



SLOVENSKI STANDARD

SIST EN 15620:2009

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Steel static storage systems - Adjustable pallet racking - Tolerances, deformations and clearances

Ortsfeste Regalsysteme aus Stahl - Verstellbare Palettenregale - Grenzabweichungen, Verformungen und Freiräume

Systèmes de stockage statiques en acier - Rayonnages à palettes réglables - Tolérances, déformations et jeux

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ICS:

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Storage equipment

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EUROPEAN STANDARD
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**Steel static storage systems - Adjustable pallet racking -
Tolerances, deformations and clearances**

Systèmes de stockage statiques en acier - Rayonnages à
palettes réglables - Tolérances, déformations et jeux

Ortsfeste Regalsysteme aus Stahl - Verstellbare
Palettenregale - Grenzabweichungen, Verformungen und
Freiräume

This European Standard was approved by CEN on 13 September 2008.

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Foreword

This document (EN 15620:2008) has been prepared by Technical Committee CEN/TC 344 “Steel static storage systems”, the secretariat of which is held by UNI.

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of an identical text or by endorsement, at the latest by April 2009, and conflicting national standards shall be withdrawn at the latest by April 2009.

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.

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, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

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Introduction

The determination of the safe load bearing capacity of racking is a structural issue and therefore the Eurocodes are relevant, especially EN 1993. The most relevant parts for racking are EN 1993-1-1 and EN 1993-1-3.

In order to have reliable state of the art guidance for those involved in designing these products and due to the differences in the shape of the structural components, detailing and connection types, additional technical information to the Eurocodes is required.

The scope of CEN/TC 344 is to establish European Standards providing guidance for the specification, design, methods of installation, accuracy of build and also guidance for the user on the safe use of steel static storage systems.

This, together with the need for harmonised design rules, was the reason that the European Racking Federation (ERF) has taken the initiative for the CEN/TC 344. This TC is in the course of preparing a series of European Standards regarding Steel static storage systems as follows:

prEN 15512, *Steel static storage systems – Adjustable pallet racking systems – Principles for structural design*;

prEN 15629, *Steel static storage systems – The specification of storage equipment*;

prEN 15635, *Steel static storage systems – The application and maintenance of storage equipment*.

The intention is for these EN series to be published sequentially over a period of ten years.

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1 Scope

This European Standard specifies tolerances, deformations and clearances that pertain to the production, assembly and erection of pallet racking including the interaction with floors. These tolerances, deformations and clearances are important in relation to the functional requirements and ensuring the proper interaction of the handling equipment used by personnel, trained and qualified as competent, in association with the specific type of racking system. The interaction conditions are also important in determining the reliability of the storage system to ensure that the chance of an industrial truck impact, pallet impact or a system breakdown is acceptably low. The design safety philosophy given in prEN 15512 is based upon compliance with this standard.

This European Standard gives guidance for a variety of issues including operating clearances, manufacturing, assembly and erection tolerance limitations, as well as deflection or strain deformation limitations under loads.

This European Standard is limited to single deep adjustable beam pallet racking operated with industrial trucks or stacker cranes. Drive-in, double deep and satellite systems will be considered for inclusion in the document in the future.

This European Standard specifically excludes the tolerances and deformation of the trucks and stacker cranes. It is the responsibility of the truck or stacker crane supplier and the client or user to ensure that the tolerances, deformations and clearances, as quoted in this European Standard for the racking systems, are acceptable for the safe operation of the overall system.

This European Standard gives guidance to be used in conjunction with the latest information from the truck and stacker crane suppliers regarding turning radii, tolerances and deformations of the truck and stacker cranes.

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2 Normative references

[SIST EN 15620:2009](#)

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The following referenced documents are indispensable for the application 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.

prEN 15512 *Steel static storage systems – Adjustable pallet racking systems – Principles for structural design*

prEN 15629 *Steel static storage systems – The specification of storage equipment*

