SLOVENSKI STANDARD
SIST EN 15620:2021

01-september-2021

Nadomešča:
SIST EN 15620:2009

Stabilni jekleni sistemi za skladiščenje - Tolerance, deformacije in prosti prostori

Steel static storage systems - Tolerances, deformations and clearances

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

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

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Ta slovenski standard je istoveten z: EN 15620:2021

ICS:

53.080	Skladiščna oprema	Storage equipment

SIST EN 15620:2021 **en,fr,de**

2003-01.Slovenski inštitut za standardizacijo. Razmnoževanje celote ali delov tega standarda ni dovoljeno.

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 15620

July 2021

ICS 53.080

Supersedes EN 15620:2008

English Version

Steel static storage systems - Tolerances, deformations and clearances

Système de stockage statique en acier - Tolérance, déformation et jeux

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

This European Standard was approved by CEN on 16 May 2021.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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European foreword

This document (EN 15620:2021) 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of an identical text or by endorsement, at the latest by January 2022, and conflicting national standards shall be withdrawn at the latest by January 2022.

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 supersedes EN 15620:2008.

This document includes the following significant technical changes with respect to EN 15620:2008:

— floor tolerances have been removed (reference is made to alternative sources);

— tolerances for Drive-In racking and Cantilever racking have been added;

— tolerances for crane racking have been removed (reference is made to alternative sources);

— the classification system for racking operated by industrial trucks has been removed.

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Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

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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 series. 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 harmonized design rules, was the reason that FEM Product Group Racking and Shelving (FEM R&S) 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.

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1 Scope

This document specifies tolerances, deformations and clearances that pertain to the production, assembly and erection and performance under load of pallet racking and cantilever racking. 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 mechanical handling equipment impact, pallet impact or a system breakdown is acceptably low.

This document is limited to:

— single deep adjustable beam pallet racking operated with industrial trucks;

— single and double deep adjustable beam pallet racking operated with stacker cranes;

— drive-in and drive through racking systems operated with industrial trucks;

— cantilever racking systems operated with industrial trucks.

This document does not apply to specialized types of equipment such as automated trucks, miniload, satellite systems, systems involving the use of articulated trucks, trucks using intrusive stacking methods or industrial truck serviced rack-clad buildings.

This document specifically excludes the tolerances and deformation of the industrial trucks, stacker cranes and floors.

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It is the responsibility of the specifier in cooperation with the client or user to ensure that the tolerances, deformations and clearances, as quoted in this document are acceptable for safe operation of the overall system considering all factors of influence and the user informed by means such as operation instructions. The specifier can carry out appropriate design/calculations to vary some of the parameters provided that an equivalent safe operation is achieved.

This document gives guidance to be used in conjunction with mechanical handling equipment and floor information.

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 15512, *Steel static storage systems - Adjustable pallet racking systems - Principles for structural design*

EN 15629, *Steel static storage systems - Specification of storage equipment*

EN 15878, *Steel static storage systems - Terms and definitions*

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3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 15878 and the following apply.

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

— IEC Electropedia: available at https://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

3.1
racking aisle width
minimum dimension measured across the aisle at the floor and at any beam level between the rack structure

3.2
deformation
displacement due to external actions

3.3
gangway
transfer aisle
space for movement or transport which does not give access to the picking or loading faces of the storage racking

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3.4
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

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3.5
intrusive stacking
placement or retrieval of a unit load where the turning radius or length of an industrial truck is greater than the operating aisle width and part of the storage location concerned is used by the truck forks and load when turning to place or retrieve a unit load

3.6
mechanical handling equipment
MHE
mechanical or electro-mechanical equipment used to transport, lift, pick and deposit unit loads

3.7
free-movement truck
industrial truck that is free to move in any direction in the aisle and make 90 ° turns into the rack face for loading and off loading

3.8
upright protector
component to protect the lower part of uprights against accidental impact from mechanical handling equipment

Note 1 to entry: Can be either free-standing or connected to the upright.

