INTERNATIONAL STANDARD

ISO 12122-2

First edition
2014-03-01

Timber structures — Determination of characteristic values —

Part 2: Sawn timber

Structures en bois — Détermination des valeurs caractéristiques —

Partie 2: Bois massif

Reference number
ISO 12122-2:2014(E)

COPYRIGHT PROTECTED DOCUMENT

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 165, *Structural Timber*.

ISO 12122 consists of the following parts, under the general title *Timber structures — Determination of characteristic values*:

— *Part 1: Basic requirements*

— *Part 2: Sawn timber*

Introduction

This International Standard sets out a framework for establishing characteristic values from test results on a sample drawn from a clearly defined reference population of sawn timber. The characteristic value is an estimate of the property of the reference population with a consistent level of confidence prescribed in the standard.

This part of ISO 12122 is to be used in conjunction with ISO 12122-1.

This part of ISO 12122 permits the evaluation of characteristic values on testing on commercial sized specimens of sawn timber.

This part of ISO 12122 is applicable to structural sawn timber. In some cases, characteristic values determined in accordance with this part of ISO 12122 can be modified to become a design value.

This part of ISO 12122 has the following annexes:

— Annex A presents a commentary on this part of ISO 12122.

Timber structures — Determination of characteristic values —

Part 2: Sawn timber

1 Scope

This International Standard gives methods for the determination of characteristic values for a defined population of sawn timber products, calculated from test values.

It presents methods for the determination of

a) characteristic value of mean-based properties, and

b) characteristic value of 5th percentile-based properties.

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.

ISO 12122-1, *Timber structures — Determination of characteristic values — Part 1: Basic requirements*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12122-1 apply.

4 Symbols and abbreviated terms

Symbols defined in the relevant ISO product or test standard shall be used. Other symbols are defined in ISO 12122-1.

5 Reference Population

In addition to the requirements for definition of the reference population in ISO 12122-1, the following attributes of sawn timber may be described:

a) climate or climate range of growing region;

b) altitude or altitude range of growing region;

c) specific silvicultural practices used in the growing region;

d) soil type or range of soil types of growing region;

e) sawing patterns (e.g. backsawn or quartersawn, core wood included or excluded);

f) seasoning method (if seasoned);

g) grading or production method.

6 Sampling

6.1 Sampling method

The sampling method shall comply with the performance objective of sampling defined in ISO 12122-1.

Representation of each of the variants in the sample shall approximate the representation of the same variants in the reference population.

The sampling method shall be documented in the report as detailed in Clause 10 and this documentation shall indicate a response to each of the identified attributes of the reference population listed in compliance with Clause 5 in this part of ISO 12122 and in ISO 12122-1.

6.2 Sample size

The sample size shall comply with requirements of ISO 12122-1 and shall take into account the coefficient of variation (V) expected for the sawn timber in the reference population.

NOTE 1 See notes under the relevant clause in ISO 12122-1.

Sawn timber properties generally have larger population coefficient of variation (V), and should therefore have a larger sample size.

NOTE 2 ISO 12122-1 gives some guidance on selecting sample size.

7 Sample conditioning

The sample storage and testing environment shall reflect conditioning in accordance with the definition of the reference population as indicated in ISO 12122-1.

8 Test data

8.1 Test method

The test data shall be obtained from

a) ISO 13910, or

b) a standard test method appropriate for the sawn timber reference population provided equivalency factors with ISO 13910 can be established.

NOTE 1 See notes under the relevant clause in ISO 12122-1.

NOTE 2 Test methods involve many variables that will affect results including loading configuration and rates, specimen positioning ,and measurement methods. The level of precision of these variables must be appropriate to the objectives of the testing and the adjustments required in 8.2.

8.2 Test data compatible with product description

Where the characteristic value is applicable to a standard size or moisture content, adjustments to the raw test data may be required. Any adjustment shall be in accordance with ISO 12122-1 and shall be detailed in the report.

NOTE These adjustments include those required to pool data from different test programs as outlined in ISO 12122-1.

9 Evaluation of characteristic values for structural properties

9.1 Structural properties

For sawn timber, material properties shall be evaluated. These shall include modulus of elasticity and characteristic strengths.

NOTE These are properties which when multiplied by a geometric parameter give a component capacity or component stiffness. Examples of these properties include characteristic modulus of elasticity and characteristic bending strength.

Determination of the characteristic values for structural properties shall be in accordance with ISO 12122-1.

9.2 Characteristic modulus of elasticity

Characteristic modulus of elasticity value for serviceability shall be the average of the test values evaluated in accordance with ISO 12122-1, and in the case of its use in the ultimate limit state it shall be either the average or the 5th percentile value.

NOTE In some cases, where a reduction of modulus of elasticity is not already factored into the behaviour equation used for design, a 5th percentile value of modulus of elasticity can be required to design for beam or column stability.

9.3 Characteristic values of strength

9.3.1 Characteristic bearing strength

The characteristic values for bearing strength, both parallel and perpendicular to grain, shall be the mean property obtained from results of tests.

9.3.2 Other characteristic values for strength based on the 5th percentile test value

The 75 % lower single-sided confidence limit of the test 5th percentile value shall be evaluated. Suitable methods for evaluating the 5th percentile value of the test data and estimating the 75 % lower single-sided confidence limit are presented in ISO 12122-1.

10 Report

The report shall comply with the requirements of ISO 12122-1.

Annex A
(informative)

Commentary

A.1 Commentary on scope

This part of ISO 12122 presents methods for determining characteristic values for only sawn structural timber. It is to be read in conjunction with ISO 12122-1.

This part of ISO 12122 presents a uniform methodology for the evaluation of characteristic values that are consistent with the characteristic values found for other structural timber products.