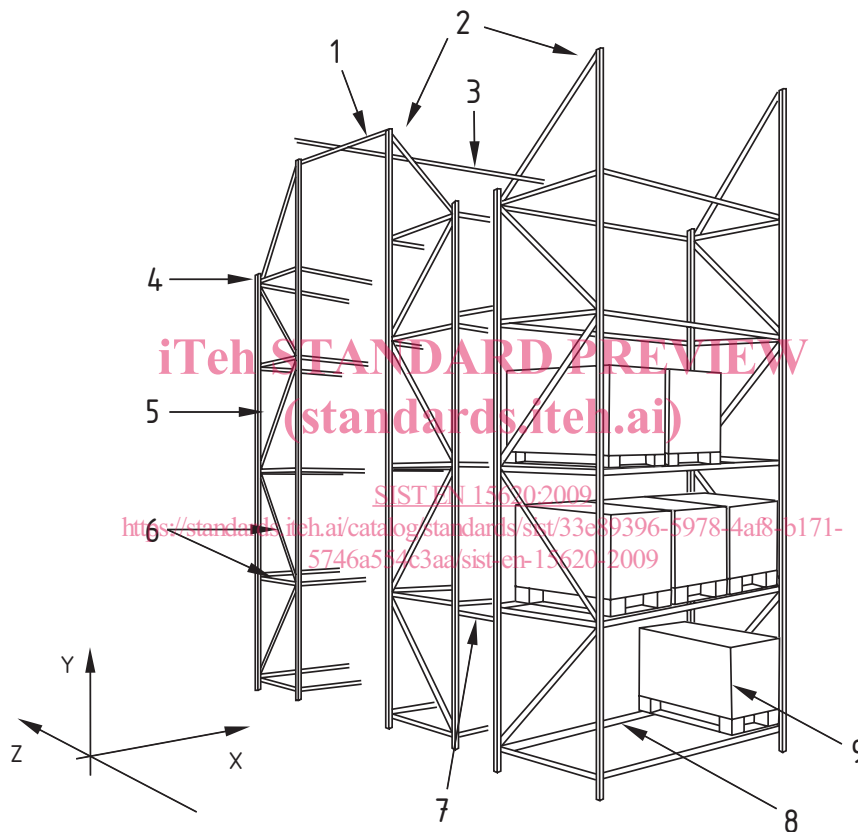
prEN ISO 3691-3, *Industrial trucks – Safety requirements and verification – Part 3: Additional requirements for trucks with elevating operator position and trucks specifically designed to travel with elevated loads (ISO/DIS 3691-3:2007)*

3 Terms and definitions

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

3.1 adjustable pallet racking
APR
 steelwork structure consisting of frames and beams adjustable in height, specifically designed to support pallets and unit loads

NOTE The main racking components are shown in Figure 1. See Informative Annex A for additional detailed information.



Key

- 1 top tie beam
- 2 double entry run
- 3 top guide rail
- 4 frame upright
- 5 single entry run
- 6 frame bracing
- 7 run spacer
- 8 beam
- 9 unit load

Figure 1 — Racking components

3.2**aisle width**

minimum dimension measured across the aisle at the floor and at any beam level between unit loads located in the nominal position or between the rack structure

NOTE See Informative Annex A for additional detailed information.

3.3**racking aisle width**

minimum dimension measured across the aisle at the floor and at any beam level between the rack structure

3.4**clearance**

nominal dimension between items

3.5**coordinate positioning**

positioning of the storage and retrieval machine using global (x and y) coordinates

3.6**deformation**

displacement due to external actions

3.7**double deep racking**

racking in which unit loads can be stored two deep from one aisle into the installation and accessed by a specially adapted long reach fork mechanism

NOTE The layout of double deep racking is shown in Figure 2.

