



# SLOVENSKI STANDARD

## SIST EN 14592:2009

01-december-2009

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### Lesene konstrukcije - Paličasta vezna sredstva - Zahteve

Timber structures - Dowel-type fasteners - Requirements

Holzbauwerke - Stiff förmige Verbindungsmittel - Anforderungen

Structures en bois - Eléments de fixation - Exigences

Ta slovenski standard je istoveten z: **EN 14592:2008**

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#### **ICS:**

21.060.01	Vezni elementi na splošno	Fasteners in general
91.080.20	Lesene konstrukcije	Timber structures

**SIST EN 14592:2009**

**en,fr,de**

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 14592**

October 2008

ICS 91.080.20

English Version

## Timber structures - Dowel-type fasteners - Requirements

Structures en bois - Eléments de fixation - Exigences

Holzbauwerke - Stifförmige Verbindungsmittel -  
Anforderungen

This European Standard was approved by CEN on 9 August 2008.

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

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**EN 14592:2008 (E)****Foreword**

This document (EN 14592:2008) has been prepared by Technical Committee CEN/TC 124 “Timber structures”, the secretariat of which is held by SFS.

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of an identical text or by endorsement, at the latest by April 2009, and conflicting national standards shall be withdrawn at the latest by July 2010.

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.

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

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## 1 Scope

This European Standard specifies the requirements and test methods for materials, geometry, strength, stiffness and durability aspects (i.e. corrosion protection) of dowel-type fasteners for use in load bearing timber structures.

Only dowel-type fasteners manufactured from steel are covered by this European Standard. For the purpose of this standard, dowel-type fasteners for timber structures are taken to be nails, staples, screws, dowels, and bolts with nuts. Definitions of these items are given in Clause 3. This European Standard specifies also the evaluation of conformity procedures and includes requirements for marking of these products.

This European Standard does not cover resin coated dowel-type fasteners and fasteners treated with fire retardants to improve their fire performance. It also does not cover resin coated fasteners.

## 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 409, *Timber structures - Test methods - Determination of the yield moment of dowel type fasteners - Nails*
- EN 1382, *Timber structures - Test methods - Withdrawal capacity of timber fasteners*
- EN 1383:1999, *Timber structures - Test methods - Pull-through resistance of timber fasteners*
- EN 1995-1-1:2004, *Eurocode 5: Design of timber structures - Part 1-1: General - Common rules and rules for buildings*  
<https://standards.iteh.ai/catalog/standards/sist/0fe5eed4-6278-4e35-9de0-18f2270417e0/EN-1995-1-1-2004>
- EN 10016 (all parts), *Non-alloy steel rod for drawing and/or cold rolling*
- EN 10025-2, *Hot rolled products of structural steels - Part 2: Technical delivery conditions for non-alloy structural steels*
- EN 10025-3, *Hot rolled products of structural steels - Part 3: Technical delivery conditions for normalized/normalized rolled weldable fine grain structural steels*
- EN 10083-1, *Steels for quenching and tempering - Part 1: General technical delivery conditions*
- EN 10083-2, *Steels for quenching and tempering - Part 2: Technical delivery conditions for non alloy steels*
- EN 10088-1, *Stainless steels - Part 1: List of stainless steels*
- EN 10088-2, *Stainless steels - Part 2: Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes*
- EN 10149-1, *Hot-rolled flat products made of high yield strength steels for cold forming – Part 1: General delivery conditions*
- EN 10218-1, *Steel wire and wire products - General - Part 1: Test methods*
- EN 10230-1, *Steel wire nails - Part 1: Loose nails for general applications*
- EN 10278, *Dimensions and tolerances of bright steel products*

**EN 14592:2008 (E)**

EN 14358, *Timber structures - Calculation of characteristic 5-percentile values and acceptance criteria for a sample*

EN ISO 780, *Packaging - Pictorial marking for handling of goods (ISO 780:1997)*

EN ISO 1461, *Hot dip galvanised coatings on fabricated iron and steel articles - Specifications and test methods (ISO 1461:1999)*

