SLOVENSKI STANDARD
SIST EN 1075:2015

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Nadomešča:
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Lesene konstrukcije - Preskusne metode - Spoji s kovinskimi ježastimi ploščami

Timber structures - Test methods - Joints made with punched metal plate fasteners

Holzbauwerke - Prüfverfahren - Verbindungen mit Nagelplatten

Structures en bois - Méthodes d'essai - Assemblages réalisés avec des connecteurs métalliques à plaque emboutie

Ta slovenski standard je istoveten z: **EN 1075:2014**

ICS:

91.080.20	Lesene konstrukcije	Timber structures

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Timber structures - Test methods - Joints made with punched metal plate fasteners

Structures en bois - Méthodes d'essai - Assemblages réalisés avec des connecteurs métalliques à plaque emboutie

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

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

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Foreword

This document (EN 1075:2014) has been prepared by Technical Committee CEN/TC 124 “Timber Structures”, the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by June 2015 and conflicting national standards shall be withdrawn at the latest by June 2015.

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.

This document supersedes EN 1075:1999.

Compared to EN 1075:1999, the following changes have been made:

a) replacement of EN 28970 by EN ISO 8970;

b) modification of definition in 3.5 for density;

c) modification of the formula in 6.6.1 for anchorage capacity;

d) improvement of figures.

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.

1 Scope

This European Standard specifies the test methods for determining the strength capacity and stiffness of joints made with punched metal plate fasteners in load bearing timber structures, being used to join two or more pieces of timber of the same thickness in the same plane.

The properties measured are:

— load-slip characteristics and maximum load resulting from the lateral resistance of the embedded projections, at various angles between the direction of the applied force and

  — the axis of the fastener (load-fastener angle α),

  — the direction of the grain of the timber (load-grain angle β),

— the tension capacity of the fastener at various angles α,

— the compression capacity of the fastener at various angles α,

— the shear capacity of the fastener at various angles α.

A nail root test method is shown in Annex A.

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.

EN 336, *Structural timber — Sizes, permitted deviations*

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

EN 26891:1991 *Timber structures — Joints made with mechanical fasteners — General principles for the determination of strength and deformation characteristics (ISO 6891:1983)*

EN ISO 8970, *Timber structures — Testing of joints made with mechanical fasteners — Requirements for wood density (ISO 8970)*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

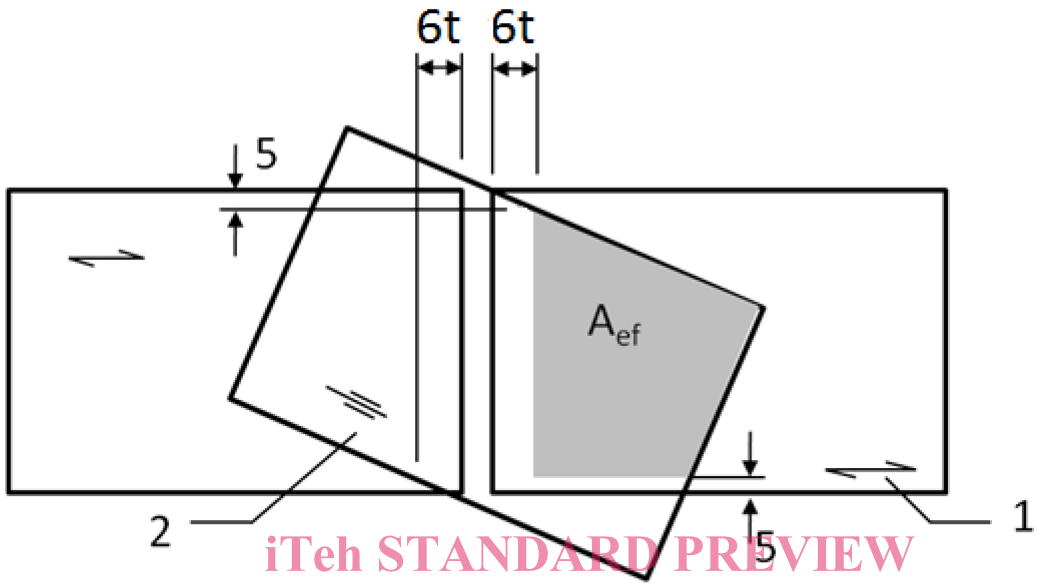
3.1
punched metal plate
fastener made of metal plate of nominal thickness not less than 0,9 mm and not more than 3,0 mm, having integral projections punched out in one direction and bent perpendicular to the base of the metal plate

3.2
major axis of fastener
direction giving the highest tension capacity per unit width of the fastener

Note 1 to entry: In many cases the punching pattern of the fastener gives rise to two main directions, perpendicular to each other, with different capacity properties.

