

**Steel static storage systems - Application and
maintenance of storage equipment**

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN 15635:2008 sisaldab Euroopa standardi EN 15635:2008 ingliskeelset teksti.

Standard on kinnitatud Eesti Standardikeskuse 15.12.2008 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.

Euroopa standardimisorganisatsioonide poolt rahvuslikele liikmetele Euroopa standardi teksti kättesaadavaks tegemise kuupäev on 12.11.2008.

Standard on kättesaadav Eesti standardiorganisatsioonist.

This Estonian standard EVS-EN 15635:2008 consists of the English text of the European standard EN 15635:2008.

This standard is ratified with the order of Estonian Centre for Standardisation dated 15.12.2008 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.

Date of Availability of the European standard text 12.11.2008.

The standard is available from Estonian standardisation organisation.

ICS 53.080

Võtmesõnad:

Standardite reprodutseerimis- ja levitamisoigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonilisse süsteemi või edastamine ükskõik millises vormis või millisel teel on keelatud ilma Eesti Standardikeskuse poolt antud kirjaliku loata.

Kui Teil on küsimusi standardite autorikaitse kohta, palun võtke ühendust Eesti Standardikeskusega:
Aru 10 Tallinn 10317 Eesti; www.evs.ee; Telefon: 605 5050; E-post: info@evs.ee

ICS 53.080

English Version

Steel static storage systems - Application and maintenance of storage equipment

Systèmes de stockage statiques en acier - Utilisation et maintenance de système de stockage

Ortsfeste Regalsysteme aus Stahl - Anwendung und Wartung von Lagereinrichtungen

This European Standard was approved by CEN on 5 October 2008.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN Management Centre or to any CEN member.

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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of 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 United Kingdom.



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

Management Centre: rue de Stassart, 36 B-1050 Brussels

Contents

Page

Foreword.....	4
0 Introduction.....	5
1 Scope	6
2 Normative references	6
3 Terms and definitions	6
4 Operational requirements	9
4.1 System requirements	9
4.2 Storage systems planning	9
5 Important data of relevance to the user	9
6 Assembly and installation	10
6.1 Skills required and provision of instructions	10
6.2 Installation quality and structural design	10
6.3 Aspects of installation work to be observed	11
7 Changes to the storage equipment configuration	12
8 Use of the storage equipment	13
8.1 General safety	13
8.1.1 Person responsible for storage equipment safety PRSES	13
8.1.2 Safe load warning notices	13
8.1.3 Training	13
8.1.4 Access to storage levels	13
8.2 Pallet or load carrying accessories	13
8.2.1 Loading	13
8.2.2 Pallet requirements	14
8.2.3 Special load make up accessories and loads	14
8.2.4 Precautions necessary for the use of weak pallets and pallets spanning in the incorrect direction	15
8.3 Unit load	15
8.3.1 Weight	15
8.3.2 Load stability	15
8.3.3 Unit load clearances	15
8.4 Unit load handling	16
8.4.1 Placement of loads	16
8.4.2 Damage to storage equipment	16
8.4.3 Timber pallet usage	16
8.4.4 Load make up accessory positioning on supports	16
8.4.5 Pallet positioning on the floor	17
8.4.6 Aisle obstructions	17
8.4.7 Handling on raised storage areas or on storage equipment supported floors	17
8.4.8 Operating aisle clearances	18
8.5 Placement on adjustable pallet racking	19
8.6 Placement in drive-in racking	20
8.6.1 Placement	20
8.6.2 Loading and unloading sequence for drive-in-racking	21
8.6.3 Use of drive-through racking access routes by trucks	22
8.7 Truck mast stiffness and floor flatness	22
9 Safety of storage equipment in use and evaluation of damaged components	23
9.1 Procedures	23

9.2	User's responsibilities	23
9.3	Reduction of safety level (margin of safety) due to damage	24
9.4	Inspection of storage equipment.....	24
9.4.1	General	24
9.4.2	Inspection.....	25
9.4.3	Inspection of automated systems	25
9.4.4	Damage investigation	26
9.4.5	Damage control procedures.....	26
9.4.6	Inspection for overload damage to beams, cantilevers or shelves	26
9.4.7	Inspection of beam connector locks	27
9.4.8	Inspection of frame uprights for out of verticality	27
9.4.9	Inspection of guidance systems for VNA trucks.....	28
9.5	Rules for the measurement and classification of damage to uprights and bracings	28
9.5.1	Measuring method for upright damage and residual deformation limits, typical for APR systems	28
9.5.2	GREEN LEVEL - requiring surveillance only	29
9.5.3	AMBER RISK – hazardous damage requiring action as soon as possible	29
9.5.4	RED RISK – very serious damage requiring immediate action	30
9.6	Rules for the evaluation of damage to pallet rack beams.....	30
9.7	Damage action procedures	30
9.7.1	Replacement of damaged components	30
9.7.2	Typical damage patterns	30
9.7.3	Inspection procedure flowchart, Inspection – Evaluation – Action	30
10	Changes that require a safety review of storage operations.....	31
Annex A	(informative) Supplier's responsibilities	33
Annex B	(informative) Examples of typical load warning notices	34
B.1	Load warning notices.....	34
B.2	Load warning notice layout.....	34
B.3	Training.....	34
B.4	Display	34
B.5	Checking load warning notice information.....	34
B.6	Equipment inspections	34
B.7	Sizes.....	34
Annex C	(informative) Pallet damage.....	49
Annex D	(informative) Safety of storage equipment in use and evaluation of damaged components	51
D.1	Reduction in margin of safety of damaged racking uprights or bracing members	51
D.2	Storage equipment inspections.....	53
D.2.1	General	53
D.2.2	Inspection schedules	54
D.2.3	Inspection for overloading of beams, cantilevers or shelves.....	54
Annex E	(informative) Use of the storage equipment – Method of placement and orientation.....	56
E.1	General	56
E.2	Placement and asymmetric loading	56
E.3	Unevenly distributed loading on pallets or other media	58
E.4	Incorrect placement of unit loads.....	59
E.5	Correct and incorrect location of unit loads.....	59
Bibliography	61

