

## **Träkonstruktioner – Fanerträ (LVL) – Krav**

## **Timber structures – Structural laminated veneer lumber – Requirements**

Europastandarden EN 14374:2004 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN 14374:2004.

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## Timber structures - Structural laminated veneer lumber - Requirements

Structures en bois - LVL (Lamibois) - Exigences

Holzbauwerke - Furnierschichtholz für tragende Zwecke -  
Anforderungen

This European Standard was approved by CEN on 22 July 2004.

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## Foreword

This document (EN 14374:2004) 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of an identical text or by endorsement, at the latest by May 2005, and conflicting national standards shall be withdrawn at the latest by May 2005.

No existing European Standards are superseded.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s). For relationship with EU Directive(s), see informative annex ZA, which is an integral part of this document.

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

**EN 14374:2004 (E)****1 Scope**

This document specifies the requirements for laminated veneer lumber for structural applications. The tests to be used, methods to carry out the evaluation of conformity and content of the marking of the product are given.

This document does not cover laminated veneer lumber treated against biological attack or fire.

**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 314-1, *Plywood – Bonding quality – Part 1: Test methods.*

EN 322, *Wood-based panels – Determination of moisture content.*

EN 323, *Wood-based panels – Determination of density.*

EN 350-2, *Durability of wood and wood-based products – Natural durability of solid wood – Part 2: Guide to natural durability and treatability of selected wood species of importance in Europe.*

EN 408, *Timber structures – Structural timber and glued laminated timber – Determination of some physical and mechanical properties.*

ENV 717-1, *Wood-based panels – Determination of formaldehyde release – Part 1: Formaldehyde emission by the chamber method.*

EN 717-2, *Wood-based panels – Determination of formaldehyde release – Part 2: Formaldehyde release by the gas analysis method.*

EN 789, *Timber structures – Test methods – Determination of mechanical properties of wood based panels.*

EN 1438:1998, *Symbols for timber and wood-based products.*

EN 13501-1, *Fire classification of construction products and building elements – Part 1: Classification using test data from reaction to fire tests.*

prEN 14358, *Structural timber – Calculation of characteristic 5-percentile value.*

### 3 Terms, definitions and symbols

For the purposes of this document, the symbols in EN 1438:1998 and the following terms and definitions apply.

#### 3.1

##### **laminated veneer lumber (LVL)**

a composite of wood veneers with wood fibres essentially oriented in the same direction

NOTE This definition does not exclude laminated veneer lumber with cross grained veneers.

#### 3.2

##### **characteristic strength and stiffness value**

the population fifth percentile value and for stiffness also the mean value obtained from results of tests with a duration of 300 s using test specimens at an equilibrium moisture content resulting from a temperature of 20 °C and a relative humidity of 65 %

#### 3.3

##### **thickness**

the dimension of a cross section, which is perpendicular to the plane of the veneers, see Figure 1

#### 3.4

##### **width**

the dimension of a cross section, which is perpendicular to the thickness, see Figure 1

#### 3.5

##### **target size**

the size of the laminated veneer lumber member specified by the purchaser at the reference moisture content of  $(10 \pm 2) \%$

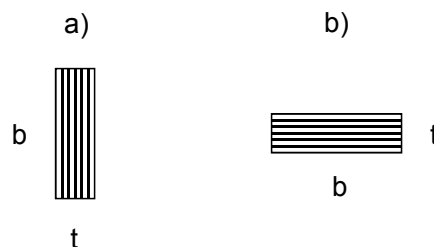


Figure 1 – Thickness  $t$  and width  $b$  of cross section of laminated veneer lumber. Case a) is the cross section related to edgewise bending while case b) is the cross section related to flatwise bending

## 4 Requirements

### 4.1 Veneers

The minimum number of veneers in the cross section shall be five. The maximum thickness of each veneer shall be 6 mm.

### 4.2 Bonding quality

The bonding quality shall be determined in accordance with the method given in annex B.

For each tested glueline the apparent cohesive wood failure percentage shall be at least 70 %.

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**4.3 Dimensions and tolerances**

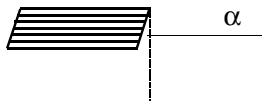
The thickness shall not deviate more than  $+(0,8 + 0,03 t)$  mm or  $-(0,4 + 0,03 t)$  mm from the target thickness ( $t$ ).

NOTE Local thickness deviations related to discontinuities of the veneers, e.g. knot holes and veneer joints, are allowed.

For widths  $< 400$  mm the width shall not deviate more than  $\pm 2$  mm from the target width. For widths  $\geq 400$  mm the width shall not deviate more than  $\pm 0,5$  % from the target width.

The length shall not deviate more than  $\pm 5$  mm from the target length.

The angles of the cross section shall not deviate more than 1:50 (about  $1,1^\circ$ ) from a right angle, see Figure 2.



**Figure 2 – Example of an angle  $\alpha$  of a cross section of laminated veneer lumber**

**4.4 Strength**

**4.4.1 General**

The manufacturer of laminated veneer lumber shall declare fifth percentile characteristic strength values.

NOTE The orientation of strength is given in annex A.

The characteristic values shall be determined from tests given in 4.4.2 to 4.4.9 and evaluated in accordance with the method given in prEN 14358.

**4.4.2 Bending strength edgewise**

The bending strength tests shall be carried out in accordance with the test method given in EN 408. In edgewise bending the width of the specimen shall be at least 100 mm.

If the width of the specimen is lower than the reference width of 300 mm, the individual test results shall be multiplied by the factor  $k_{m,corr}$ :

$$k_{m,corr} = \left( \frac{b}{300} \right)^s$$

where  $b$  is the width of the tested specimen in mm and  $s$  is the size effect parameter given by:

$$s = 2v - 0,05$$

where  $v$  is the coefficient of variation of the test results.  $v$  may be taken less than 0,10 only if it is verified from at least two years of documented experience.