3.3
effective area of fastener
area of the total contact surface between the plate and the timber, reduced by 5 mm from the edges of the timber and by a distance in the grain direction from the end of timber equal to 6 times the fastener's nominal thickness, see Figure 1

Dimensions in millimetres



Key

1 direction of the grain

2 major axis of the fastener

Figure 1 — Definition of effective area of fastener

3.4
anchorage capacity per unit area
maximum load resisted by the joint per effective unit area of the fastener

3.5
mean density
population 50-percentile value with the mass and volume corresponding to equilibrium moisture content at a temperature of 20 °C and a relative humidity of 65 %

3.6
design core thickness of the fastener
nominal thickness of the fastener, reduced by the thickness of the coating and further reduced by the minus tolerance of the core thickness

4 Symbols and abbreviations

A_{ef}	effective area of fastener, in square millimetres
b	width of fastener perpendicular to the major axis of the fastener, in millimetres
$f_{a,\alpha,\beta}$	fastener anchorage capacity, in newtons per square millimetre
$f_{c,\alpha}$	fastener compression capacity, in newtons per millimetre
$f_{t,\alpha}$	fastener tension capacity, in newtons per millimetre
$f_{t,act}$	actual tension strength of the fastener material, in newtons per square millimetre
$f_{t,k}$	characteristic tension strength of the fastener material, in newtons per square millimetre
$f_{v,\alpha}$	fastener shear capacity, in newtons per millimetre
$f_{y,act}$	actual yield stress of the fastener material in newtons per square millimetre
$f_{y,k}$	characteristic yield stress of the fastener material in newtons per square millimetre
F	load, in newtons
F_{max}	maximum load, in newtons
$F_{max,est}$	estimated maximum load, in newtons
h	depth of timber, in millimetres
l	length of fastener parallel to the major axis of the fastener, in millimetres
l_1, l_2	lengths of area covered by the fastener (see Figure 3), in millimetres
l_j	length of the fastener in the joint line, in millimetres
t	thickness of timber test piece, in millimetres
$t_{cor,d}$	design core thickness of fastener, in millimetres
t_{act}	actual core thickness of fastener, in millimetres
α	angle between the direction of the applied force and the major axis of the fastener, in degrees
β	angle between the direction of the applied force and the direction of the grain of the timber, in degrees
θ	angle between the gap line and the line through the load point and the centre point of the fastener (see Figure 6), in degrees
ρ	density of the timber member in which the failure took place, in kilogram's per cubic metre.

5 Materials

5.1 Timber

The timber shall be selected in accordance with EN ISO 8970.

5.2 Fasteners

The fastener specification, including the relevant characteristic mechanical properties (e.g. tensile strength, yield stress and elongation) of the steel used to manufacture the fasteners, determined using standard test procedures, shall be recorded. For the purpose of verifying such records, material shall be available which has been taken from the coil used in the manufacture of the fasteners.

The ductility of the fasteners at the root position of the projections shall be determined in accordance with Annex A.

The sizes (length and width) of fastener to be used for the various tests should be selected in such a way that capacity values for the complete range of sizes normally produced by the fastener manufacturer shall be obtained.

6 Test methods

6.1 General

For the determination of the fastener tension capacity, the timber shall be sufficiently strong for failure to occur in the fastener. The timber used shall have a target size, see EN 336, of not less than 35 mm or twice the length of the projections plus 5 mm, whichever is the greater.

In the tests specified in 6.4.1 and 6.4.2 the minimum timber thickness should be limited to that proposed for use in service.

Test data of anchorage capacity should not be applied to joints with members thinner than those tested, but may be applied to joints with thicker members.

NOTE Examples of properly located transducers are given in Annex C (informative).

If there are no special requirements, the timber shall be planed; the difference in thickness between adjoining pieces shall not exceed 0,5 mm. For each test piece, the two individual members to be joined shall be cut from adjacent positions on the same plank to ensure a test piece of balanced density. In each group of similar test pieces, the timber for each test piece shall be cut from a different plank.

Timber members for the test pieces shall be cut so that the areas to which the fasteners are embedded are free from knots, local grain disturbance, fissures and wane. Elsewhere the members shall be free from characteristics which could lead to premature failure in the timber.

The moisture content of the timber and its density shall be determined.

6.2 Conditioning

The test pieces shall be manufactured with the timber at an equilibrium moisture content corresponding to (20 ± 2) °C and (85 ± 5) % relative humidity and shall afterwards be conditioned for at least one week at (20 ± 2) °C and (65 ± 5) % relative humidity. The timber material is conditioned when it attains constant mass. Constant mass is considered to be attained when the results of two successive weightings, carried out at an interval of 6 h, do not differ by more than 0,1 % of the mass of the timber material. For certain investigations other moisture conditioning may be appropriate, and shall be reported.

NOTE For some hardwoods a much longer conditioning period may be necessary.

