SLOVENSKI STANDARD
SIST EN 16860:2019

01-maj-2019

Železniške naprave - Zahteve in splošna načela za zagotovitev koristnega tovora v železniškem tovornem prometu

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

Bahnanwendungen - Anforderungen und Grundsätze für die Ladegutsicherung für Güterwagen

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

Ta slovenski standard je istoveten z: **EN 16860:2019**

ICS:

03.220.30	Železniški transport	Transport by rail
55.180.99	Drugi standardi v zvezi z distribucijo blaga s prevozom	Other standards related to freight distribution of goods

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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

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

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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of an identical text or by endorsement, at the latest by September 2019, and conflicting national standards shall be withdrawn at the latest by September 2019.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

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.

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, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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.

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 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 considerate as validated.

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

In order to ensure safe transport, it may be necessary to pack goods, to assemble them to form load units or take other appropriate measures.

The following clauses show different examples of principles for securing of payload.

5.2 Positive–fit payload securing

Positive–fit can be realized by rigid loading or compact loading.

Rigid loading can be achieved by fixing the payload in the wagon with brackets (for example wooden wedges).

For example see Figure 1.

Dimensions in millimetres

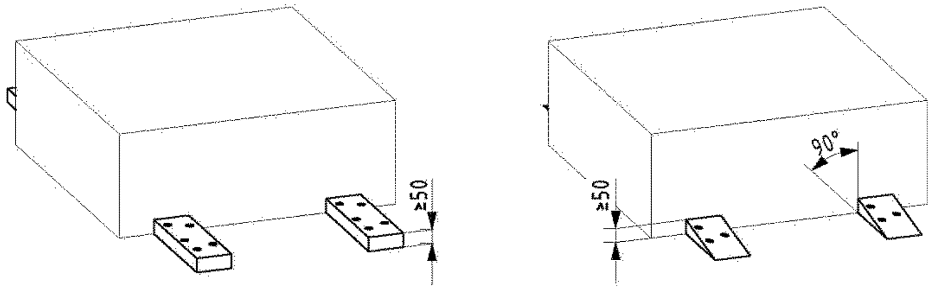
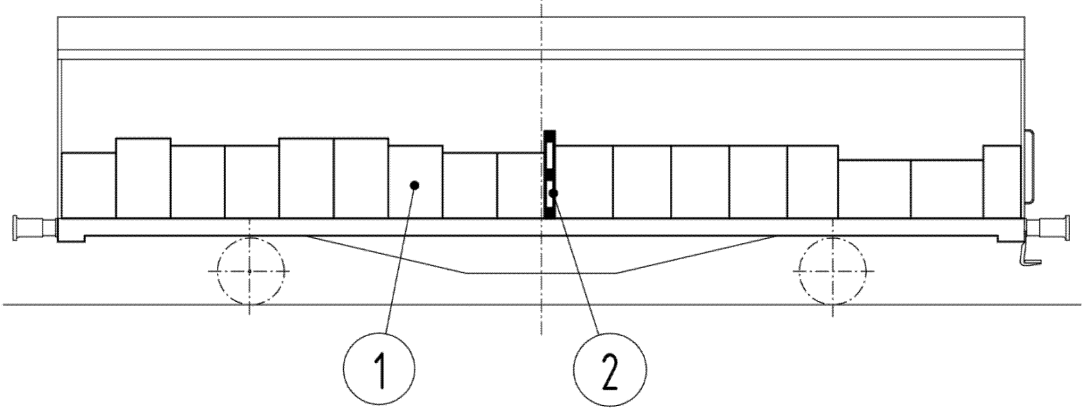


Figure 1 — Example of rigid loading

Compact loading can be achieved by leaving no intermediate space or filling the remaining space with packing (for example flat pallets placed upright, wooden cross-bracing).

For example see Figure 2.



Key

1 payload

2 packing (e.g. pallets)

Figure 2 — Example of compact loading

5.3 Force-fit payload securing

Force-fit payload securing against sliding can be achieved by increasing:

— the friction between payload and the loading surface by extra downward loads utilizing straps or fastening equipment,

— the friction coefficient μ and as an option additionally increasing the friction coefficient by using for example anti slip mats.

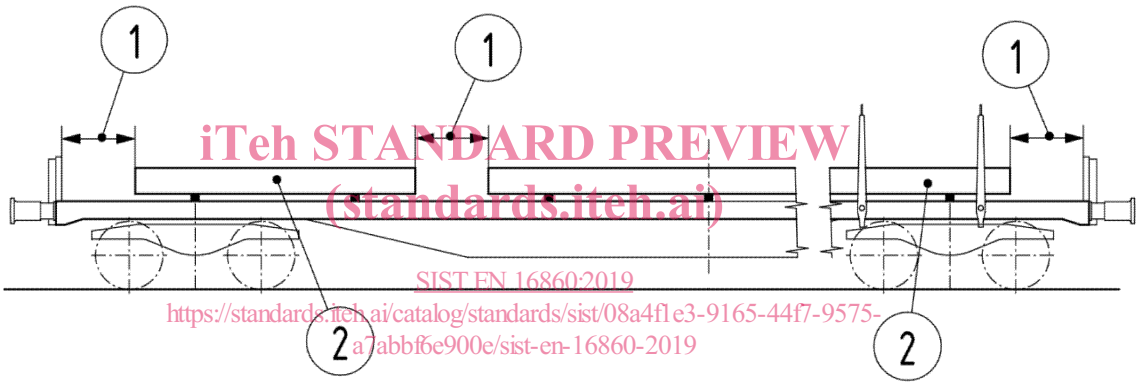
5.4 Controlled sliding payload securing

Controlled sliding lengthways of payload is particularly suited to:

— heavy goods that cannot be secured in a compact or rigid arrangement lengthways on/in the wagon (e.g. steel billets, slabs),

— goods that are sensitive to impact, liable to be damaged as a result of the effect of longitudinal stresses (for example machinery).

If necessary, a void of sufficient length should be left clear in case of movement of the goods lengthways in the wagon. The slide distances to be kept clear shall be determined on the basis of the combinations of materials used, see Figure 3.



Key

1 void

2 slab

Figure 3 — Example of possible controlled sliding free loading

Goods/load units which are supposed to slide lengthways on/in the wagon and which due to their nature cannot slide directly on their supporting surface, can be:

— positioned on timbers (underlayers);

— fastened to skids;

— positioned on sleds if their supporting parts are prone to breaking or the load unit cannot be securely fastened on its mountings.

Skids and runners for loading trestles shall be designed to withstand the stresses arising.

For example see Figure 4.