SLOVENSKI STANDARD
SIST EN 16116-2:2014

01-april-2014

Železniške naprave - Izvedbene zahteve za stopnice, ograje in dostop za osebje - 2. del: Tovorni vagoni

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

Bahnanwendungen - Konstruktionsanforderungen an Tritte, Handgriffe und damit in Zusammenhang stehende Zugänge für das Personal an Güterwagen

Applications ferroviaires - Exigences pour la conception des marchepieds, mains courantes et accès du personnel - Partie 2: Wagons

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ICS:

45.060.20	Železniški vagoni	Trailing stock

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

Applications ferroviaires - Exigences pour la conception des marchepieds, mains courantes et accès du personnel - Partie 2: Wagons

Bahnanwendungen - Konstruktionsanforderungen an Tritte, Handgriffe und zugehörige Zugänge für das Personal - Teil 2: Güterwagen

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Foreword

This document (EN 16116-2:2013) 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of an identical text or by endorsement, at the latest by March 2014, and conflicting national standards shall be withdrawn at the latest by March 2014.

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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 organisations 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

To achieve an undisturbed, reliable and safe operation of freight trains it is essential to define common requirements for safe access and egress for rolling stock of interoperable trains with respect to e.g. structural requirements, operating characteristics, way of operation, maintenance as well as their handling.

Coupling of freight wagons by means of screw couplings is usually done by personnel.

The design of freight wagons needs to be suitable to meet these functions without exposing staff to undue risk.

Freight wagons require sufficient space for their coupling and uncoupling by staff without any rigid features impeding accessibility to the screw coupler. Also there is a need for provision of suitable footsteps and handrails for personnel, to allow temporary travel outside the vehicle during shunting as well as to access the vehicle.

If wagons according to TSI-FW are equipped with steps and handholds, these needs apply to all designs of vehicle.

To achieve an undisturbed, reliable and safe operation it is therefore essential to harmonise the functional requirements and characteristic dimensions and assess and permanently ensure their suitability for interoperable traffic.

1 Scope

This European Standard specifies the minimum requirements for ergonomic and structural integrity of steps and handrails used together to give staff access to freight wagons. It does not cover ladders, top platforms and top gangways.

It defines in particular the required spaces necessary for handling of screw couplings with side buffers, for shunter handrails, for shunter's stand, for steps and handrails.

This European Standard also defines their dimensions, positions, limits for durability and functionality.

It also defines the general requirements for the access to tail lights for freight wagons.

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

EN 12561-7, *Railway applications — Tank wagons — Part 7: Platforms and ladders*

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

EN 15273-2, *Railway applications — Gauges — Part 2: Rolling stock gauge*

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 couples and uncouples vehicles or directs 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 wagon 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

4 Steps and handrails

4.1 General requirements

If not otherwise defined in this standard, steps and handrails used by staff shall be secured as follows:

— with bolts of adequate length and self-locking nuts, or

— with bolts of adequate length and cottered hexagon castlenuts, or

— with high-strength lock ring-bolts.

The mechanical strength of the material used for all kind of handrails and steps, where the properties according to 4.2.2 are not required, shall be as a minimum that of EN 10025-2, grade S235JR.

4.2 Steps

4.2.1 General

Steps shall be made with non-slip surface.

This should be a metal grating, see Figure 1, Pos. 1 or Pos. 2.

For all other solutions the following characteristics shall be fulfilled:

— **Resistance to friction**
The average value of the friction coefficient measured in three directions (lengthwise, breadthwise and diagonally) shall reach the following minimum values:

a) in dry condition = 0,65

b) in wet condition (water) = 0,65

c) in oiled condition = 0,30

Friction coefficient 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.

— **Mechanical strength**
Metal gratings shall withstand, without residual deformation, a horizontal compression force of at least 4 kN, exerted parallel and at right angles to the edge of the step board, and of at least 8 kN exerted diagonally in relation to the edge of the step board. Elastic deformations shall not exceed 10 mm.

— **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 with 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.

4.2.2 Shunter's step

The material for the steps support shall be S355J2C + N in accordance with EN 10025-2.

