



SLOVENSKI STANDARD

oSIST prEN 14081-1:2012

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Lesene konstrukcije - Razvrščanje konstrukcijskega lesa pravokotnega prečnega prereza po trdnosti - 1. del: Splošne zahteve

Timber structures - Strength graded structural timber with rectangular cross section - Part 1: General requirements

Holzbauwerke - Nach Festigkeit sortiertes Bauholz für tragende Zwecke mit rechteckigem Querschnitt - Teil 1: Allgemeine Anforderungen

Structures en bois - Bois de structure à section rectangulaire classé pour sa résistance - Partie 1: Exigences générales

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Timber structures - Strength graded structural timber with rectangular cross section - Part 1: General requirements

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tragende Zwecke mit rechteckigem Querschnitt - Teil 1:
Allgemeine Anforderungen

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 124.

If this draft becomes a European Standard, 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.

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prEN 14081-1:2012 (E)**Foreword**

This document (prEN 14081-1:2012) has been prepared by Technical Committee CEN/TC 124 “Timber Structures”, the secretariat of which is held by AFNOR.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 14081-1:2005+A1:2011.

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.

For relationship with EU Directive, see informative Annex ZA, which is an integral part of this document.

Other parts of the series of EN 14081 are:

EN 14081-2, *Timber structures - Strength graded structural timber with rectangular cross section - Part 2: Machine grading; additional requirements for initial type testing,*

EN 14081-3, *Timber structures - Strength graded structural timber with rectangular cross section - Part 3: Machine grading; additional requirements for factory production control,*

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Introduction

There are basically two methods of strength grading: visual grading and machine grading.

Machine grading is in common use in a number of countries. The countries use two basic systems, referred to as 'output controlled' and 'machine controlled'. Both systems require a visual override inspection to cater for strength-reducing characteristics that are not automatically sensed by the machine. The output-controlled system is suitable for use where the grading machines are situated in sawmills grading limited sizes, species and grades in repeated production runs. This enables the system to be controlled by testing timber specimens from the daily output. These tests together with statistical procedures are used to monitor and adjust the machine settings to maintain the required strength properties for each strength class. With this system it is permissible for machine approval requirements to be less demanding and for machines of the same type to have non-identical performance.

The machine controlled system was developed in Europe. Because of the large number of sizes, species and grades used it was not possible to carry out quality-control tests on timber specimens drawn from production. The system relies therefore, on the machines being strictly assessed and controlled, and on considerable research effort to derive the machines settings, which remain constant for all machines of the same type.

Visual grading is also in common use in a number of countries. There are many different visual strength grading rules for timber in use in Europe. These have come into existence to allow for:

- different species or groups of species;
- geographic origin; [oSIST prEN 14081-1:2012](https://standards.iteh.ai/catalog/standards/sist/8be6908a-086a-4a29-ad31-47807a15fa20/osist-pren-14081-1-2012)
- different dimensional requirements;
- varying requirements for different uses;
- quality of material available;
- historic influences or traditions.

Because of the diversity of existing visual grading rules in use in different countries, it is currently impossible to lay down a single set of acceptable rules for all Member States.

The requirements given in this European Standard on visual strength grading rules therefore give basic principles, which should be followed when drawing up requirements for limits for some of the characteristics.

The accepted assignments to strength classes are based on approved grading reports (AGR).

In most cases, the AGR's have been evaluated by CEN/TC124/WG2/TG1, which is the basis for the attestation of conformity by the Notified Body conducting the certification of the producer's factory production control (FPC) needed for the CE marking.

prEN 14081-1:2012 (E)**1 Scope**

This European Standard specifies the requirements for visual and machine graded structural timber with rectangular cross-sections shaped by sawing, planing or other methods, and having minimum dimensions complying with EN 336.

This European Standard consists of provisions for test methods, evaluation of conformity (ITT and FPC) and marking of both grading types of structural timber.

NOTE For the machine graded timber additional provisions for ITT are given in EN 14081-2 and for FPC in EN 14081-3.

This European Standard identifies as a minimum the characteristics for which limits are given in visual grading rules.

This European Standard covers structural rectangular timber, untreated or treated against biological attack.

This European Standard does not cover timber treated by fire retardant products to improve its fire performance.

Finger jointed timber made of rectangular cross-sections is not covered in this European Standard.