**4.4.3 Bending strength flatwise**

The bending strength tests shall be carried out in accordance with the test method given in EN 408. In flatwise bending the thickness of the specimen shall be at least 38 mm.



#### 4.4.4 Tension strength parallel to the grain

The tension strength tests parallel to the grain shall be carried out in accordance with the test method given in EN 408. The length of the specimen between the testing machine grips shall be at least 1 000 mm.

If the length of the specimen between the testing machine grips is lower than the reference length of 3 000 mm, the individual test results shall be multiplied by the factor  $k_{t,corr}$ :

$$k_{t,corr} = \left( \frac{l}{3\,000} \right)^{s/2}$$

where  $l$  is the length of the specimen between the testing machine grips in mm and  $s$  is the size effect parameter given in 4.4.2.

#### 4.4.5 Tension strength perpendicular to the grain

The tension strength tests perpendicular to the grain shall be carried out in accordance with the test method given in EN 408. The cross section of the specimen shall be at least 45 mm x 45 mm.

#### 4.4.6 Compression strength parallel to the grain

The compression strength tests parallel to the grain shall be carried out in accordance with the test method given in EN 408. The cross section of the specimen shall be at least 45 mm x 45 mm.

#### 4.4.7 Compression strength perpendicular to the grain

The compression strength tests perpendicular to the grain shall be carried out in accordance with the test method given in EN 408. The cross section of the specimen shall be at least 45 mm x 45 mm.

#### 4.4.8 Shear strength related to edgewise bending

The shear strength tests related to edgewise bending shall be carried out in accordance with the test method given in EN 408.

#### 4.4.9 Shear strength related to flatwise bending

The shear strength tests related to flatwise bending shall be carried out in accordance with the planar shear test method given in EN 789. The thickness of the specimen shall be at least 25 mm.

### 4.5 Stiffness

#### 4.5.1 General

The manufacturer of laminated veneer lumber shall declare fifth percentile as well as mean characteristic modulus of elasticity values and mean characteristic shear modulus values.

The characteristic values shall be determined from tests given in 4.5.2 - 4.5.5 and evaluated in accordance with the method given in prEN 14358.

#### 4.5.2 Modulus of elasticity parallel to the grain

The modulus of elasticity tests parallel to the grain shall be carried out in accordance with the local modulus of elasticity in bending test method given in EN 408. The specimen shall be loaded in edgewise bending. The width of the specimen shall be at least 100 mm.

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### 4.5.3 Modulus of elasticity perpendicular to the grain

The modulus of elasticity tests perpendicular to the grain shall be carried out in accordance with the test method given in EN 408. The specimen shall be loaded in tension. The cross section of the specimen shall be at least 45 mm x 45 mm.

### 4.5.4 Shear modulus related to edgewise bending

The shear modulus tests related to edgewise bending shall be carried out in accordance with the test method given in EN 408.

### 4.5.5 Shear modulus related to flatwise bending

The shear modulus tests related to flatwise bending shall be carried out in accordance with the planar shear test method given in EN 789. The thickness of the specimen shall be at least 25 mm.

## 4.6 Density

The manufacturer of laminated veneer lumber shall declare fifth percentile as well as mean characteristic density values.

The density shall be determined in accordance with the method given in EN 323.

## 4.7 Moisture content

The moisture content shall be determined in accordance with the method given in EN 322.

## 4.8 Reaction to fire

The reaction to fire classification of laminated veneer lumber shall be declared when subject to regulatory requirements, and may be declared otherwise.

The reaction to fire class shall be determined in accordance with EN 13501-1. Where the test method requires, the product shall be mounted and fixed in a manner representative of its intended end use.

## 4.9 Release of formaldehyde

The manufacturer of laminated veneer lumber shall declare the release of formaldehyde class.

The release of formaldehyde class shall be determined in accordance with the method given in Annex C.

## 4.10 Natural durability against biological attack

The manufacturer of laminated veneer lumber shall declare the natural durability of the wood from which the product is manufactured in accordance with EN 350-2.

# 5 Evaluation of conformity

## 5.1 General

The compliance of laminated veneer lumber with the requirements of this standard and with the declared values and classes of the characteristics shall be demonstrated by initial type testing or assessment and factory production control.

## **5.2 Initial type testing or assessment**

### **5.2.1 General**

Initial type testing or assessment of laminated veneer lumber shall be performed to demonstrate conformity to the declared values or classes of the characteristics.

Initial type testing shall also be carried out whenever a significant change in the adhesives, grade or species of the veneers or manufacturing processes affects the declared characteristics of an already initial type tested product. When the change only affects some of the declared characteristics then the initial type testing may be restricted only to those characteristics.

Where testing or assessment has previously been performed according to the requirements of this document (same product, characteristics, test method, sampling procedure, system of attestation of conformity) such testing or assessment may be taken into account for the purposes of initial type testing or assessment.

The sampling procedure used and the results from the initial type testing or assessment shall be recorded and the records shall be kept for at least five years after the last date of production of the product to which they relate.

### **5.2.2 Sampling**

The laminated veneer lumber to be used in initial type testing shall be a representative sample of the population.

For initial type testing of bonding quality, strength, stiffness and density the sample size shall be at least 32 for each species or combination of species, growth region or combination of growth regions, production line, product grade and characteristic to be tested.

For initial type testing of release of formaldehyde the sample size shall be at least 3 for each species or combination of species and adhesive to be tested.

### **5.2.3 Characteristics to be initial type tested or assessed**

In initial type testing or assessment the characteristics given in Table 1 shall be determined.