



SLOVENSKI STANDARD
SIST EN 386:1996
01-avgust-1996

Lepljen lameliran les - Zahteve za uporabo in minimalne zahteve za proizvodnjo

Glued laminated timber - Performance requirements and minimum production requirements

Brettschichtholz - Leistungs- und Mindestanforderungen an die Herstellung

Bois lamellé collé - Prescriptions de performance et prescriptions minimales de fabrication

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ICS:

79.060.99 Druge lesne plošče Other wood-based panels

SIST EN 386:1996 **en**

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CEN

European Committee for Standardization
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Foreword

This European Standard has been prepared by the Technical Committee CEN/TC 124 "Timber structures" of which the secretariat 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of an identical text or by endorsement, at the latest by August 1995, and conflicting national standards shall be withdrawn at the latest by August 1995.

In accordance with the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

Introduction

Glued laminated timber is obtained by bonding together a number of laminations having their grain essentially parallel. In this way a member with a rectangular solid cross-section can be produced.

The purpose of the requirements in this standard is to obtain reliable and durable bonding, so that the bonds in the glued laminated timber will maintain their integrity throughout the intended life of the structure. The requirements will need to be supplemented to take into consideration special production conditions, materials or functional requirements. The requirements apply to structural members of service classes 1 and 2. For timber structures of service class 3 special precautions shall be taken, for example weather resistant adhesives shall be used. The requirements for these are given in EN 301.

1 Scope

This standard specifies requirements for the components of glued laminated timber members, minimum requirements for the production of such members for structural use.

The standard is applicable to products with a finished lamination thickness of not more than 45 mm.

Although most glued laminated timber is made from coniferous species this standard also applies to broad leaved species if information is available to enable them to be satisfactorily bonded.

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 301 Adhesives, phenolic and aminoplast for load bearing timber structures - Classification and performance requirements

- EN 385:1994 Finger jointed structural timber - Performance requirements and minimum production requirements
- EN 391 Glued laminated timber - Delamination test of glue lines
- EN 392 Glued laminated timber - Glue line shear test
- EN 518 Structural timber - Grading - Requirements for visual strength grading standards
- EN 519 Structural timber - Grading - Requirements for machine strength graded timber and grading machines

3 Definitions

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

3.1 adhesive type: Adhesive types I and II, see EN 301.

3.2 glued laminated timber (glulam): Structural member formed by bonding together timber laminations with their grain running essentially parallel.

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3.3 horizontal glulam: Glued laminated timber with the glue line plane perpendicular to the long length of the cross section, see figure 1a.

3.4 vertical glulam: Glued laminated timber with the glue line plane perpendicular to the short length of the cross section, see figure 1b.

3.5 service class 1: Service class characterized by a moisture content in the materials corresponding to a temperature of 20 °C and the relative humidity of the surrounding air only exceeding 65 % for a few weeks per year.

NOTE: In service class 1 the average equilibrium moisture content in most softwoods will not exceed 12 %.

3.6 service class 2: Service class characterized by a moisture content in the materials corresponding to a temperature of 20 °C and the relative humidity of the surrounding air only exceeding 85 % for a few weeks per year.

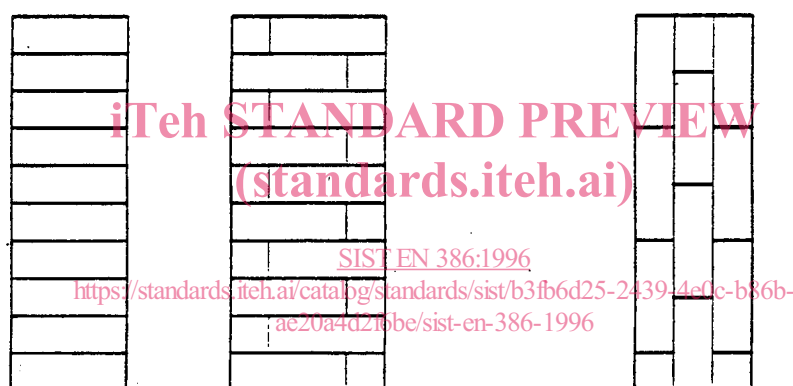
NOTE: In service class 2 the average equilibrium moisture content in most softwoods will not exceed 20 %.

