SLOVENSKI STANDARD
SIST EN 14081-1:2016

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SIST EN 14081-1:2006+A1:2011
SIST EN 14081-4:2009

Lesene konstrukcije - Po trdnosti razvrščen konstrukcijski les pravokotnega prečnega prereza - 1. del: Splošne zahteve

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

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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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ICS:

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EUROPEAN STANDARD

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English Version

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

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SIST EN 14081-1:2016

Contents

Page

European foreword 4
Introduction 5
1 Scope 6
2 Normative references 6
3 Terms and definitions 7
4 Symbols 8
5 Requirements for structural timber 9
5.1 Mechanical resistance 9
5.1.1 General 9
5.1.2 Visual strength grading 9
5.1.3 Machine strength grading 9
5.2 Fire resistance (charring rate) 11
5.3 Reaction to fire 11
5.4 Release of dangerous substances 12
5.5 Biological durability 12
5.5.1 Structural timber without preservative treatment 12
5.5.2 Structural timber with preservative treatment 13
5.6 Geometrical data 13
6 Assessment and verification of constancy of performance –AVCP 13
6.1 General 13
6.2 Type testing 13
6.2.1 General 13
6.2.2 Test samples, testing and compliance criteria 14
6.2.3 Test reports 15
6.2.4 Shared other party results 15
6.3 Factory production control (FPC) 15
6.3.1 General 15
6.3.2 Requirements 16
6.3.3 Product specific requirements 19
6.3.4 Initial inspection of factory and of FPC 20
6.3.5 Continuous surveillance of FPC 20
6.3.6 Procedure for modifications 21
7 Marking 21
7.1 Marking methods 21
7.2 Information on the timber (method A) or on the package (method B) 21
7.3 Information in the documents accompanying strength graded structural timber 22
8 Environmental issues 23
Annex A (normative) Requirements for strength reducing characteristics for visual grading standards 24
A.1 Limitations for strength-reducing characteristics 24
A.1.1 Knots 24
A.1.2 Slope of grain 24

SIST Preview
(https://ecommerce.sist.si)
SIST EN 14081-1:2016

SIST EN 14081-1:2016

A.1.3 Density and rate of growth 24
A.1.4 Fissures 25
A.2 Limitations for geometrical characteristics 25
A.2.1 Wane 25
A.2.2 Warp 25
A.3 Limitations for biological characteristics 26
A.4 Other characteristics 26
A.4.1 Reaction wood 26
A.4.2 Other criteria 26
Annex B (normative) Marking codes for species 27
B.1 Marking codes for single species 27
B.2 Marking codes for species combination 28
Annex C (normative) Measurement of moisture content 30
C.1 General 30
C.2 Measurement of moisture content of timber during production 30
Annex ZA (informative) Clauses of this European Standard addressing the provisions of the EU Construction Products Regulation 31
ZA.1 Scope and relevant characteristics 31
ZA.2 Procedure for Assessment and Verification of the Constancy of Performance (AVCP) of strength graded structural timber with rectangular cross section 33
ZA.2.1 System(s) of AVCP 33
ZA.2.2 Declaration of performance (DoP) 34
ZA.2.2.1 General 34
ZA.2.2.2 Content 35
ZA.2.2.3 Example of DoP 35
ZA.3 CE marking and labelling 36
ZA.3.1 General 36
ZA.3.2 CE marking 36
ZA.3.3 Marking on the product or on a label attached to the package 39
Bibliography 41

SIST Preview
(https://ecommerce.sist.si)
SIST EN 14081-1:2016
https://standards.iteh.ai/catalog/standards/sist/2421f6fd-9d2f-425b-ae68-51d548903558/sist-en-14081-1-2016

SIST EN 14081-1:2016

European foreword

This document (EN 14081-1:2016) 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 August 2016, and conflicting national standards shall be withdrawn at the latest by November 2017.

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 14081-4:2009, 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 Regulation n°305/2011.

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

EN 14081-4:2009 will be withdrawn and replaced by 5.1.3, paragraph 2 of this document.

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Compared to EN 14081-1:2005+A1:2011, the following modifications have been made:

— new Clause 6 for Assessment and Verification of Constancy of Performance linked to the CPR;

— Annex ZA has been adapted to the CPR;

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https://ecommerce.sist.si/catalog/standards/sist/2431f6d-0d2f-425b-ae68-51d548903558/sist-en-14081-1-2016

— new clauses on Fire Resistance, release of dangerous substances, geometrical data and environmental issues have been added;

— marking codes for species combinations have been moved to Annex B;

— improvement of several definitions.

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.

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.

SIST EN 14081-1:2016

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 control' and 'machine control'. Both systems require a visual override inspection to cater for strength-reducing characteristics that are not automatically sensed by the machine.

Output control is suitable for use where the grading machines are situated in manufacturing units 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.