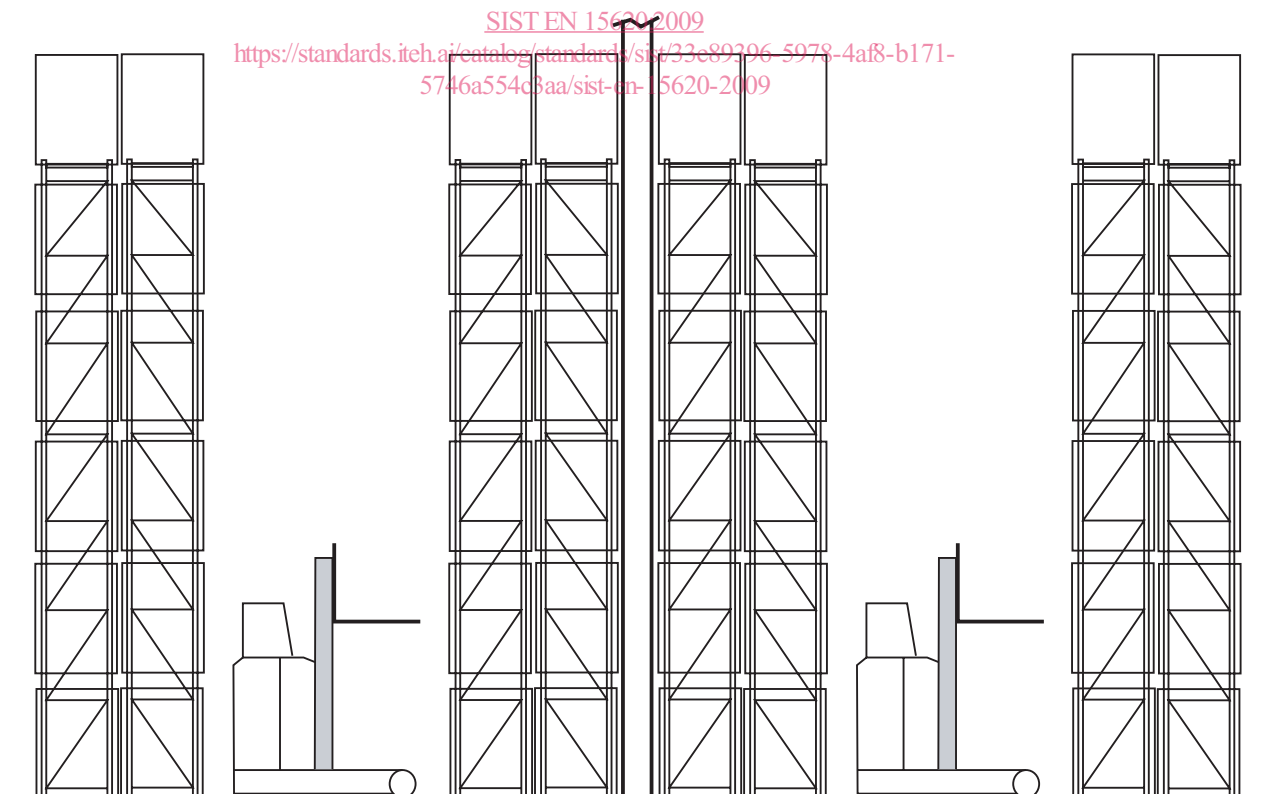


Figure 2 — Double deep racking

EN 15620:2008 (E)**3.8 Floor surface****3.8.1****elevational difference**

dimension in vertical height between two points

3.8.2**flatness**

surface regularity characteristics over a short distance not related to a datum

3.8.3**levelness**

surface regularity characteristic related to a datum

3.9**gangway**

space for movement or transport which does not give access to the picking or loading faces of the storage racking

3.10**location fine positioning**

local adjustment of the machine with respect to the rack components in the x and/or y directions using sensors on the crane and location devices on the rack

3.11**installers**

trained and qualified as competent personnel who assemble and build the racking at the site location

3.12**intrusive stacking**

placement or retrieval of a pallet where the turning radius or length of a lift truck is greater than the aisle width and part of the pallet storage location concerned is used by the truck forks and load when turning to place or retrieve a pallet

3.13**mechanical handling equipment****MHE**

mechanical equipment used to transport the unit load to be stored

3.14 Movement**3.14.1****defined movement****DM**

area where the mechanical handling equipment uses a fixed path

NOTE Defined movement areas are usually associated with high-level storage racking. The layout is designed specifically to accommodate the racking and MHE. Storage facilities often combine areas of free movement for low-level activities alongside areas of defined movement for high-level storage.

