BSI Standards Publication

Rail dependent storage and retrieval equipment - Safety requirements for S/R machines

National foreword

This British Standard is the UK implementation of EN 528:2021. It supersedes BS EN 528:2008, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee MHE/14, Rail dependent storage and retrieval equipment - Safety.

A list of organizations represented on this committee can be obtained on request to its committee manager.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Compliance with a British Standard cannot confer immunity from legal obligations.

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English Version

Rail dependent storage and retrieval equipment - Safety requirements for S/R machines

Transtockeurs - Prescriptions de sécurité

Regalbediengeräte - Sicherheitsanforderungen

This European Standard was approved by CEN on 4 January 2021.

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This document (EN 528:2021) has been prepared by Technical Committee CEN/TC 149 “Power-operated warehouse equipment”, 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of an identical text or by endorsement, at the latest by September 2021, and conflicting national standards shall be withdrawn at the latest by September 2021.

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 mandate given to CEN by the European Commission and the European Free Trade Association and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

This document supersedes EN 528:2008.

The main changes compared to the previous edition EN 528:2008 are as follows:

— clearer / more understandable Annex C dealing with preventing access to dangerous movements across the load entry/exit points;

— Annex ZA has been updated by introducing the generic template for Annex ZA amended in accordance with decision of EU commission;

— revision and adaption of Annex B Performance level according to EN ISO 13849-1:2015;

— the scope has been stated more precisely;

— more readable and clearer text in standard due to avoidness of separate chapters for automatic and manual machines;

— amendment or rather change of the following definitions (3):

  — on-board control position (3.4), permanent on-board control position (3.5), load entry / exit points (3.7), working place (3.8), pick and deposit station (3.9), restricted area (3.11), danger area (3.12), satellite vehicle (3.15), powered access cabin (3.20), climb assistance system (3.21), rated speed (3.22), normal operation (3.25), deleted definition 3.22 and renamed following definitions;

— speed limitation (4.9.4) has been updated and been stated more precisely;

— where a powered access cabin is provided, it shall comply with the requirements for control positions (4.9.7.2);

— Detachable ladders may be used up to a maximum height of 3 m (4.9.7);

— safety gear required for lifting carriages, that are designed to carry person(s) (4.4.4.1);

— the ratio of the minimum breaking force to the maximum static force for all types of suspension elements to the lifting of persons has been reduced from 10 to 8 (4.4.5.1);

— requirements for additional person(s) on the lifting carriage has been stated more precisely (4.9.2.2);

— prevention against load falling into adjacent automatically operated aisles: Safety level (PLr) is not more depending on the frequency of access to the aisle (4.10.7.3);

— physical safety backstops shall be dimensioned according to the loads that occur (4.10.7);

— information on the planned dismantling of the installation is required in information for use (6.8).

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

This document is a type C standard as stated in EN ISO 12100:2010.

This document is of relevance, in particular, for the following stakeholder groups representing the market players with regard to machinery safety:

— machine manufacturers (small, medium and large enterprises);

— health and safety bodies (regulars, accident prevention organizations, market surveillance etc.).

Others can be affected by the level of machinery safety achieved with the means of the document by the above-mentioned stakeholder groups:

— machine users/employers (small, medium and large enterprises);

— machine users/employees (e.g. trade unions, organizations for people with special needs);

— service providers, e.g. for maintenance (small, medium and large enterprises).

The above-mentioned stakeholder groups have been given possibility to participate at the drafting process of this document.

The machinery concerned and the extent to which hazards, hazardous situations and hazardous events are covered are indicated in the Scope of this standard.

When requirements of this type-C standard are different from those which are stated in type-A or type-B standards, the requirements of this type-C standard take precedence over the requirements of the other standards, for machines that have been designed and built according to the requirements of this type-C standard.

While producing this standard, it was assumed that:

a) only competent persons operate the machine;

b) components without specific requirements are:

   1) designed in accordance with the usual engineering practice and calculation codes, including all failure modes;

   2) of suitable mechanical and electrical construction;

   3) made of materials with adequate strength and of suitable quality;

c) harmful materials, such as asbestos are not used as part of the machine;

d) components are kept in good repair and working order, so that the required characteristics remain despite wear;

e) by design of the load bearing elements, safe operation of the machine is ensured for loading ranging from zero to 100 % of the rated possibilities;

f) discussions have taken place between the user and the supplier concerning particular conditions for the use and places of use of the machinery;

g) working area is adequately lit;

h) places of installation allow a safe use of the machine.

This document is applicable to all types of Storage and Retrieval (S/R) machines, restricted to the rails on which they travel within and outside the aisles for the storage and retrieval of unit loads and/or long goods such as bar materials and/or for order picking or similar duties. These machines embody lifting means along a mast and may include lateral handling facilities. Also included is the transfer equipment used to change between aisles. Control of machines may range from manual to fully automatic.

S/R-machine-related satellite vehicles according to definition 3.15 are included as a load-handling-device (LHD).

References in this standard to racking, buildings and systems only apply where it is necessary to assess the hazards and risks at their interfaces with S/R machines.

This document deals with all significant hazards relevant to rail dependent storage and retrieval equipment, when they are used under the conditions intended by the manufacturer including reasonably foreseeable misuse (see Annex F "List of significant hazards").

This document is applicable to machines and equipment that are manufactured after the date of issue of this document. A transition period of 12 months is proposed.

Figures of examples of machines and transfer equipment to which this standard applies are shown in Annex A.

Safety requirements and/or measures in this standard apply to equipment used under indoor conditions. However, additional risk assessments and safety measures need to be considered for uses in severe conditions, e.g. extremely high temperatures, loads, the nature of which could lead to a dangerous situation (e.g. especially brittle loads, explosives), earthquake effects and also contact with foodstuff.

This document also deals with the technical requirements for electromagnetic compatibility (EMC).

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 81-50:2020, *Safety rules for the construction and installation of lifts — Examinations and tests — Part 50: Design rules, calculations, examinations and tests of lift components*

EN 341:2011, *Personal fall protection equipment — Descender devices for rescue*

EN 353-1:2014+A1:2017, *Personal fall protection equipment — Guided type fall arresters including an anchor line — Part 1: Guided type fall arresters including a rigid anchor line*

EN 358:2018, *Personal protective equipment for work positioning and prevention of falls from a height — Belts and lanyards for work positioning or restraint*

EN 361:2002, *Personal protective equipment against falls from a height — Full body harnesses*

EN 363:2018, *Personal fall protection equipment — Personal fall protection systems*

EN 614-1:2006+A1:2009, *Safety of machinery — Ergonomic design principles — Part 1: Terminology and general principles*

EN 795:2012, *Personal fall protection equipment — Anchor devices*

EN 894-1:1997+A1:2008, *Safety of machinery — Ergonomics requirements for the design of displays and control actuators — Part 1: General principles for human interactions with displays and control actuators*