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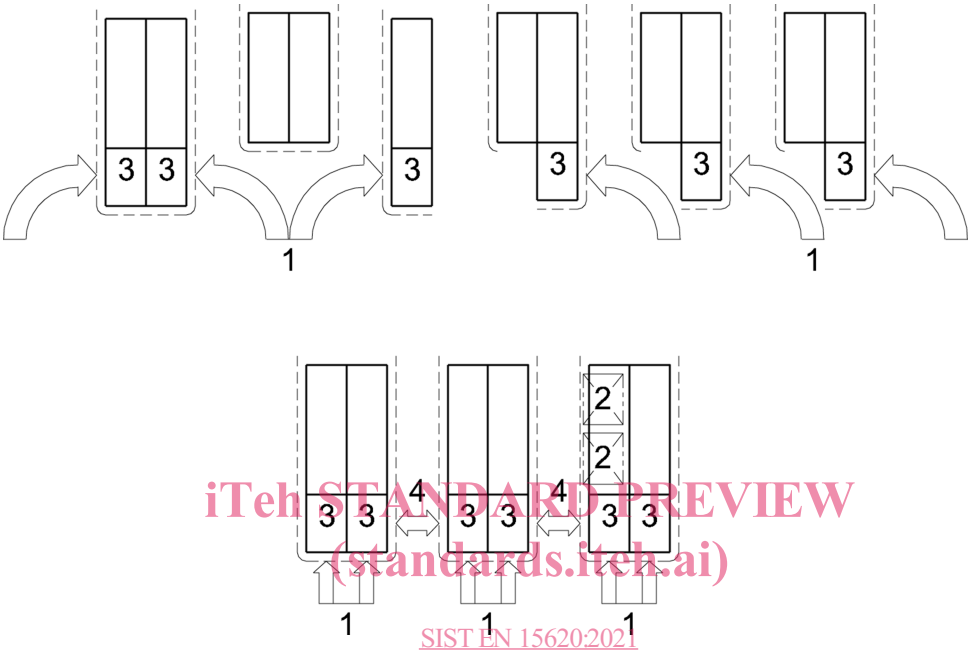
3.9
pick up and deposit station
P & D station
structure at the end of an operating aisle used as an interface between different types of mechanical handling equipment

Note 1 to entry: See Figure 1.



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Key

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

Figure 1 — Example of P & D stations

3.10
racking types

3.10.1
wide aisle racking
pallet racking arranged to leave aisles of sufficient width for use with free-movement trucks

3.10.2
narrow aisle racking
pallet racking arranged in a similar way to wide aisle racking and for use with free-movement trucks, but having aisles of a reduced width for use with more specialist types of industrial truck

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3.10.3
very narrow aisle racking
VNA
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

3.10.4
crane racking class 100 and 200
pallet racking operated by a stacker crane

3.10.5
drive-in racking
DIR
system of racking that provides storage where pallets are stored two or more deep and where access is gained by driving an industrial truck into a lane with pallets supported along their sides on beam rails supported from the uprights

Note 1 to entry: In DIR, the industrial truck drives into a lane and reverses out.

3.10.6
drive-through racking
DTR
system of racking similar to DIR but where the industrial truck could drive through the lane if there are no pallets in the lane

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Note 1 to entry: Drive-through racking lanes are not designed as access routes through the racking but allow full access for pallets to be placed from either end of the aisle, enabling the first-in first-out logistic principle.

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3.11
reference directions
directions at 90° to each other related to the orientation of the racking

Note 1 to entry: X is the down aisle direction, Y is the vertical direction and Z is the cross aisle direction.

3.12
specifier
person or company that provides the supplier with a specification based on the user's requirements

Note 1 to entry: The specifier may be a consultant, other specialist, the user or the equipment supplier acting as the specifier.

3.13
stacker crane
storage and retrieval machine running on a rail and stabilised at the top of the mast by an upper guide rail

3.14
tolerances
dimensional variations from the nominal dimension or position arising from manufacture, assembly and erection

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3.15
user
company or person who manages and operates the installation on a daily basis and is responsible for the continuing safety of the installation

3.16
cantilever arm
load-carrying member connected at one end to the cantilever column in the cross-aisle direction

Note 1 to entry: Arms can either be fixed or adjustable dependent upon the type of racking.