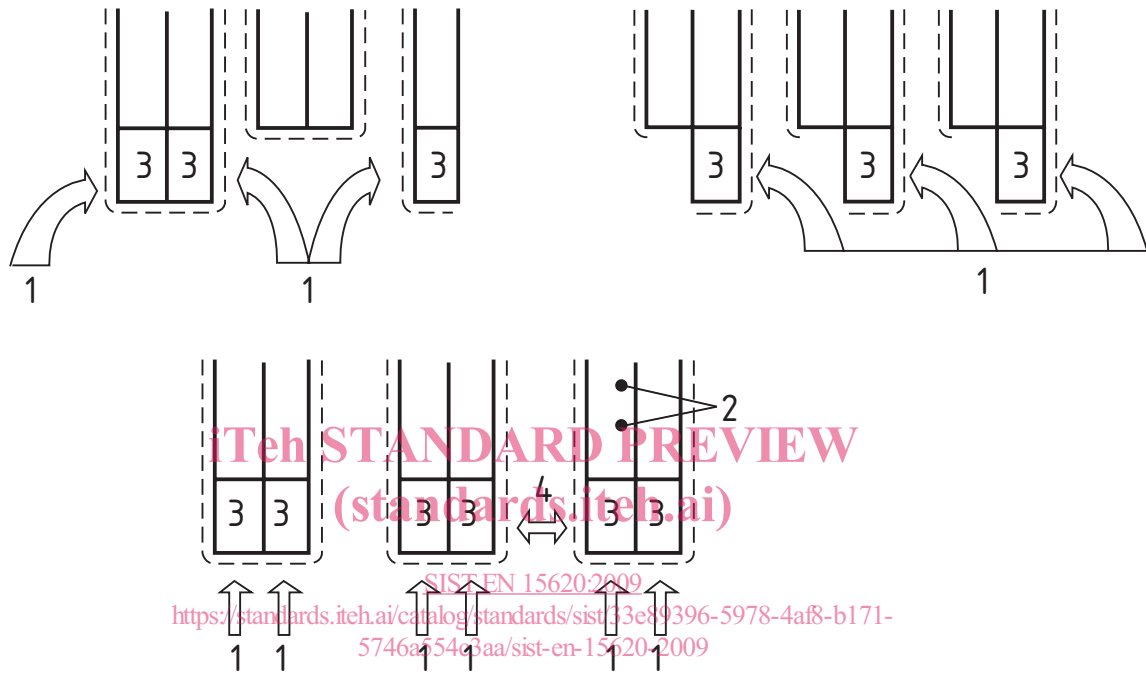
3.14.2**free movement****FM**

area where the mechanical handling equipment (MHE) travels freely in any direction

3.15**pick up and deposit stations****P and D stations**

storage locations at the end of an aisle used as an interface between different types of mechanical handling equipment

NOTE The P and D station as shown in Figure 3 can be used as an interface between the unit load and handling equipment that is dedicated to the rack aisle (such as very narrow aisle [VNA] trucks or cranes) and the conveyors or free movement trucks which service the installation. The P and D station can also be used to accurately fix the location of the unit load relative to the racking. This is often used by trucks or cranes having a fixed length of fork stroke and ensures accuracy in the X and Z directions when placing the unit load onto the rack beams.

**Key**

- 1 free movement truck access
- 2 unit load positions in the racks
- 3 P and D stations
- 4 very narrow aisle (VNA)

Figure 3 — Example of P and D stations

3.16 Racking Classes**3.16.1****crane racking class 100 and 200**

pallet racking arranged as a very narrow aisle system and operated by a stacker crane running on a rail and stabilised at the top of the mast by a top guide rail

3.16.2**narrow aisle racking class 400**

pallet racking arranged in a similar way to wide aisle racking, but having aisles of a reduced width for use with more specialist types of lift truck

3.16.3**very narrow aisle racking class 300**

pallet racking arranged with aisles of a width to cater only for the truck and the unit load width plus an operational clearance where the truck cannot make 90° turns into the rack face for loading and off loading

EN 15620:2008 (E)**3.16.4****wide aisle racking class 400**

pallet racking arranged to leave aisles of sufficient width to allow the fork lift truck equipment to traverse the length of the aisle and make 90° turns into the rack face for loading and off loading

3.17**reference directions**

directions at 90° to each other related to the orientation of the racking

NOTE The reference directions X, Y and Z are defined in Figure 1. X is the down aisle direction, Y is the vertical direction and Z is the cross aisle direction.

3.18**single deep racking**

pallet racking where there is only a single run of unit loads each side of the aisle, which is served by the handling equipment in that aisle

3.19**specification**

detailed description of the user's requirements including the racking specification and other data such as the ambient storage conditions, the floor construction, local authority requirements, etc., including all details affecting either the design of the installation or its construction

3.20**specifier**

person or company that provides the supplier with a specification based on the user's requirements

NOTE The specifier may be a consultant, other specialist, the user or the equipment supplier acting as the specifier.