3.7 service class 3: Service class characterized by climatic conditions leading to higher moisture contents than service class 2.

3.8 maximum delamination percentage: see EN 391.

3.9 total delamination percentage: see EN 391.

3.10 wood failure percentage: see EN 392.



a) Horizontal glulam

b) Vertical glulam

The boards side by side are not necessarily edge bonded, see 6.4.1.4.

Figure 1: Glue lines in cross sections showing the normal position of the glue lines

4 Symbols

A area, in square millimetres;

f_m bending strength of a single end joint, in newtons per square millimetre;

$f_{m,k}$ characteristic bending strength of the end joints in the lamination, in newtons per square millimetre;

$f_{m,r,k}$ required characteristic bending strength of the end joints, in newtons per square millimetre;

$f_{m,15,k}$ characteristic bending strength of 15 tested end joints, in newtons per square millimetre;

f_v shear strength, in newtons per square millimetre;

- m* mean value (the variable is given in parenthesis);
- r* radius of curvature, in millimetres;
- t* lamination thickness, in millimetres.

5 Requirements

5.1 General

The strength grading of the timber and the bonding operations shall result in reliable and durable bonds.

These general requirements shall be considered satisfied if both the requirements in this clause and the minimum production requirements in clause 6 are fulfilled.

5.2 Timber

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The timber shall be strength graded in conformity with either EN 518 or EN 519.

5.3 Adhesives

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The adhesive shall be capable of producing strong and durable joints so that the integrity of the bond is maintained throughout the intended lifetime of the structure.

Acceptable strength and durability can be achieved by the use of a polycondensation adhesive of the phenolic or aminoplastic type as defined in EN 301. The adhesive shall meet the requirements for adhesive type I or II as appropriate in EN 301.

NOTE: The adhesive should be chosen considering the climatic conditions in service, the timber species, the preservative used (if any) and the production methods.

Adhesives of type I may be employed for structural members to be used in all service classes. Adhesives of type II may only be used for service classes 1 and 2 provided the temperature of the member in the structure will always be below 50 °C.

5.4 End joints in laminations

The characteristic bending strength $f_{m,k}$ obtained from flatwise bending tests of the end joints shall meet the following requirement:

$$f_{m,k} \geq f_{m,r,k}$$

where

$f_{m,r,k}$ is the required characteristic bending strength.

The flatwise bending tests shall be performed in conformity with EN 385.

The characteristic bending strength shall be determined from the Log-Normal probability distribution function.

5.5 Glue line integrity and strength

5.5.1 The requirements for glue line integrity shall be based on testing of the glue line in a full cross-sectional specimen, cut from the manufactured glulam member. The specimens shall be representative of the manufacture.

5.5.2 For structures of service class 3, delamination tests shall be made in conformity with method A of EN 391.

For structures of service class 1 or 2 the testing shall be either delamination tests in conformity with method A of EN 391 or block shear tests in conformity with EN 392.

NOTE: For routine quality control the test methods specified can be substituted by the following:
Delamination method A can be substituted by delamination method B of EN 391.
For members to be used in service class 1 or 2 block shear tests can be substituted by delamination method C of EN 391.

5.5.3 Depending on the method and number of cycles the total delamination percentage of each cross-sectional specimen shall be less than the values given in table 1.

Table 1: Maximum values for the total delamination percentages

Method	Applicable to adhesive type	Max. total delamination percentage after cycle no.:		
		1	2	3
A	Type I	-	5	10
B	Type I	4	8	-
C	Type II	10	-	-