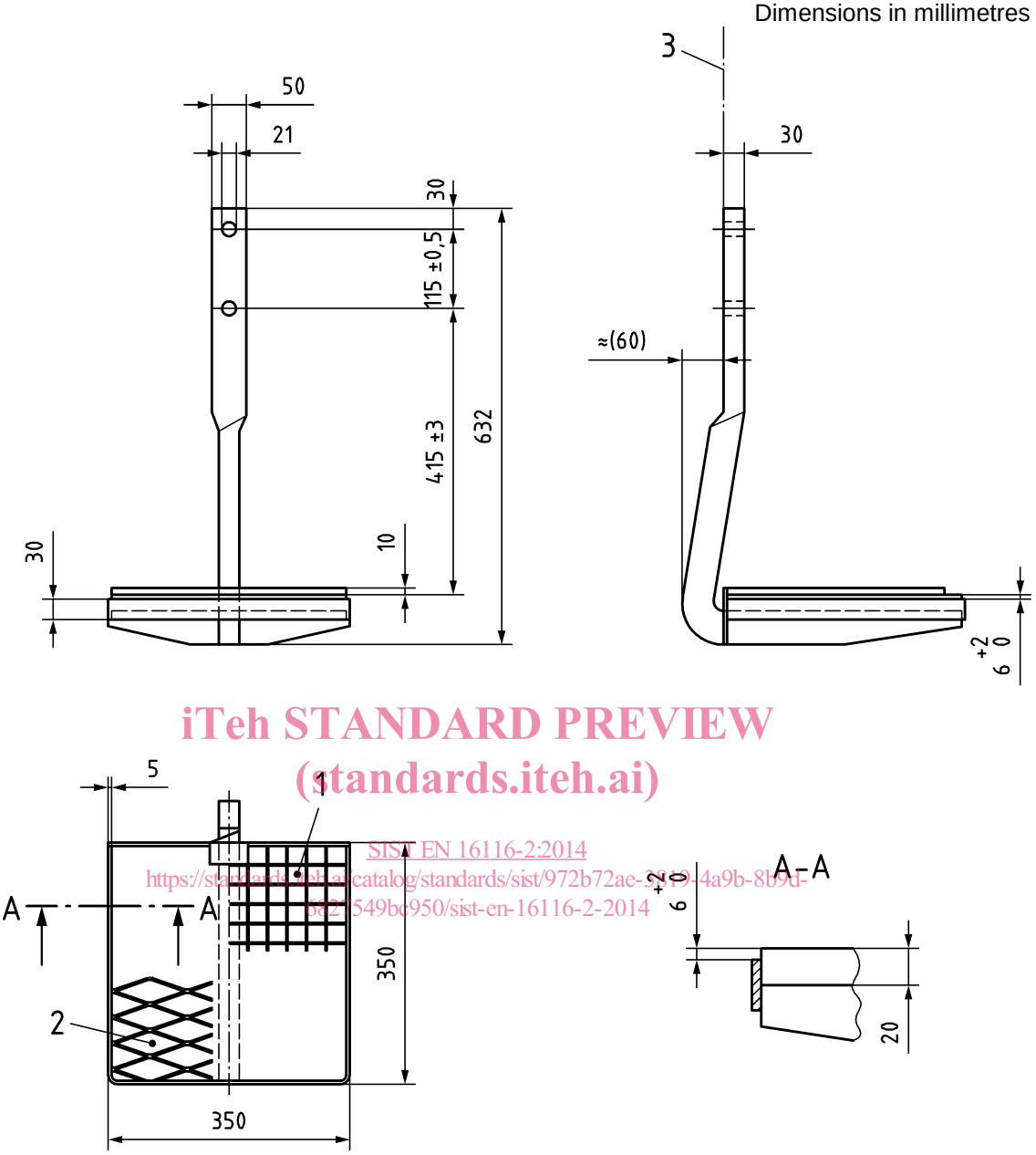
Cold forming for steps support is not allowed.

The shunter's step is shown in Figure 1. The grating according to Figure 1 is mandatory.

For specific operation the size of the step of the shunter’s stand can be reduced to 270 mm x 225 mm.

The surface protection (e.g. hot-galvanised) should provide an adequate service life.