3.17
cantilever base
horizontal structural component fixed to the bottom of the cantilever column and to allow load transfer and fixing to the floor

3.18
cantilever column
vertical member supporting the cantilever arms that can either be single sided or double sided

3.19
datum
reference point, line or plane

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4 Symbols

For the purpose of this document, a number of the following symbols may be used together with standard subscripts.

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Additional symbols and subscripts are defined where they first occur.

A symbol and subscript may have several meanings in this document.

In general, primary symbols are not defined with all the standard subscripts with which they may be used.

A	manoeuvring clearance
A	clear entry between two uprights (pallet racking)
A	bay width (cantilever racking)
$A_t(n)$	total length of the rack (comprising ‘n’ bays)
A_{ST}	minimum operating aisle width
a	horizontal clearance in Drive-In racking
b	vertical clearance in Drive-In racking
B	misalignment of uprights across an aisle
BF	misalignment of rack uprights across a frame
B_0	distance to system datum
C_x, C_z	out-of-plumb of the member with respect to the relevant axis
D	rack depth
D	rack frame depth

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D	90 ° turning width of truck and load
D_p	depth of unit load and pallet
E	racking aisle width
F	distance from aisle X datum to the rack
F_1	variation between adjacent uprights measured near floor level in the Z direction
G_x, G_y, G_z	curvature of the arm or beam with respect to the relevant axis
h	height of compartment
H	height from top of base plate to top of upright
H_1	height from top of bottom beam level to top of any other beam level (pallet racking)
H_1	height from the underside of the base to arm 1 (cantilever racking)
H_{1A}	height from top of base plate to top of bottom beam level (pallet racking)
HB	height from top of beam level to top of beam level above (pallet racking)
HB	dimension between bracing beams (cantilever racking)
J_x, J_z	curvature of the upright with respect to the relevant axis
L	centre to centre distance of uprights
L	beam span
L	cantilever arm length
L	maximum deviation of arm level with respect to the top of the baseplate level
M	maximum variation of pallet support level between both sides of the pallet
M	distance from front upright to centre of top guide rail
T_w	beam twist at mid span
W	upright width
WE	tolerance field of mutually opposite frames
W_p	width of unit load and pallet
X	clearance in the X direction (with a subscript)
Y	clearance in the Y direction (with a subscript)
Z	clearance in the Z direction (with a subscript)
δ_u	hogging deformation
δ_d	sagging deformation
δ_{VB}	deflection at the tip of a cantilever arm
δ	deflection of a cantilever upright in the X or Z direction

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5 Racking types

5.1 General

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

5.2 Crane racking Class 100

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 2.

