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Järnvägar – Krav och allmänna principer för att säkra last i godstransporter på järnväg

Railway applications – Requirements and general principles for securing payload in rail freight transport

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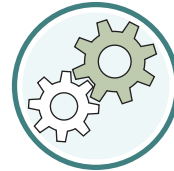
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EUROPEAN STANDARD

EN 16860

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 2019

ICS 45.060.20; 55.180.99

English Version

Railway applications - Requirements and general principles for securing payload in rail freight transport

Applications ferroviaires - Exigences et principes généraux en matière d'arrimage de la charge utile lors du transport ferroviaire de fret

Bahnanwendungen - Anforderungen und Grundsätze für die Ladegutsicherung für Güterwagen

This European Standard was approved by CEN on 30 December 2018.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (EN 16860:2019) 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of an identical text or by endorsement, at the latest by September 2019, and conflicting national standards shall be withdrawn at the latest by September 2019.

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This document has been prepared under a standardization request 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.

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1 Scope

This document specifies the minimum requirements for securing payload to ensure safe operation of freight wagons, utilizing a train speed of up to 120 km/h. It is serving as a basis for the design and implementation of payload securing methods.

Additional requirements in the case of wagons designed for the transport of special payload and/or with integrated load security (e.g. tank wagons, hopper wagons, car carriers, coil carriers and wagons for intermodal transport) are not part of this document.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 12663 (all parts), *Railway applications — Structural requirements of railway vehicle bodies*

EN 15273-3, *Railway applications — Gauges — Part 3: Structure gauges*

EN 15528, *Railway applications — Line categories for managing the interface between load limits of vehicles and infrastructure*

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

EN 15723, *Railway applications — Closing and locking devices for payload protecting devices against environmental influences — Requirements for durability, operation, indication, maintenance, recycling*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1

load

all kinds of external applied forces and moments, distributed load, pressure or weight

3.2

payload

load which the vehicle is designed to transport under specified conditions of operation, in addition to its tare weight

3.3

force

single acting load

3.4

removable fastenings

fastenings or a combination of several fastenings utilized to restrain or secure payload, which are not a fixed part of the wagon

3.5

positive-fit

fit by which the payload is secured by ensuring there is no intermediate space or by filling the remaining space with packing or by preventing movement

3.6

force-fit

fit by which the payload is secured by increasing the friction between payload and the loading surface

3.7

controlled sliding

payload that they may slide on the wagon loading surface lengthways in a restricted manner

3.8

Alphacode

combination of capitals and small types to define typical standard wagons according to UIC 438-2

4 Requirements for securing of payload

4.1 General

The payload shall be distributed as uniformly as possible and secured against uncontrolled movement to avoid negative interferences to axle/wheel loads, loading gauge and brake performance.

The following requirements shall be observed at all times:

- a) The following ratios for axle or wheel load shall not be exceeded:
 - 2: 1 axle load ratio in longitudinal direction for two-axle wagons;
 - 3: 1 bogie load ratio in longitudinal direction for bogie wagons;
 - 1: 1,25 load ratio in lateral direction also for a wheelset;

NOTE Examples for calculations can be found in UIC Loading rules.

In all above mentioned cases the single permissible wheel load shall not be exceeded.

- b) Criteria for stability, whereby heavy and lighter goods are to be arranged so that the payload centre of gravity should be as low as possible to reduce the likelihood of tipping and loss of payload.
- c) Payload shall not prevent opening, closing and locking of sliding doors, sliding walls and opening roofs.
- d) Doors, closure devices and hatches which are used for loading and unloading of payload shall be securely closed during transport, see EN 15723.
- e) All other equipment for securing payload shall be stowed in a safe manner.

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- f) Goods that are able to be lifted upwards by aerodynamic or vibration effects shall be covered by appropriate equipment (e.g. tarpaulin, net). The aim of this device is to avoid pollution and the loss of payload. In any case they cannot be used to increase the capacity of the wagon.

4.2 Requirements that arise from the following influencing factors

4.2.1 Type of wagon and operation

The characteristics of the wagon and its operation shall be considered when applying this standard.

4.2.2 Infrastructure

Wagons and payloads shall be in accordance with the infrastructure requirements such as:

- Permissible Line Category according to EN 15528;
- For vehicles the permissible infrastructure gauges (reference profiles) according to EN 15273-3;
- For payload (on flat wagons) the published loading gauge profile of the Infrastructure Manager.

Infrastructure is considered as classification of lines, track quality, switches, crossings, curves and gauges defined by the location of the obstacles.

NOTE Deviations can be agreed by the responsible parties (e.g. infrastructure manager, railway undertaking).

4.2.3 Payload

The properties of the wagon shall correspond with the features of the payload.

These features are:

- geometrical conditions (e.g. centre of gravity);
- unit loads or bulk;
- weight or density;
- dimension;
- temperature.

Changes in volume and weight caused by the influence of weather or loads caused during transport are also to be taken into consideration.

4.2.4 Loads

4.2.4.1 General

Loads arising during transport shall be taken into account. These loads shall be taken as acting independently and arise in the:

- longitudinal direction (x-axis) to the wagon;
- lateral direction (y-axis) to the wagon;
- vertical direction (z-axis) to the wagon.

The directions of these loads are in accordance with the EN 12663 series.

The time for which the above forces are exerted is approximately 1/10 s (acceleration measurements filtered at 15-20 Hz). Where securing devices are dimensioned by calculation, these forces should be considered quasi-static for the purposes of securing payloads.

Applied values for acceleration are: $g = 9,81 \text{ m/s}^2$.

4.2.4.2 In longitudinal direction

The resulting applicable loads are the payload mass multiplied with the following applicable acceleration values:

- Acceleration values for payload which is rigidly secured:
 - $\leq 4 \times g$: single wagon and groups of wagons in normal shunting conditions; This load applies to the fixings for the securing of the load to the supporting structure of the vehicle but not the vehicle ends.
 - $\leq 1 \times g$: wagons not subject to hump and fly shunting and wagons with long-stroke shock absorbers or using approved procedures to reduce the applied loads during transit.
- Values for payload which can slide lengthways in the wagon:
 - $\leq 1 \times g$: single wagon and groups of wagons in normal shunting conditions.

4.2.4.3 In lateral direction

$$\leq 0,5 \times g$$

4.2.4.4 in vertical direction

$$\leq (1 \pm 0,3) \times g$$

Vertical forces in an upwards direction reduce friction, and thus encourage the displacement of the payload.

The lateral and vertical forces exerted on the payload during transport are caused by vibrations at 2 Hz – 8 Hz.

NOTE Applicable friction coefficients and safety factors are defined in the technical specification. Examples of these can be found in the EN 12195 series.

5 Methods/Principles for loading and securing of payload

5.1 General

NOTE 1 Examples for typical freight wagons and payload and their combinations are given in code of practice UIC (UIC Loading rules).

The method/principle selected for loading and securing of payload shall be validated according to Annex B.

Methods/principle already used and validated by their use in previous operations can be considered as validated.

NOTE 2 Wagon and payload combination covered by UIC Loading rules are considered to be validated by their use.