



# SLOVENSKI STANDARD

## SIST EN 1381:2000

01-april-2000

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### Lesene konstrukcije - Metode preskušanja - Nosilni spoji s sponkami

Timber structures - Test methods - Load bearing stapled joints

Holzbauwerke - Prüfverfahren - Tragende Klammerverbindungen

Structures en bois - Méthodes d'essai - Assemblages agrafés porteurs

Ta slovenski standard je istoveten z: **EN 1381:1999**

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#### **ICS:**

91.080.20      Lesene konstrukcije      Timber structures

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EUROPEAN STANDARD

EN 1381

NORME EUROPÉENNE

EUROPÄISCHE NORM

August 1999

ICS 91.080.20

English version

## Timber structures - Test methods - Load bearing stapled joints

Structures en bois - Méthodes d'essai - Assemblages  
agrafés porteursHolzbauwerke - Prüfverfahren - Tragende  
Klammerverbindungen

This European Standard was approved by CEN on 11 July 1999.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

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## Foreword

This European Standard has been prepared by Technical Committee CEN/TC 124 "Timber structures", the secretariat of which is held by DS.

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 February 2000, and conflicting national standards shall be withdrawn at the latest by February 2000.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

This Standard is one of a series of standards for test methods for building materials and components. It was prepared by a working group under the convenorship of National Standards Authority of Ireland (NSAI).

The Standard is based on ISO/DIS 9708 'Timber structures - Joints with mechanical fasteners - Testing of joints with nails or staples'.

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## 1 Scope

This standard specifies test methods for determining the strength and deformation characteristics of stapled joints in load-bearing timber structures.

The methods assess joints with members of timber (solid timber and glued laminated timber) or wood-based products in the combination proposed for use in service and using all types of staples up to 3 mm diameter for circular cross-section staples or 4 mm × 2 mm for rectangular or oval cross-section staples.

The methods determine load-slip characteristics and maximum load of joints with laterally loaded staples where various angles between the applied force and the timber grain direction or the main direction of the wood-based products, respectively, are possible.

## 2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

|               |  |
|---------------|--|
| EN 322        | Wood-based panels - Determination of moisture content  |
| EN 323        | Wood-based panels - Determination of density   |
| EN 26891 1991 | Timber structures - Joints made with mechanical fasteners - General principles for the determination of strength and deformation characteristics (ISO 6891:1983) |
| EN 28970      | Timber structures - Testing of joints made with mechanical fasteners - Requirements for wood density (ISO 8970:1989)   |
| ISO 3130      | Wood - Determination of moisture content for physical and mechanical tests   |
| ISO 3131      | Wood - Determination of density for physical and mechanical tests  |

## 3 Definitions

For the purposes of this standard, the following definitions apply:

- 3.1 staple:* Double-bent, u-shaped piece of round, square, rectangular or oval wire with pointed legs
- 3.2 staple crown:* Connection between the two staple legs
- 3.3 staple leg diameter:* Diameter of a round staple leg or the smaller dimension of a rectangular or oval staple leg
- 3.4 staple length:* Length of each staple leg, including point
- 3.5 staple width:* Width across the staple legs, see figure 1

*3.6 deformation of the joint:* Mean value of the measurements of the relative displacements of the two side members with respect to the central member.

#### 4 Symbols

- $a$  staple width, see figure 1, in millimetres
- $b$  width of member cross-section, in millimetres
- $d$  nominal staple diameter, see figure 1, in millimetres
- $F$  load, in newtons
- $t$  member thickness, in millimetres
- $l$  staple length, see figure 1, in millimetres
- $\alpha_{\text{cm}}$  angle between the direction of a staple crown and the grain direction or the main direction of the wood-based products, respectively, see figure 2, in degrees

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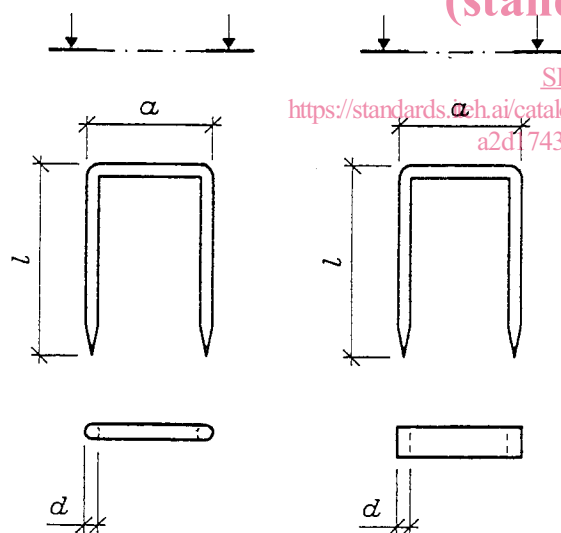