Machine control 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. Machine control 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 standards for timber in use in Europe. These have come into existence to allow for:

— different species or groups of species;

— geographic origin;

— different dimensional requirements;

— varying requirements for different uses;

— quality of material available;

— historic influences or traditions.

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SIST EN 14081-1:2016
https://ecommerce.sist.si/catalog/sist/2431f6fd-9d2f-425b-ae68-51d548903558/sist-en-14081-1-2016

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

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

The assignments to strength classes are based on grading reports.

When these grading reports are evaluated and approved by CEN/TC 124/WG2/TG1, they become Approved Grading Reports (AGR) which are required for assigning visual grades to EN 1912 and for machine control.

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1 Scope

This European Standard specifies requirements for strength graded structural timber with rectangular cross-sections either visual or machine graded, shaped by sawing, planning or other methods and with cross-sectional dimensions complying with EN 336 (referred to as structural timber in the following clauses).

This European Standard includes provisions for test methods, Assessment and Verification of Constancy of Performance and marking of structural timber.

NOTE 1 For machine strength graded timber additional provisions for type testing (TT) are given in EN 14081–2 and for factory production control (FPC) in EN 14081–3.

NOTE 2 An acceptance procedure for verification of a lot is given in EN 14358 which may be used for a delivery of structural timber.

This European Standard identifies characteristics for which limits have to be given in visual grading standards.

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

This European Standard does not cover:

— timber treated by fire retardant products to improve its fire performance;

— thermally and/or chemically modified timber;

— structural finger jointed timber.

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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.

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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, *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*

SIST EN 14081-1:2016

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, *Fire classification of construction products and building elements — Part 1: Classification using test data from reaction to fire tests*

EN 13501-2, *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*

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EN 15804, *Sustainability of construction works — Environmental product declarations — Core rules for the product category of construction products*

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

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https://ecommerce.sist.si/catalog/standards/sist/2431f6fd-9d2f-425b-ae68-51d548903558/sist-en-14081-1-2016

EN 16485, *Round and sawn timber — Environmental Product Declarations — Product category rules for wood and wood-based products for use in construction*

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

3 Terms and definitions

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

3.1
dry-graded structural timber
timber for which grading has been completed after it has been dried

3.2
grading standard
a set of grading rules contained in a National Standard or a proprietary document that is publically available

3.3
machine strength grading
process by which structural timber is sorted by a machine sensing, non-destructively, one or more properties of the timber, with any necessary visual overriding inspection, into grades or strength classes to which characteristic values of strength, stiffness and density may be allocated

SIST EN 14081-1:2016

3.4
package
structural timber of one grade, of one species or species combination, to be delivered to one customer

3.5
settings
values associated with the variable controls of a grading machine which determine the acceptance to each grade or strength class of structural timber graded by the machine

3.6
strength class
result of the classification of structural timber based on particular values of its mechanical properties and density

3.7
structural timber
timber with rectangular cross section strength graded either by visual means or by machine

3.8
strength-reducing characteristic
property or feature of a piece of structural 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.

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3.9
timber source
identifiable geographical origin of a species or species combination from which timber is, or is intended to be, strength graded

SIST EN 14081-1:2016
https://ecommerce.sist.si/catalog/standards/sist/2431f6fd-9d2f-425b-ae68-51d548903558/sist-en-14081-1-2016

3.10
visual strength grading
process by which structural timber is sorted, by visual inspection and assessment, into grades to which characteristic values of strength, stiffness and density can be allocated

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

3.11
thickness
smaller dimension perpendicular to the longitudinal axis of a piece of timber

3.12
width
greater dimension perpendicular to the longitudinal axis of a piece of timber

4 Symbols

M machine graded structural timber

DG dry-graded structural timber

PT preservative treated structural timber

SIST EN 14081-1:2016

5 Requirements for structural timber

5.1 Mechanical resistance

5.1.1 General

Mechanical resistance covers modulus of elasticity, bending strength, compressive strength, tension strength, shear strength and density.

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 bending strength, tension strength, compression strength, shear strength, modulus of elasticity and density according to 5.1.2 or 5.1.3. Characteristic values shall be determined in accordance with EN 384.

If the structural timber is assigned to a strength class from EN 338, the characteristic values for the properties shall be those given for the strength class in EN 338.

If the grading has been carried out before processing, provided that the processing reduction is not greater than 5 mm for dimensions greater than or equal to 22 mm but 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 structural timber shall be re-graded.

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

Since some geometrical characteristics (fissures, distortion) depend on the moisture content and affect the strength properties, marking shall consider the moisture content at the time of grading.

Moisture content shall be determined in accordance with EN 13183-2 or EN 13183-3 with an accuracy of ± 3 % moisture content (see Annex C).

