passengers, when the door is closed, special handrails and steps for shunters may be omitted. In this case, the inner handrails and the inner door steps shall serve as a working position for the shunter when the door is open. The shunter shall have the possibility to open the doors from outside or inside and sliding doors shall not cause danger to the shunter during the shunting process.

Powered units that are exclusively or mainly intended for shunting purposes shall be provided at least at one end with a transverse platform accessible from both sides.

For the different types of vehicles, the following Table 1 provides the requirements for the working position and reserved spaces for the shunter and the corresponding clauses of this standard for the detailed descriptions. To avoid the risk of train surfing, the safe working position based on steps and corresponding handrails, which are accessible when the doors are closed, is not allowed for passenger coaches.

Table 1 — Requirements for safe working position of the shunter

Type of vehicle		Safe working position for shunter	Corresponding clauses for		
			steps	hand-rails	reserved spaces
Passenger coaches	With side end doors	Side end doors or position inside vehicle with sight for directing driving	5.1	5.1	6.2.1
	Without side end doors	Position inside vehicle with sight for directing driving	5.1	5.1	6.2
	Car carriers	Lower deck	8.1	8.1	6.2.1
Cab ends of driving trailers		Drivers cab and/or step with a corresponding handrail or shunter's stand[a]	5.2, 5.3.1	5.4.2	6.2
Powered units	Intended for shunting purposes	Transverse platform	5.5	5.5	6.2.1
		Steps at each of the four corners	5.3.2	5.4.3	6.2
	Not intended for shunting purposes	Drivers cab and/or step with a corresponding handrail or shunter's stand[a]	5.2, 5.3.1	5.4.2	6.2

[a] For power units not intended for shunting purposes and cab ends of driving trailers, steps with a corresponding handrail or a shunter's stand are not necessary but may be required by the specification.

Vehicles which have to be coupled by screw couplings shall be equipped with two shunter handrails as described in 5.4.1.

5.2 Shunter's stand

If a shunter's stand is required the shunter's step shall be designed according to 5.3.1 in combination with the corresponding handrails according to 5.4.2.

The position and dimensions required for the shunter's step and the corresponding handrails are those of the general case in EN 16116-2.

If applicable the rear edge of the shunter's step should lie in the buffer vertical fixing plane.

The minimum distance of the step end to the contact plane of the fully compressed buffers shall be 150 mm.

5.3 Steps

5.3.1 Shunter's step

The shunter's step may be made according to EN 16116-2.

For this step design, securing by welding is not permissible.

This step design fulfils the requirements given in Clause 4.

Other designs for the shunter's step are permissible if they fulfil the requirements given in Clause 4.