6.3 Fabrication of test pieces

Test pieces shall be made with two fasteners positioned parallel to each other and symmetrically on opposite faces of the joint. The size and geometry of the test pieces will depend upon fastener size and the property being measured. The test pieces shall be assembled using the method (e.g. press or roller) normally used with the particular fasteners in the commercial production of structural timber components and the projections of the fastener shall be fully embedded in the timber so that the contact surface of the fastener is flush with the surface of the timber. If complementary nails are used to locate fasteners during the assembly of joints, such nails shall either be omitted from the test pieces or withdrawn prior to the test. The fasteners shall not be modified by the removal of any projections or by notching.

In the case of the testing of fastener compression capacity (see 6.4.4), the test piece shall be fabricated so that the pieces of timber in the test piece are separated by a gap of not less than 4 mm.

In the case of the other test series, the test piece shall be fabricated so that the pieces of timber in the test piece are separated by a gap of not less than 2 mm.

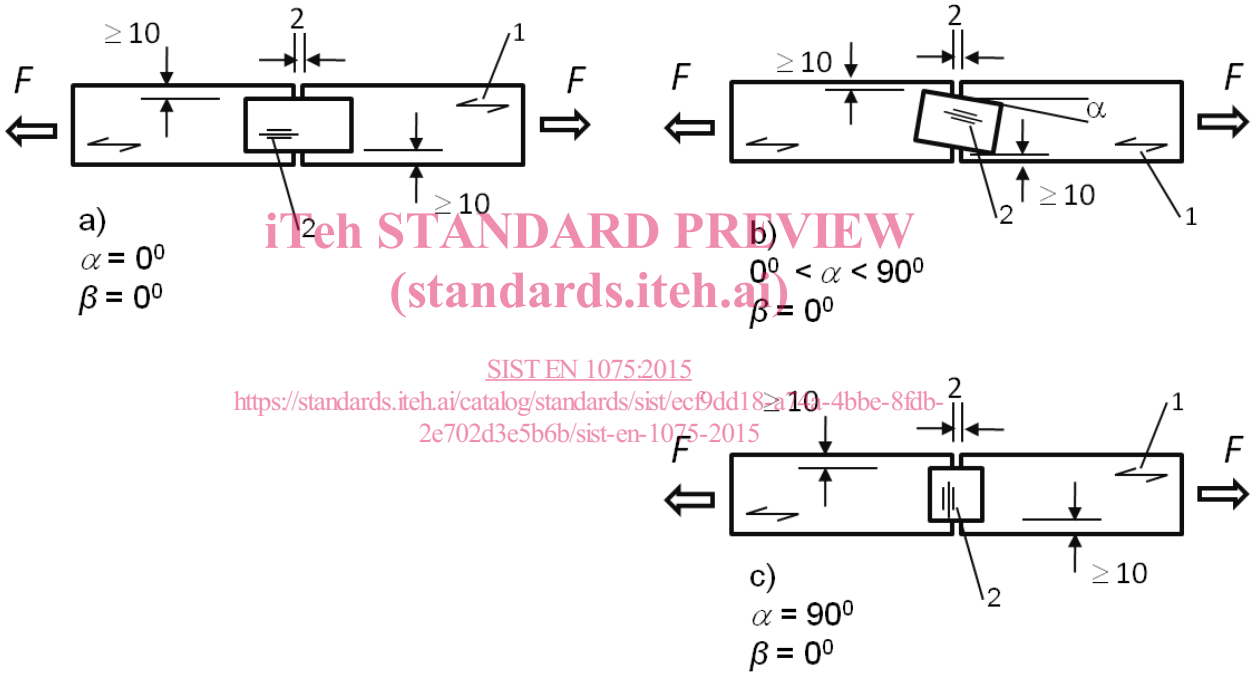
The fastener size should be chosen so that no anchorage failure occurs in the determination of the tension, compression and shear capacity of the fastener. However, in testing for shear capacity, some buckling of the edge of the fastener may occur locally and this should be acceptable.

6.4 Preparation of test pieces

6.4.1 Anchorage capacity and load-slip characteristics of contact surface and timber: load parallel to grain

The maximum load due to the lateral resistance of the fastener projections and the load-slip characteristics, with the load applied in the direction parallel to the grain of the timber, shall be determined using the test piece shown in Figure 2.

Dimensions in millimetres



Key

1 direction of the grain

2 major axis of the fastener

Figure 2 — Test pieces for anchorage capacity and load-slip characteristics of contact surface: load parallel to grain

The length of the test piece shall be such that the ends of the test machine grips shall be not less than 200 mm from the ends of the fasteners. Where necessary, the ends of the test piece may be reinforced to avoid premature failure at the grips.

Generally, fasteners have multiple projections in a modular arrangement and it will be sufficient to test one size of fastener at each value of the angle α. The size of the fastener shall be such that its dimension in the direction of the applied force is the largest for which failure at the embedded projections will occur.