Dry graded structural timber shall have at the time it is graded for fissures and distortion, a mean moisture content of 20 % or less with no individual measurement exceeding 24 %.

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If the grading method restricts the structural timber to a special use, e.g. flatwise bending or compression, this shall be reflected in the marking.

5.1.2 Visual strength grading

Structural timber shall be graded visually in accordance with a grading standard which meets the requirements given in Annex A. This grading standard shall be publically available.

If the grade and species or species combination 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. Assignments according to EN 384 to be included in EN 1912 should be reported and evaluated by CEN/TC 124. Accepted reports 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 manufacturer's factory production control (FPC) needed for the CE marking. A current list of AGRs may be obtained through CEN/TC 124 secretariat.

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

5.1.3 Machine strength grading

For a grade and species (or species combination) graded by a machine control system, the settings shall be derived for the total growth area from which the structural timber will be sourced.

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Grading machines shall use settings determined in accordance with EN 14081-2. Grading machines and settings used in machine control system should be evaluated by CEN/TC 124. Settings which have been accepted by CEN/TC 124 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 manufacturer's factory production control (FPC) needed for the CE marking. A current list of AGRs may be obtained through CEN/TC 124 secretariat.

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

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

Strength class according to EN 338 [a]		**C18, D18, T11 and below**	**Above C18, D18, T11**
Max. length of fissures [b]	Fissures not going through the thickness	Fissures less than half the thickness may be ignored [f]	
		Not greater than 1,5 m or 1/2 the length of the piece, whichever is the lesser	Not greater than 1 m or 1/4 the length of the piece, whichever is the lesser
	Fissures going through the thickness	Not greater than 1 m or 1/4 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 [c] in mm over 2 m of length	Bow	20 mm	10 mm
	Spring	12 mm	8 mm
	Twist	2 mm/25 mm width	2 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 [d] (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. Insect holes above 2 mm diameter shall not be permitted. Smaller holes shall be assessed as other defects	
Other defects [e]		Where the reduction in strength caused by another 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	

[a] For alternative strength classes, visual overrides are checked with corresponding strength value limits

[b] The length of fissures is linked with moisture content and therefore the limits given apply only at the time of grading. Permitted limits for both the depth and length of fissures refer to the sum of fissures in one plane in a piece of timber.

[c] Warp is influenced by moisture content, so the limits apply only at the time of grading. Longitudinal curvature in square section pieces may be assessed using the limits for bow.

[d] Stain is not a structural defect and is acceptable without limitation.

[e] Other defects include for example mechanical damage, top rupture, and included bark.

[f] A 0,2 mm feeler gauge is a suitable device for measuring fissure depth.

Where a machine does not grade completely to the ends of each piece of structural timber (as in bending type machines) the ungraded portions shall be visually inspected and assessed.

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If the diameter of knots and slope of grain in the incompletely graded portions exceeds the limits given in Table 2, then the piece of structural timber shall be rejected. Knots and slope of grain shall be measured in accordance with EN 1310:1997, 4.1.2.

Table 2 — Visual override inspection requirements for incompletely machine graded portions

	Strength class according to EN 338 [a]	
	C18, D18, T11 and below	**Above C18, D18, T11**
Knot diameter on face	up to 1/2 x width of piece	up to 1/4 x width of piece
Knot diameter on edge	up to 3/4 x thickness of piece	up to 1/2 x thickness of piece
Slope of grain	1 in 6	1 in 10
[a] For alternative strength classes, visual overrides are checked with corresponding strength value limits		
NOTE 1 These limits are applicable only where the size of knots and slope of grain in the non-fully graded portion exceeds the size of similar characteristics in the fully graded portion of the same piece. NOTE 2 The knot diameter is measured perpendicular to the longitudinal axis of the piece of timber. For arris knots the above limits apply to the portion of the knot visible on the particular face or edge being considered.		

5.2 Fire resistance (charring rate)

Where required, the fire resistance performance of the structural timber whether treated against biological attack or not, shall be tested and declared according to EN 13501-2 or determined by calculation according to EN 1995-1-2. When calculating the fire resistance, the charring rate shall be evaluated on the basis of the species and characteristic density.

5.3 Reaction to fire

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The class of reaction to fire performance of the structural timber (including the additional classification on smoke production and flaming droplets/particles, if any), shall be determined and declared according to EN 13501-1:

a) either without the need for further testing (CWFT), as given in Table 3 [1)], if the structural timber is proved to meet the requirements of the class also given therein;

b) or based on testing of the timber according to the standards, referred to in EN 13501-1, when the timber does not meet the requirements of Table 3 or where a higher classification than the one in a) is sought.

[1] This table is the same as given in the Decision of the Commission 2003/43/EC of 2003-01-17 (*see OJEU L13 of 2003-01-18*), as amended firstly by 2003/593/EC of 2003-08-07 (*see OJEU L201 of 2003-08-08*),