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 335-1, *Durability of wood and wood-based products — Definition of use classes — Part 1: General*

EN 335-2, *Durability of wood and wood-based products — Definition of use classes — Part 2: Application to solid wood*

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

EN 338, *Structural timber — Strength classes*

EN 350-1, *Durability of wood and wood-based products — Natural durability of solid wood — Part 1: Guide to the principles of testing and classification of the natural durability of wood*

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 384, *Structural timber — Determination of characteristic values of mechanical properties and density*

EN 844-7, *Round and sawn timber — Terminology — Part 7: Terms relating to anatomical structure of timber*

EN 844-9, *Round and sawn timber — Terminology — Part 9: Terms relating to features of sawn timber*

EN 844-10, *Round and sawn timber — Terminology — Part 10: Terms relating to stain and fungal attack*

EN 1310:1997, *Round and sawn timber — Method of measurement of features*

EN 1912:2004+A4:2010, *Structural timber — Strength classes — Assignment of visual grades and species*

EN 1995-1-2, *Eurocode 5 — Design of timber structures — Part 1-2: General — Structural fire design*

EN 13183-2, *Moisture content of a piece of sawn timber — Part 2: Estimation by electrical resistance method*

EN 13183-3, *Moisture content of a piece of sawn timber — Part 3: Estimation by capacitance method*

EN 13238, *Reaction to fire tests for building products — Conditioning procedures and general rules for selection of substrates*

EN 13501-1:2007+A1:2009, *Fire classification of construction products and building elements — Part 1: Classification using test data from reaction to fire tests*

EN 13501-2:2007+A1:2009, *Fire classification of construction products and building elements — Part 2: Classification using data from fire resistance tests, excluding ventilation services*

EN 13556, *Round and sawn timber — Nomenclature of timbers used in Europe*

EN 13823, *Reaction to fire tests for building products — Building products excluding floorings exposed to the thermal attack by a single burning item*

EN 14081-2, *Timber structures — Strength graded structural timber with rectangular cross section — Part 2: Machine grading; additional requirements for initial type testing*

EN 14081-3, *Timber structures — Strength graded structural timber with rectangular cross section — Part 3: Machine grading; additional requirements for factory production control*

EN 15228:2009, *Structural timber — Structural timber preservative treated against biological attack*

EN ISO 3166-1, *Codes for the representation of names of countries and their subdivisions — Part 1: Country codes (ISO 3166-1)*

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3 Terms and definitions [47807a15fa20/osist-pren-14081-1-2012](https://standards.iteh.ai/catalog/standards/sist/8be6908a-086a-4a29-ad31-47807a15fa20/osist-pren-14081-1-2012)

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

3.1

batch

timber of one species, species combination, population and size graded in one working shift. In the case of machine graded timber, the timber should also be graded by one machine.

3.2

characteristic strength

population 5-percentile value obtained from the results of tests with a duration of (300 ± 120) s using test pieces at an equilibrium moisture content resulting from a temperature of 20 °C and a relative humidity of 65 %

3.3

control plank

object that simulates the characteristics of timber that are being sensed by the measuring devices in a grading machine, which, when passed through the machine, is able to check the calibration of the machine dynamically

3.4

dry-graded timber

timber that is part of a batch that has intentionally been graded at a mean moisture content of 20 % or less, without any measurement exceeding 24 %

3.5

grade

strength grade or strength class

prEN 14081-1:2012 (E)**3.6****machine strength grading**

process by which a piece of timber can be sorted by a machine sensing, non-destructively, one or more properties of the timber, with any necessary visual overriding inspection, into grades to which characteristic values of strength, stiffness and density may be allocated. There are two methods of control, machine control and output control (see Introduction)

3.7**package**

timber

- of one grade,
- of one species or species combination,
- of one cross section size or of multiple sizes where the timber is to be used for one structure,
- graded in one working shift
- to be delivered to one customer

3.8**producer**

legal entity responsible for the conformity of the product to the requirements of this European Standard

3.9**settings**

values associated with the variable controls of a grading machine which determine the acceptance to each grade of timber graded by the machine

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3.10**strength class**

result of the classification of structural timber based on particular values of its mechanical properties and density

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3.11**strength-reducing characteristic**

property or feature of a piece of timber that reduces its load bearing capacity

Note 1 to entry: Can result from natural growth of the tree (e.g. knots, slope of grain), changes in moisture content (e.g. fissures), conversion of the log (e.g. the inclusion of wane), attack from fungi, insects or mechanical damage.

3.12**timber population**

timber from an identifiable source and of a species or species combination that is, or is intended to be, strength graded and marketed as a commercially defined product

3.13**timber size**

sawn or processed dimensions with respect to the permitted deviations given in EN 336

3.14**visual strength grading**

process by which a piece of timber can be sorted, by means of visual inspection, into a grade to which characteristic values of strength, stiffness and density may be allocated

Note 1 to entry: Electronic or mechanical instruments can be used to assist the visual grader in this process.

3.15**width**

greater dimension perpendicular to the longitudinal axis of a piece of timber

4 Symbols

None.

5 Requirements for structural timber

5.1 Strengths, modulus of elasticity and density

5.1.1 General on grading

Structural timber, shall be either visually graded according to 5.1.2 or machine graded according to 5.1.3, and have characteristic values for the edgewise bending strength, tension strength, compression strength, shear strength, modulus of elasticity and density according to the method given in 5.1.2 or 5.1.3.