This part of ISO 12122 does not establish methods for the determination of design values. These can be determined based on characteristic values from test data, but for sawn timber will also incorporate safety factors to account for any or all of the following factors:

— Expected changes in product or product properties over a long period. These changes could be due to variations in timber resource quality, production methods, or quality of other raw materials;

— The complexity of the reference population. For example, where the reference population has a large number of producers who draw their resource over a large area, then the sampling may not effectively reflect all possible combinations of resource quality and production methods. In this way, the sample may not be truly representative and a safety factor may be applied to allow for that.

A.2 Commentary on normative references

No commentary.

A.3 Commentary on terms and definitions

No commentary. (See ISO 12122-1).

A.4 Commentary on symbols

No commentary. (See ISO 12122-1).

A.5 Commentary on reference population

Characteristic values can be taken to represent the properties of the material from which the sample was taken. The reference population is the definition of the parent population to which the characteristic properties are said to apply. ISO 12122-1 presents some general requirements for definition of the reference population, but some other features are known to influence the structural properties of sawn timber:

— The climate or climate range of the growing region is known to affect the density of the wood, branch sizes in the tree and hence knot sizes in the wood;

— The altitude of the growing region has been known to affect not only the properties of the sawn wood produced at those altitudes, but also the relationships between the characteristic values of the structural properties. In some cases, the topography can also influence structural properties;

— Silvicultural practices can affect characteristics in the wood from which the sample was taken. This can include planting density, fertilization practices, pruning or trimming practices, and irrigation. Each of these can influence growth rates of the trees and hence wood density branch size and branch configuration. These can affect the properties of the sawn timber that is produced from these logs;

— Soil type is also influential on growth rates and hence on wood density and growth characteristics. Normally, forests have a range of soil types, but some regions can feature a predominance of one soil type (e.g. stony calcareous soils);

— Sawing patterns affect knot positions and alignment. Where a population has a predominant sawing pattern, this should be declared, as different sawing patterns may deliver products with significantly different properties. In particular, the nature of the core wood (close to the pith) is different to the properties of the wood away from the pith. Hence, if core wood is excluded from a particular reference population, that should be stated in the definition of the reference population;

— Temperature of seasoning can also have an influence on the structural properties of seasoned sawn timber. Range of seasoning temperatures and method of seasoning which can relate to the speed of moisture removal shall be declared;

— Many different technologies for stress-grading structural product are available. The use of a particular grading technology can affect the properties of the product or the range of properties produced.

ISO 12122-1 refers to the period over which the product was manufactured. In some cases, the time of year affects the properties of the production of sawn timber. This can relate to the temperature or moisture content of the wood at different stages of production, or it can be an effect of accessibility of different types of forest at different times of the year.

The lists in both ISO 12122-1 and this part of ISO 12122 are examples, but the intent of this clause is that anything in the manufacture of the product that can affect the structural properties shall be included in the description.

A.6 Commentary on sampling

In general, sawn timber incorporates a large number of variations in raw material, production methods, and hence structural properties. It generally has higher V within a stress-grade compared with other timber products. Also compared with manufactured timber products, the generally low level of manufacturing control over sawn timber products means that larger sample sizes are required to capture all of the variants in properties within a reference population.

Guidance on sample size can be found in ISO 12122-1.

A.7 Commentary on sample conditioning

Where the reference population is unseasoned timber, there are no specific requirements on conditioning. However, timber should be stored awaiting testing so that it does not become seasoned in storage.

Likewise, where the reference population is seasoned timber, it must be stored so that its moisture content remains within the requirements for the seasoned product.

Otherwise the requirements of ISO 12122-1 apply.

A.8 Commentary on testing

A.8.1 Commentary on test method

ISO 13910 presents test methods for most structural properties for sawn timber. Other properties can be tested in accordance with other recognized timber test international and national standards.

A.8.2 Commentary on test data compatible with product description

Adjustment of the test data to a reference size, moisture content or temperature can be required. Where this is performed, it shall comply with the requirements of ISO 12122-1.

For sawn timber, the characteristic properties often relate to a reference size, and hence where pooling of data on different sizes takes place, the data must be corrected to the standard size. In order to do this, the guidelines on pooling in ISO 12122-1 should be carefully followed.

A.9 Commentary on evaluation of characteristic values for structural properties

A.9.1 Commentary on structural properties

Structural properties of sawn timber are generally presented as modulus of elasticity and strengths that must be multiplied by a relevant geometric property for design.

— Strengths are presented in the same units as stress and multiplied by an area to give a force or a section modulus to give a moment as the section capacity.

— Modulus of elasticity (in the same units as stress) is used in the calculation of deformation under load.

Table A.1 — Classification of characteristic values for structural properties

Characteristic value	Basis
Characteristic properties	
Bending strength f_m	5th percentile
Tension strength $f_{t,0}$ parallel to grain	5th percentile
Compression strength $f_{c,0}$ parallel to grain	5th percentile
Shear strength f_s	5th percentile
Compression strength perpendicular to grain $f_{c,90}$	Mean (5th percentile)[a]
Tension strength perpendicular to grain $f_{t,90}$	5th percentile
Modulus of elasticity E	Mean (5th percentile)[a]
Shear modulus G	Mean (5th percentile)[a]
[a] Indicates that for some products, a 5th percentile value may be required in addition to the normal mean-based value.	

A.9.2 Commentary on characteristic modulus of elasticity

No commentary. (See ISO 12122-1).

A.9.3 Commentary on characteristic values of strength

No commentary. (See ISO 12122-1).

A.10 Commentary on report

No commentary. (See ISO 12122-1).

Bibliography

[1] ISO 13910, *Timber structures — Strength graded timber — Test methods for structural properties*

ICS 91.080.20

Price based on 7 pages