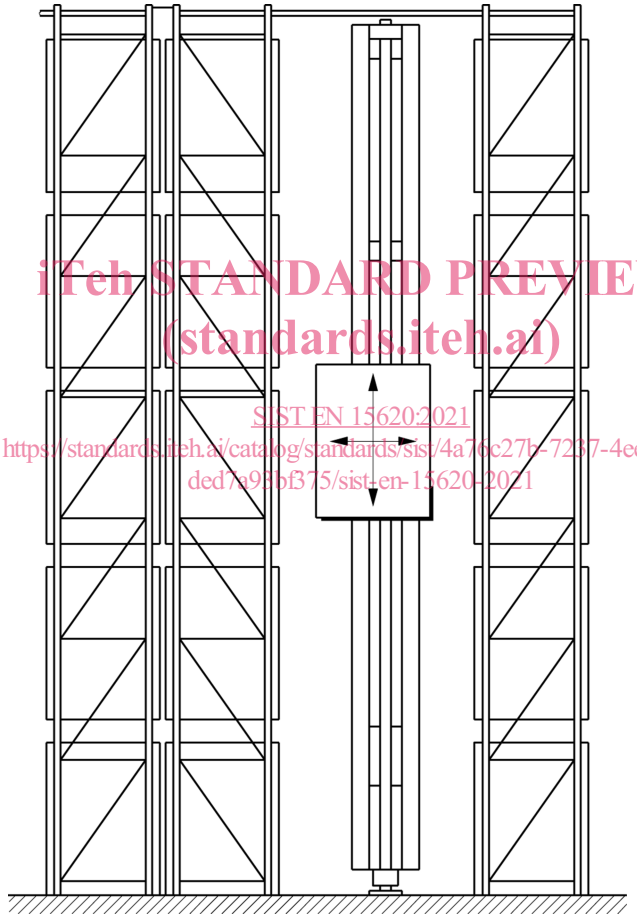

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Figure 2 — Crane racking

The stacker cranes are automatically controlled, do not have a fine positioning system at the unit load storage positions.

5.3 Crane racking Class 200

Crane operated installations where the stacker cranes are automatically controlled and have fine positioning system at the unit load storage positions. Also includes installations where the stacker crane is manually controlled.

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5.4 Very narrow aisle racking

5.4.1 General

Very narrow aisle pallet racking is arranged with aisles wide enough only for the truck and the unit load width plus operational clearance as shown in Figure 3.

The unit loads are handled within the aisles without the need for the truck to turn bodily into the rack face.

The trucks are usually guided into and along the aisle length and have fixed or rising cabs.

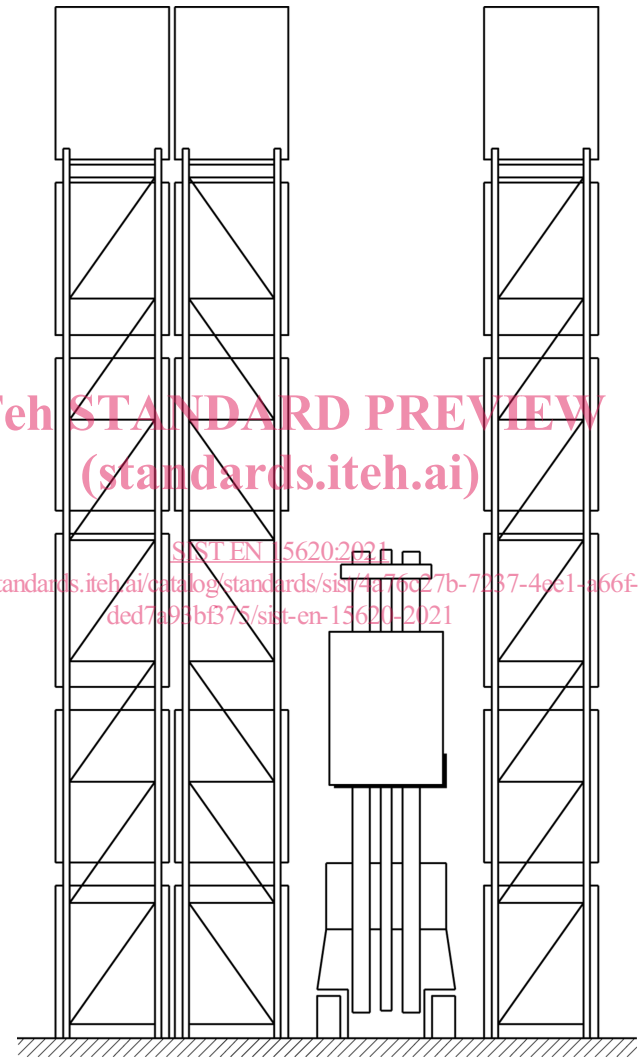

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Figure 3 — Very narrow aisle racking

5.4.2 Very narrow aisle (operator up)

Very narrow aisle installations where the truck operator is raised and lowered with the unit load and has manual height adjustment to position the load. Alternatively, the operator remains at ground level and has the use of an indirect visibility aid such as closed-circuit television (CCTV) or an equivalent system to guide the operator.