EN ISO 4014, *Hexagon head bolts - Product grades A and B (ISO 4014:1999)*

EN ISO 4016, *Hexagon head bolts - Product grade C (ISO 4016:1999)*

EN ISO 4017, *Hexagon head screws - Product grades A and B (ISO 4017:1999)*

EN ISO 4018, *Hexagon head screws - Product grade C (ISO 4018:1999)*

EN ISO 4032, *Hexagon nuts, style 1 - Product grades A and B (ISO 4032:1999)*

EN ISO 4034, *Hexagon nuts - Product grade C (ISO 4034:1999)*

EN ISO 9001, *Quality management systems - Requirements (ISO 9001:2000)*

EN ISO 10666:1999, *Drilling screws with tapping screw thread - Mechanical and functional properties (ISO 10666:1999)*

ISO 286-2, *ISO system of limits and fits - Part 2: Tables of standard tolerance grades and limit deviation for holes and shafts*

ISO 2081, *Metallic coatings - Electroplated coatings of zinc on iron or steel*

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**3 Terms and definitions**

For the purposes of this document, terms and definitions given in EN 1995-1-1:2004 and the following apply.

**3.1****plain shank nail (smooth nail)**

nail that has a constant cross-section along its entire length (e.g. round, square or grooved nails)

**3.2****threaded nail**

nail that has its shank profiled or deformed over a part of its length

**3.3****staple crown width**

distance between the outer edges of the staple legs

**3.4****dowel**

cylindrical metal fastener that does not contain an integral head

NOTE Dowels may be threaded and have nuts fitted at either end.

**3.5****bolt**

cylindrical metal fastener containing an integral head at one end and a threaded portion to receive a nut at the other end



**3.6****withdrawal parameter**

parameter measuring the resistance of a timber test piece to the withdrawal of a timber fastener

**3.7****head pull-through parameter**

parameter measuring the resistance of a timber test piece to the pulling through of the head of a timber fastener or the crown of a staple

**3.8****tensile capacity**

tensile capacity measured during a test following the principle of EN 1383, as described in 6.1.4.5

**3.9****nominal diameter**

screws intended for use in load bearing timber structures,  $d$  being the maximum outer cross-section diameter of the threaded part, and for nails  $d$  being the minimum outer cross-sectional dimension of the unprofiled part, when measured as described in 5.3

NOTE For plain shank nails, spiral rolled nails or annular ring shank nails, intended for use in load bearing timber structures,  $d$  is the minimum outer cross-sectional diameter of the round nail wire, or the side length dimension of the minimum cross-sectional for a square nail, for all other profiled nails, intended for use in load bearing timber structures;  $d$  is the minimum cross-sectional diameter of the original wire rod, from which the profiled nail has been produced (see Figure 1).