If the grading has been carried out before processing, provided that the processing reduction is not greater than 5 mm for dimensions less than or equal to 100 mm, or not greater than 10 mm for dimensions greater than 100 mm, the grade shall be considered not to have changed. If the reduction is greater, the timber shall be re-graded.

Moisture content shall be determined in accordance with EN 13183-2 or EN 13183-3. The accuracy of moisture meter shall be ± 2 %.

If the grading method restricts the timber to a special use, e.g. flatwise bending or compression, the timber shall be marked accordingly.

5.1.2 Visual strength grading

Timber shall be graded visually in accordance to a national grading standard that meets the requirements given in Annex A. <https://standards.iteh.ai/catalog/standards/sist/8be6908a-086a-4a29-ad31-47807a15fa20/osist-pren-14081-1-2012>

If the grade and species have been assigned to a strength class by EN 1912, the characteristic values for the properties shall be those given for the assigned strength class in EN 338; otherwise they shall be determined in accordance with EN 384.

If there are any restrictions or additional criteria related to the strength or constructional use of timber, resulting from the method of grading or species of timber, they shall be stated in the grading standard.

5.1.3 Machine strength grading

If the timber is machine graded to a strength class from EN 338, the characteristic values for the properties shall be those given for the strength class in EN 338; otherwise they shall be determined in accordance with EN 384.

For a grade and species (or species combination) graded by a machine controlled system, the settings shall be derived for the total growth area from which the timber will be graded within one or more countries.

Grading machines shall use settings determined in accordance with EN 14081-2. Grading machines and settings used in machine controlled system shall be evaluated by CEN/TC124. Accepted settings shall be documented in Approved Grading Reports (AGR).

NOTE Approved Grading Reports are intended to give basic documentation for the certification by a Notified Body of a producer's factory production control (FPC) needed for the CE marking. An updated list of AGRs may be obtained through CEN/TC124.

The visual characteristics of each piece of machine graded timber shall meet the requirements given in Table 1.

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Table 1 — Visual override inspection requirements for machine strength graded structural timber

Strength class acc. to EN 338		C18 and below	Above C18
Max. length of fissures ^a	Fissures not going through the thickness	Fissures less than half the thickness may be ignored e Not greater than 1,5 m or ½ the length of the piece, whichever is the lesser	Not greater than 1 m or ¼ the length of the piece, whichever is the lesser
	Fissures going through the thickness	Not greater than 1 m or ¼ the length of the piece, whichever is the lesser. If at the ends, a length not greater than two times the width of the piece	Only permitted at the ends with a length not greater than the width of the piece
Max. warp ^b in mm over 2 m of length	Bow	20 mm	10 mm
	Spring	12 mm	8 mm
	Twist	2 mm/25 mm width	1 mm/25 mm width
	Cup	Unrestricted	Unrestricted
Wane		Wane shall not be greater than one third of the full edge and/or face dimensions of the piece	
Soft rot and dote ^c (see EN 844-10)		Soft rot shall not be permitted. Dote is permitted	Soft rot shall not be permitted. Dote shall not be permitted
Insect damage		Active infestation shall not be permitted. Wood wasp holes shall not be permitted and worm and pin holes shall be assessed as other defects	
Other defects		Where the reduction in strength caused by the other defect is obviously less than caused by defects permitted by this table, the piece may be accepted provided the defect is of a type that will not increase after conversion and drying	
<p>a The length of fissures is linked with moisture content and therefore the limits given apply only at the time of grading. As a consequence of this, the moisture content at the time of grading should be appropriate to the end-use. Permitted limits for both the depth and length of fissures refer to the sum of fissures in one plane in a piece of timber.</p> <p>b Warp is influenced by moisture content, so the limits apply only at the time of grading. As a consequence of this, the moisture content at the time of grading should be appropriate to the end-use. Longitudinal curvature in square section pieces may be assessed using the limits for bow.</p> <p>c Stain is not a structural defect and is acceptable without limitation.</p> <p>d Other defects include for example mechanical damage, top rupture, included bark</p> <p>e A 0.2 mm feeler gauge is a suitable device for measuring fissure depth</p>			

Where a machine does not fully grade to the ends of each piece of timber (as in bending type machines) these non-fully graded portions shall be visually examined. If the diameter of knots and slope of grain in the non-fully graded portions exceeds the size of such defects exceeds the limits given in Table 2, then the piece of timber shall be rejected. Knots and slope of grain shall be measured in accordance with EN 1310.

Timber that has previously been graded shall not be re-graded to the same or different grades unless the method of determining settings has made allowances for such changes to the timber population caused by the previous grading.