Foreword

This document (EN 15635:2008) 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 May 2009, and conflicting national standards shall be withdrawn at the latest by May 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.

0 Introduction

0.1 Structural Eurocodes for load-bearing structures and buildings

The Commission of the European Communities (CEC) initiated the work of establishing a set of harmonized technical rules for the design of building and civil engineering works, which would initially serve as an alternative to the different rules in force in the various member states and would ultimately replace them. These technical rules are known as the "Structural Eurocodes".

Because the determination of the safe load-bearing capacity of static storage systems is a structural engineering task, the Eurocodes are relevant, particularly EN 1993-1-1 and EN 1993-1-3, as far as the design is concerned. The codes and guidelines produced by CEN/TC 344 are intended to amplify and clarify the requirements of the Eurocodes since they particularly apply to design while specification, installation and application and maintenance are considered as special requirements for racking and shelving products. This European Standard considers application and maintenance.

0.2 Additional European Standards for racking and shelving

Due to the differences in the shape of structural components, detailing and connection types, additional technical information to the Eurocodes is required in order to provide state of the art guidance. This guidance is for the client or consultant specifying the requirement, the designer producing a sound structural design, the installer building the structure and the user who operates and maintains the structure in accordance with the design specification.

This together with the need to provide harmonized design rules, is the reason that the European Racking Federation (ERF) has taken the initiative to support this development of a range of European Standards for specific types of racking and shelving used in specific applications (see bibliography).

0.3 Additional information specific to EN 15635

This European Standard gives additional information to that in Eurocodes EN 1990 and EN 1991, to be used in the structural design of storage systems (see also prEN 15512) and is intended for use by:

- a) committees drafting design related product, testing and execution standards;
- b) clients (e.g. for the formulation of their specific requirements);
- c) specifiers, designers, suppliers, installers and end users of the product;
- d) relevant building control authorities.

Expertise in the technical properties of racking components and knowledge of the specific methods of calculation to determine the safe load carrying capacity data for the products shall be available normally from the manufacturer of that product. These standardized products can have infinite variation in their configuration. Structural engineering in steel requires special attention for the cold formed sections normally in use and for flexural and (overall) frame instability. Users should refer to prEN 15512 for more information on these aspects.

Users of storage equipment should refer to EN 15629 to ensure that the specified layout and configuration is not in conflict with the methods of operation, ensuring safe operating conditions in the workplace.

This European Standard deals with these user-defined aspects. A clear user specification for the provision of a safe storage equipment design is an essential basis to provide and complement safe working conditions.

This European Standard is also relevant to specifiers and suppliers.

1 Scope

This European Standard gives guidelines for operational aspects relevant to structural safety of storage systems. Such systems operate with heavy mechanical handling equipment working in close proximity to static storage equipment. This European Standard minimizes the risk and consequences of unsafe operation or damage to the structure. Some other forms of storage equipment are only partially covered and further consideration, beyond the scope of this European Standard, can be required.

This European Standard gives guidance in conjunction with prEN 15512, EN 15620, and EN 15629 to ensure that the specifier, user and designer are aware of the constraints in each other's area to allow a safe design to be produced.

This European Standard specifically excludes storage equipment manufactured from materials other than steel (except for certain accessories) and equipment intended to be used for domestic storage purposes

2 Normative references

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.

EN 15629, *Steel static storage systems — The specification of storage equipment*

EN 15620, *Steel static storage systems — Adjustable pallet racking — Tolerances, deformations and clearances*

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 load make up accessories and unit loads

3.2 allowable loading

beam, frame or shelf safe load capacity indicated by the storage equipment supplier to the user on the safe load warning notices based upon the data supplied by the specifier

3.3 bay load

total allowable weight of all the unit loads in a bay of racking not including any unit loads that can be stored on the floor of the bay

3.4 clearance

nominal dimension between items

3.5 compartment load

load, which can be loaded into one compartment of a rack or shelving structure from one side