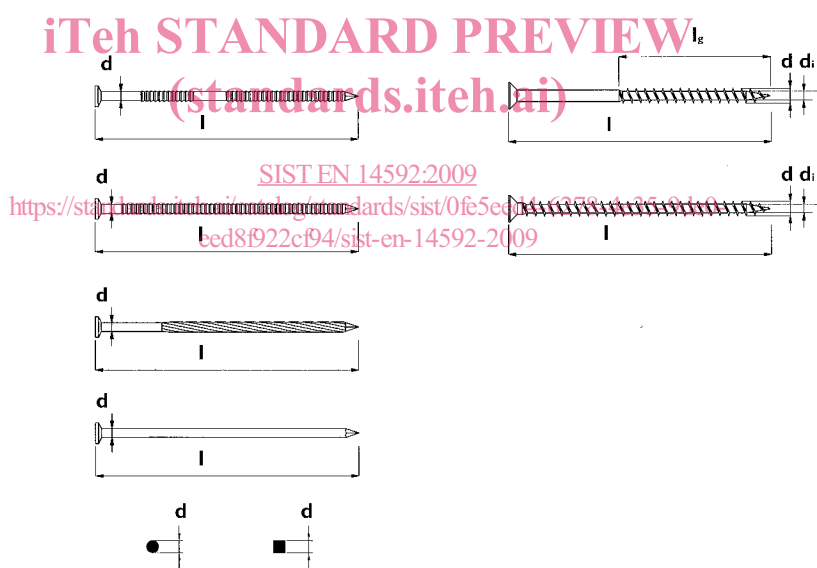


Figure 1 – Nominal diameter and length of nails

**3.10****effective screw diameter**

parameter used in the calculation of the characteristic yield moment of screws as given in EN 1995-1-1

NOTE Defined in EN 1995-1-1 as  $d$  – diameter in mm measured on the smooth shank, it only applies for part threaded screws which have their threaded part turned down from the original rod diameter, and therefore have a shank diameter equal to the maximum outer cross-sectional diameter of the threaded part. For all other screws produced by rolling or forging,  $d$  is the maximum cross-sectional diameter of the threaded part, as described in 6.3.1 (see Figures 1 and 3).

## EN 14592:2008 (E)

## 3.11

**stiffness**

value based on required bend angle (deformation),  $\alpha$  of the characteristic yield strength (capacity) either found by testing or calculated according to EN 1995-1-1

**4 Symbols and abbreviations**

For the purposes of this standard, the symbols and abbreviations given in EN 1995-1-1 and the following apply.

$A_{80}$	percentage elongation (%)
$A_h$	nail head cross-sectional area (mm <sup>2</sup> )
$A_s$	staple leg cross-sectional area (mm <sup>2</sup> )
$d$	nominal diameter (mm)
$d_h$	head diameter (mm)
$d_i$	inner thread diameter; inner diameter of fluting (mm)
$d_{ef}$	effective screw diameter (mm)
$f_{ax,k}$	characteristic withdrawal parameter (N/mm <sup>2</sup> )
$f_{head,k}$	characteristic head pull-through parameter (N/mm <sup>2</sup> )
$f_{tens,k}$	characteristic tensile capacity (head pull-off or shank tensile capacity) (kN)
$f_{tor,k}$	characteristic torsional strength (Nmm)
$f_u$	tensile strength of the wire (N/mm <sup>2</sup> )
$h_t$	nail head thickness (mm)
$l$	overall fastener length (mm)
$l_g$	length of profiling/threading (mm)
$l_p$	length of the nail point (mm)
$M_{y,k}$	characteristic yield moment (Nmm)
$R_{tor,k}$	characteristic torsional resistance to insertion into timber with a density of 450 kg/m <sup>3</sup> when conditioned to constant mass at 20 °C and 65 % relative humidity (Nmm)
$\alpha$	bend angle (°)
$\rho_k$	characteristic timber density when conditioned to constant mass at 20 °C and 65 % relative humidity (kg/m <sup>3</sup> )

**5 Dimensions and tolerances****5.1 Method of measurement and accuracy**

Dimensions shall be taken on the completed fastener using a calibrated device capable of achieving an accuracy of  $\pm 1$  % of the measurement.

**5.2 Length**

Where appropriate the overall length of a fastener shall be measured and the result declared. When sampled in accordance with Tables 2 to 6 and measured, the overall length shall be within  $\pm 2,5$  % of the declared value.

**5.3 Nominal diameter**

Where appropriate, the nominal diameter of a fastener shall be measured and the result declared. Unless otherwise stated in this standard, the nominal diameter shall be within  $\pm 2,5$  % of the declared value when sampled in accordance with Tables 2 to 6 and measured as follows:

- the diameter shall be measured at several points around the circumference and along the length;
- the maximum measurement shall be taken as the nominal diameter.

## 5.4 Other dimensions

Where appropriate, other dimensions, e.g. point length of a fastener, threaded length and head thickness, shall be measured and the result declared. When sampled in accordance with Tables 2 to 6 and measured, these other dimensions shall be within  $\pm 5\%$  of the declared values.