Dimensions in millimetres

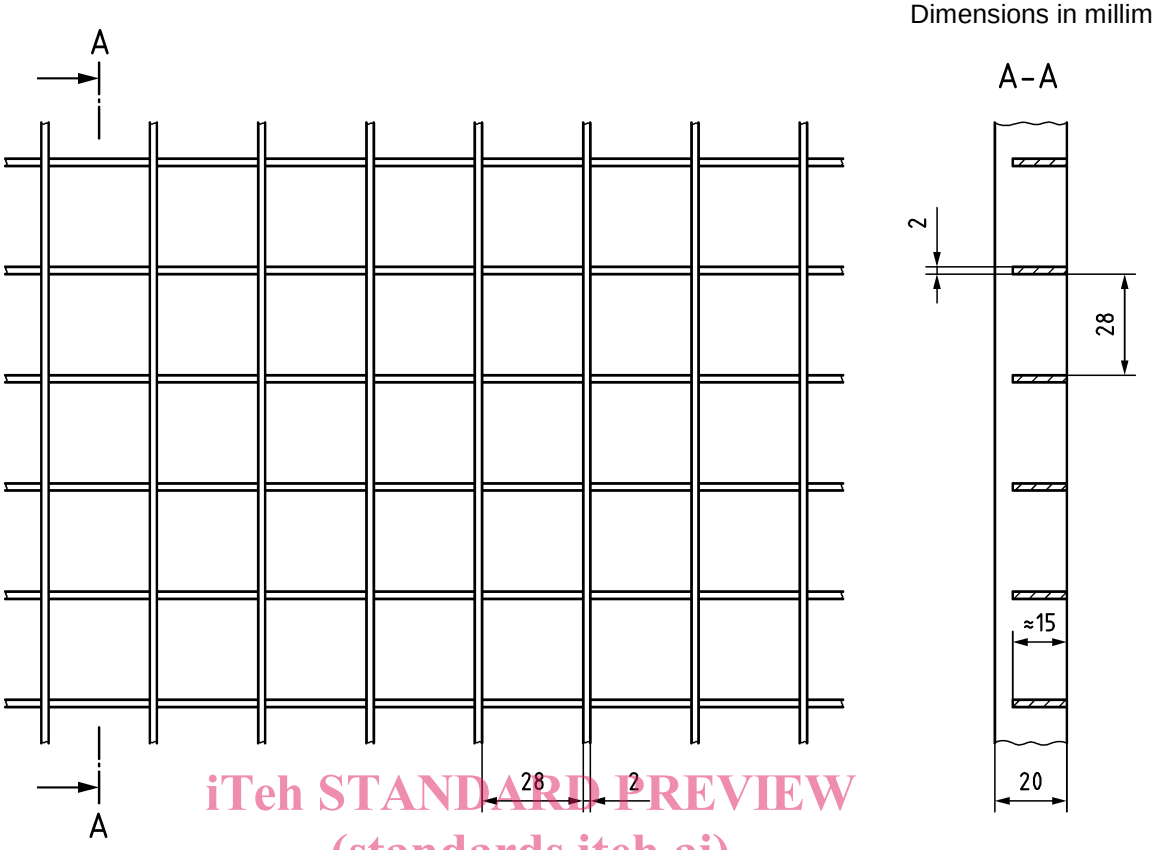


Key

1 grating from welded metal (Figure 2a)
2 grating from expanded metal (Figure 2b)
3 buffer fixing plane