3.21**stacker crane**

a storage and retrieval machine running on a rail and stabilised at the top of the mast by an upper guide rail

3.22**supplier**

company that supplies the storage equipment

NOTE The Company may be the original manufacturer or an intermediate company acting as a distributor.

3.23**tolerances**

dimensional variations from the nominal dimension or position arising from manufacture, assembly and erection of handling and storage equipment and other aspects of their environment that may affect the system such as the building, the unit load and the concrete floor

3.24**user**

company or person who manages and operates the installation on a daily basis and is responsible for the continuing safety of the installation

3.25**very narrow aisle****VNA**

aisle of a width to cater only for the truck and the unit load width plus an operational clearance where the truck cannot make 90° turns into the rack face for loading and off loading

4 Racking classes

4.1 General

Erection tolerances, deformations and clearances have been divided into four groups to cover the general requirements of the four groups of handling equipment. The racking for each classification requires a different standard of installation tolerances, deformations and minimum clearances for safe operation. See Annex B for more information on general safety philosophy.

4.2 Class 100, Stacker crane

Pallet racking arranged as for a very narrow aisle system but operated by a stacker crane. The aisles are wide enough only for the stacker crane or load width plus operational clearance as shown in Figure 4.

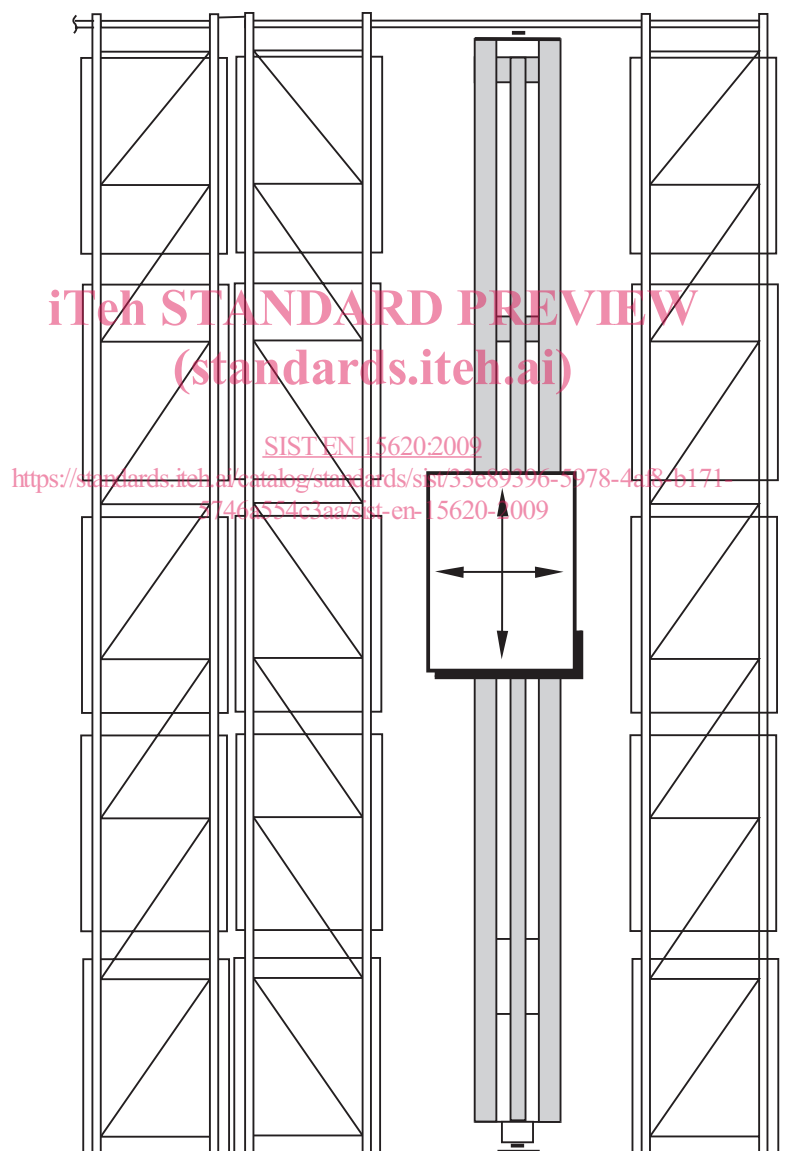


Figure 4 — Crane racking

The stacker cranes are automatically controlled, do not have a fine positioning system at the unit load storage positions and are usually for storage systems less than 18 m in height.