## 5.5 Cross-sectional area

Where appropriate, the cross-sectional area of a fastener shall be measured and the result declared. When sampled in accordance with Tables 2 to 6 sufficient measurements shall be taken to enable the cross-sectional area to be calculated. The cross-sectional area shall be within  $\pm 5\%$  of the declared value.

# 6 Requirements

## 6.1 Nails

### 6.1.1 General

The requirements of EN 10230-1 on preferred form and dimensions, tolerances and surface coatings of the nails shall be fulfilled.

### 6.1.2 Materials

Nail shall be produced from a wire with a minimum tensile strength of  $600 \text{ N/mm}^2$  determined in accordance with EN 10218-1. The wire shall be drawn from either non-alloy steel rods produced in accordance with EN 10016 (all parts), or wire drawn from austenitic stainless steel rods produced in accordance with EN 10083-1 or EN 10088-2.

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### 6.1.3 Geometry

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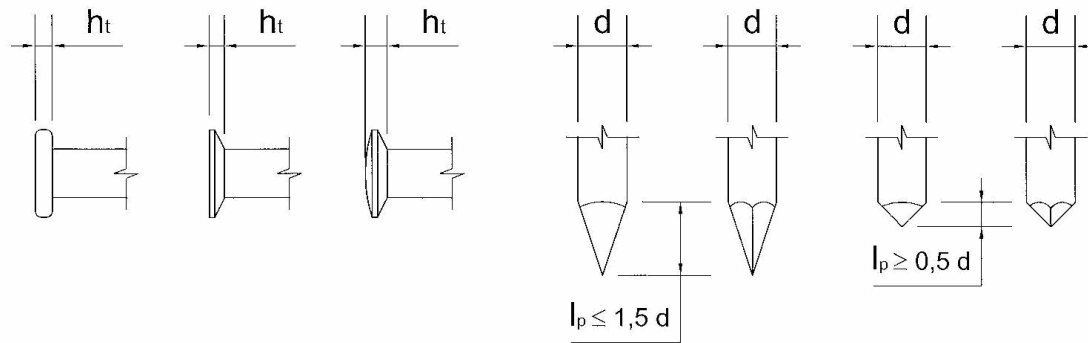
The nominal diameter,  $d$ , of nail shall not be less than 1,9 mm and shall not be greater than 8,0 mm.

The area of the nail head,  $A_h$ , shall not be less than  $2,5 d^2$ , and the thickness of the head,  $h_t$ , shall not be less than  $0,25 d$  (see Figure 2).

The length ( $l$ ) of the nail (see Figure 1) and the length of the point,  $l_p$ , shall not be less than  $0,5 d$  and shall not be greater than  $1,5 d$  (see Figure 2).

For profiled nails the length of the the threaded part shall be minimum 4,5  $d$ .

Dimensional tolerances for nails shall comply with the requirements of EN 10230-1.



**Figure 2 – Geometry of nails heads and points**

NOTE Standard dimensions for various types of loose nail are given in EN 10230-1.

### 6.1.4 Mechanical strength and stiffness

#### 6.1.4.1 General

For the purpose of the mechanical strength of nails the following characteristic properties shall be used in this standard:

- characteristic yield moment,
- characteristic withdrawal parameter, [SIST EN 14592:2009](https://standards.iteh.ai/catalog/standards/sist/0fe5eed4-6278-4e35-9de0-c9d8f922cf94/sist-en-14592-2009)
- characteristic head pull-through parameter, <https://standards.iteh.ai/catalog/standards/sist/0fe5eed4-6278-4e35-9de0-c9d8f922cf94/sist-en-14592-2009>
- characteristic tensile capacity.

The characteristic strength results for nails (see 6.1.4.2 to 6.1.4.5) shall be declared either directly from tests or, in certain cases and types of nails, from equations given in EN 1995-1-1. Where characteristic strength values are declared from test results, they shall be calculated in accordance with EN 14358.