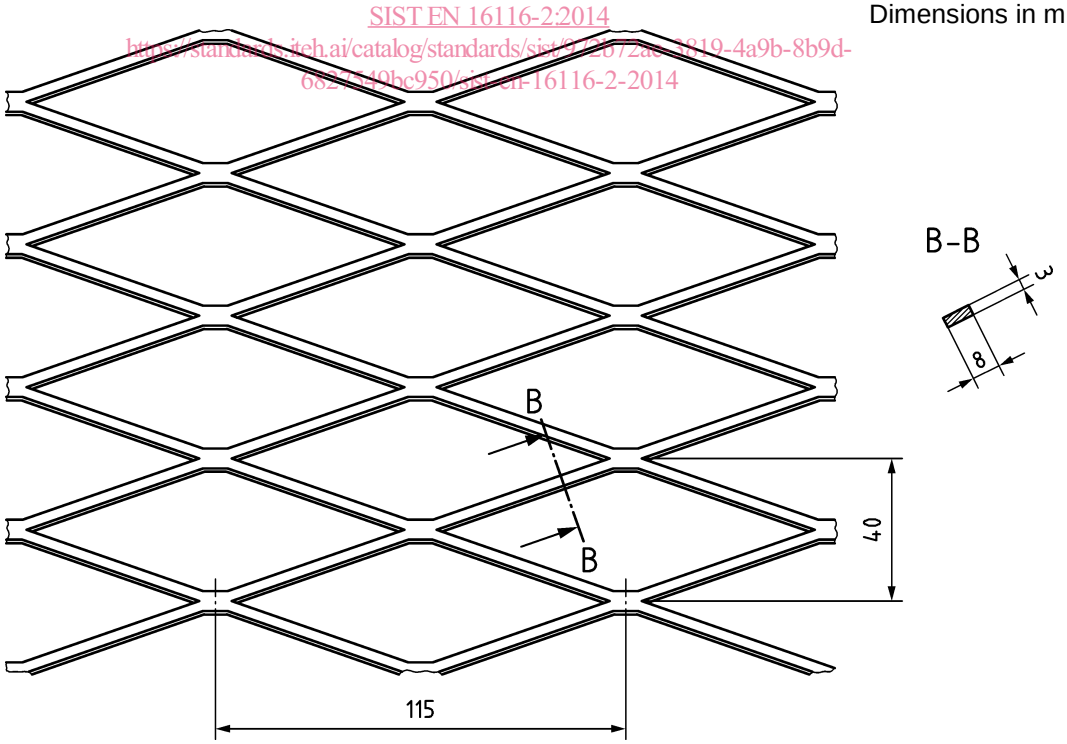
Figure 1 — Shunter's step

Dimensions in millimetres



a) Example for grating from welded metal

Dimensions in millimetres



b) Example for grating from expanded metal

Figure 2 — Examples for grating

4.2.3 Other steps

The other steps may be welded into place in accordance with EN 15085.

The minimum dimensions (length × width) of the surface shall be:

— crossing steps and steps for checking the load 175 mm × 175 mm;
When stirrup shaped steps are used for crossing steps at the wagon side they shall be 425 mm × 50 mm

— steps for platform or gangway 430 mm × 160 mm;

— steps for staff access to the wagon floor from both sides 500 mm × 110 mm;
When stirrup shaped steps are used they shall be 500 mm × 50 mm

— stirrup shaped steps and steps with a width < 160 mm, the friction resistance has to be in accordance with 4.2.1 and the clearance behind the steps including the width of the step shall be in accordance with EN 12561-7.

The minimum distance in vertical direction at steps for platforms and gangways (example in B.1) shall be:

— If there are more than one step, the vertical distance between the steps and platform shall not be less than 360 mm and not more than 400 mm. An equal distance of 365 mm should be preferred.

— The lateral recess between the second and the lowest step shall be 80 mm.

4.3 Handrails

4.3.1 General

If there are no deviating indications in the drawings, the handrails shall be made from round-bar steel with minimum diameter of 20 mm or pipe steel. The maximum diameter shall be 35 mm.

The handrails shall withstand the loads applied by the shunters accessing the steps or the space between the buffers.

When using round-bar steel and material specifications, fixing requirements and dimensions given in this standard it is proven that these loads are sustained. Otherwise it shall be demonstrated by analyses or tests that the handrail is capable of withstanding a force of 1,5 kN applied at any point over its length at any direction without causing permanent deformation in it. When demonstrated by tests, permanent deformations on first loading shall not be considered.

All measurements related to the positions of the handrails are referring to the centrelines of the handrails. Clearances are measured from the surfaces of the handrails.

The clearance between the handrails and any part of the wagon shall be at least 120 mm.

In order to comply with the kinematic gauge the position of the handrails can be adjusted in exceptional cases.

4.3.2 Shunter handrail

Wagons shall be equipped with two shunter handrails at each headstock under the buffers.

The clearance between the handrails and any part of the wagon can be reduced to 100 mm. The minimum dimensions and the positions for the shunter handrail are defined in Figure 3 and Figure 4.