Figure 1: Staple dimensions

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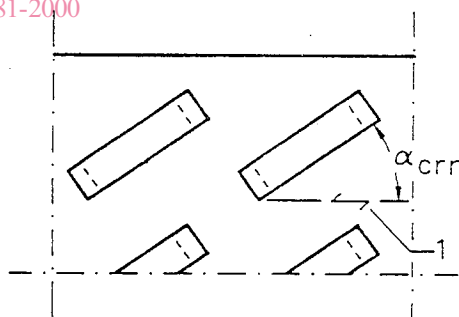


Figure 2: Angle between the staple direction and the grain direction or the main direction of a wood-based product (1)

## 5 Materials

### 5.1 Timber

The timber (solid timber or glued laminated timber) shall be selected in accordance with either of the methods given in EN 28970.

For each test piece, the individual members to be joined shall be selected to ensure a test piece of balanced density. For a group of similar test pieces, separate planks shall be used for each test piece.

NOTE: The members should be free from major defects which could lead to premature failure in the area away from the fasteners.

### 5.2 Wood-based products

The specification of these products shall be established. The products used for the individual members of the test pieces shall be representative of the class or range of product to which they belong and the relevant properties shall be declared.

One unique grade shall be used to make the test pieces. For each test piece, the individual members in the joint shall be selected from separate pieces of material.

### 5.3 Staples

The specification of the staple wire and the staples shall be established.

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## 6 Test methods

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### 6.1 General

The moisture content and density of the timber or wood-based products members at test shall be determined as specified in ISO 3130, ISO 3131, EN 322 and EN 323 as appropriate.

### 6.2 Conditioning

The test pieces shall be manufactured with the timber or wood-based products at an equilibrium moisture content corresponding to  $(20 \pm 2)$  °C and  $(85 \pm 5)$  % relative humidity. The material is conditioned when it attains constant mass. Constant mass is considered to be attained when the results of two successive weighings, carried out at an interval of 6 h, do not differ by more than 0,1 % of the mass of the material.

After manufacture the test pieces shall be stored for at least one week at  $(20 \pm 2)$  °C and  $(65 \pm 5)$  % relative humidity.

For certain investigations other moisture conditioning may be appropriate, and shall be reported.

NOTE: For some hardwoods a much longer storing period may be necessary or the test pieces should be made with appropriate gaps between the members.



### 6.3 Fabrication of test pieces

If there are no special requirements, timber members shall be planed. Test pieces shall be fabricated with the staple legs perpendicular to the member surface. The insertion of the staples shall follow normal practice, which shall be reported.

NOTE: The depth of staple crown indentation will have an influence on the test result, particularly for joints loaded in double shear. Therefore, if the fabrication technique permits, the staple crowns should protrude above the surface.

### 6.4 Preparation of test pieces

#### 6.4.1 Load parallel to grain

For joints consisting solely of timber or wood-based products (or combinations thereof) the test pieces shall be made as three-member joints with four staples from each side, loaded in single shear, see figure 3.

Tests shall at least be made with equal numbers of test pieces with  $\alpha_{\text{crn}} = 0^\circ$ ,  $\alpha_{\text{crn}} = 45^\circ$  and  $\alpha_{\text{crn}} = 90^\circ$ .

NOTE : The 50 mm minimum end length shown in figure 3 may not be appropriate to thin timber or wood-based products subjected to compression loads.

#### 6.4.2 Load perpendicular to grain

For joints consisting solely of timber or wood-based products (or combinations thereof) the test pieces shall be made as three-member joints with four staples from each side, loaded in single shear, see figures 4 and 5.

Tests shall at least be made with equal numbers of test pieces with  $\alpha_{\text{crn}} = 0^\circ$ ,  $\alpha_{\text{crn}} = 45^\circ$  and  $\alpha_{\text{crn}} = 90^\circ$ .

### 6.5 Test procedure

The test shall be carried out in accordance with clause 7 and 8 of EN 26891:1991 with the following additions:

- a) if compression test pieces are used, instability of the members shall be prevented and
- b) the separation of the side members in combination with pulling out the staples shall not be significantly hindered by the loading equipment.