ICS 53.080 SLOVENSKÁ TECHNICKÁ NORMA November 2016

STN	**Statické oceľové skladovacie systémy. Nastaviteľné paletové regálové systémy. Zásady seizmického konštruovania.**	**STN EN 16681** 26 9506

Steel static storage systems - Adjustable pallet racking systems - Principles for seismic design

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 10/16

Obsahuje: EN 16681:2016

123667

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 16681

June 2016

ICS 53.080

English Version

Steel static storage systems - Adjustable pallet racking systems - Principles for seismic design

Systèmes de stockage statique en acier - Systèmes de rayonnages à tablettes ajustables - Principes pour le calcul parasismique

Ortsfeste Regalsysteme aus Stahl - Verstellbare Palettenregale - Leitsätze für die erdbebensichere Gestaltung

This European Standard was approved by CEN on 7 April 2016.

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-CENELEC 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-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of 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, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Ref. No. EN 16681:2016 E

Contents

Page

European foreword

This document (EN 16681:2016) 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 December 2016 and conflicting national standards shall be withdrawn at the latest by December 2016.

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

0 Introduction

0.1 Effects of seismic actions on racking systems

Racking systems are load bearing structures for the storage and retrieval of goods in warehouses. The goods are generally stored on pallets or in box containers.

Racking systems are constructed from steel components; although components are standardized, they are only standard to each manufacturer. These components differ from traditional steel components in the following regard:

a) continuous perforated uprights;

b) hook-in connections;

c) structural components for racking, which generally consist of cold formed thin gauge members.

In respect of the loads, the self-weight of a rack structure is typically very small or negligible with respect to the total mass, whereas in a typical building the percentage of dead and permanent loads will be much greater.

The nature and the distribution of the goods stored on racking systems strongly affect the response and the safety of the structure under seismic actions. In fact:

— unit loads are in general simply supported vertically by the racking structure and kept in their position when loaded by inertial actions only by friction;

— unit loads are in general sub-structures with distinct dynamic characteristics in terms of frequency and damping, and their behaviour affect the response of the system.

During real earthquakes or earthquake simulated on shaking tables, movements of pallets on pallet beams were observed; these were either very small ones, contributing to the dissipation of energy by means of friction, or very large, with movements of the pallets that produced their falling between beams or outside the rack in the aisle. For this reason, friction between pallet and pallet beam and internal damping in the unit load has a relevant influence in the dynamic response of the rack and affects the entity of the inertial actions.

Also, the safety of the installation related to the movement and eventual falling of the pallets requires a proper assessment.

This European Standard deals with all the relevant and specific seismic design issues for racking systems, based on the criteria of EN 1998-1:2004, Eurocode 8.

0.2 Requirements for EN Standards for racking and shelving in addition to Eurocodes

While the basic technical description of an earthquake is the same for all structures, the general principles and technical requirements applicable for conventional steel structures have to be adapted for racking systems, in order to take into account the peculiarities of racking to achieve the requested safety level.

Also, the methods of analysis and the design requirements need to be addressed to the peculiarity of racking structures.

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

This, together with the need of harmonized design rules was the reason that European Racking Federation ERF/FEM Racking and Shelving has taken the initiative for CEN/TC 344. CEN/TC 344 is in the course of preparation of a number of European Standards for specific types of racking and shelving and particular applications, which exist in the European Standards (EN) and working group activities (WG).

0.3 Liaison

CEN/TC 344 “Steel Static Storage Systems” liaise with CEN/TC 250 “Structural Eurocodes”, CEN/TC 135 “Execution of steel structures and aluminium structures” and CEN/TC 149 “Power operated warehouse equipment”.

0.4 Additional information specific to EN 16681

This European Standard is intended to be used with EN 1998-1, EN 15512 and related standards.

EN 1998-1 is the first of 6 parts; it gives design rules intended to be used for structures fabricated with conventional materials, including steel.

EN 15512 is the reference standard for the design of racking structures and components; it addresses the principles of the EN 1990, Eurocode, and EN 1993 series, Eurocode 3, to the adjustable pallet racking systems and it needs to be applied also when actions are produced by an earthquake.

1 Scope

This European Standard specifies the structural design requirements applicable to all types of adjustable pallet racking systems fabricated from steel members, intended for storage of unit loads and subject to seismic actions.

This European Standard gives also guidelines for the design of clad rack buildings in seismic zones, where requirements are not covered in the EN 1998 series.

This European Standard does not cover other generic types of storage structures. Specifically, this European Standard does not apply to mobile storage systems, drive-in, drive-through and cantilever racks or static steel shelving systems.

This European Standard does not apply to the design of seismic isolated racking structures.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.[1)]

EN 1090-2, *Execution of steel structures and aluminium structures - Part 2: Technical requirements for steel structures*

EN 1990 (all parts), *Eurocode - Basis of structural design*

EN 1993 (all parts), *Eurocode 3 - Design of steel structures*

EN 1998-1:2004[2)], *Eurocode 8: Design of structures for earthquake resistance - Part 1: General rules, seismic actions and rules for buildings*

EN 15512:2009, *Steel static storage systems - Adjustable pallet racking systems - Principles for structural design*

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

EN 15629:2008, *Steel static storage systems - Specification of storage equipment*

EN 15635:2008, *Steel static storage systems - Application and maintenance of storage equipment*

EN 15878:2010, *Steel static storage systems - Terms and definitions*

ETAG 001 series, *Guideline for European technical approval of metal anchors for use in concrete*

1) Complementary rules to existing Norms specific for seismic applications are included in the following annexes:
— Annex I "*Data to be exchanged between the Specifier/End User and the rack's Supplier*" as complement to EN 15629:2008
— Annex J "*Complementary rules to* EN 15635" as complement to EN 15635:2008
— Annex K "*Complementary rules to* EN 15629" as complement to EN 15629:2008

2) This document is impacted by the amendment EN 1998-1:2004/A1:2013.