For the purposes of strength calculations for nailed joints, the nail diameter shall be taken as the nominal diameter,  $d$ , measured in accordance with 5.3.

For the purpose of the mechanical stiffness of nails the following characteristic properties shall be used in this standard:

- characteristic yield moment.

For the purposes of stiffness (bend angle  $\alpha$ ), for round or square cross-section nails, the declaration is related to the result of the characteristic yield moment  $M_{y,k}$  which shall be declared either directly by testing in accordance with EN 409 or calculated from the relevant equations given in EN 1995-1-1.

For all other types of nail the result shall be declared by testing in accordance with EN 409.

#### 6.1.4.2 Characteristic yield moment

For round or square cross-section nails, the characteristic yield moment  $M_{y,k}$  the result shall be declared either directly by testing in accordance with EN 409 or declared by calculation according to the relevant equations given in EN 1995-1-1.

For all other types of nail, including treaded nails, the characteristic yield moment  $M_{y,k}$  of the nail the result shall be declared from testing in accordance with EN 409.

#### 6.1.4.3 Characteristic withdrawal parameter

Characteristic withdrawal parameter  $f_{ax,k}$  of plain shank nails shall be less than  $4,5 \text{ N/mm}^2$  when measured on timber with a characteristic density of  $350 \text{ kg/m}^3$  when conditioned to constant mass at  $20 \text{ }^\circ\text{C}$  and 65 % relative humidity.

For plain shank nails, the characteristic withdrawal parameter  $f_{ax,k}$  the result shall be declared on one or more characteristic timber densities or on other types of wood based products, either directly by testing in accordance with EN 1382 or declared by calculation according to the relevant equations given in EN 1995-1-1.

Characteristic withdrawal parameter  $f_{ax,k}$  of threaded nails shall be greater than or equal to  $4,5 \text{ N/mm}^2$  when measured on timber with a characteristic density of  $350 \text{ kg/m}^3$  when conditioned to constant mass at  $20 \text{ }^\circ\text{C}$  and 65 % relative humidity.

For all other types of nail, the characteristic withdrawal parameter  $f_{ax,k}$  the result shall be declared on one or more characteristic timber densities or on other types of wood based products, by testing in accordance with EN 1382.

#### 6.1.4.4 Characteristic head pull-through parameter

For plain shank nails, the characteristic head pull-through parameter  $f_{head,k}$  the result shall be declared on one or more characteristic timber densities or on other types of wood based products, either directly by testing in accordance with EN 1383 or declared by calculation according to the relevant equations given in EN 1995-1-1.

For all other types of nail, the characteristic head pull-through parameter  $f_{head,k}$  the result shall be declared on one or more characteristic timber densities or on other types of wood based products, by testing in accordance with EN 1383.

#### 6.1.4.5 Characteristic tensile capacity

The characteristic tensile capacity of nails  $f_{tens,k}$  (head pull-off or shank tensile capacity) the result shall be declared by testing in accordance with EN 1383, using a steel plate to replace the head side timber member shown in Figure 4 of that standard. The steel plate shall be of sufficient thickness to induce either a pull-off failure of the head, or a tensile failure of the shank and shall contain a pre-drilled hole for the nail which shall not exceed the maximum outer diameter of the nail + 1 mm in diameter. For partially profiled nails the area of transition from the profiled to the smooth part of the shank shall be located within the free length of testing and shall have a clear distance from the jaws of the testing equipment of at least  $3 d$ . The rate of loading shall be chosen so that the failure load (ultimate load) is reached within  $10 \text{ s} \pm 5 \text{ s}$ .

#### 6.1.5 Corrosion protection

For nails, where corrosion protection is required, the grade of the parent material or thickness of coating shall be declared in accordance with Annex A.

Examples of minimum corrosion protection or material specifications for different service classes are given in EN 1995-1-1.