
**Timber structures — Determination
of characteristic values —**

**Part 6:
Large components and assemblies**

*Structures en bois — Détermination des valeurs caractéristiques —
Partie 6: Composants assemblés*

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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 voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 165, *Timber structures*.

A list of all parts in the ISO 12122 series can be found on the ISO website.

Introduction

This document sets out a framework for establishing characteristic values from test results on a sample drawn from a clearly defined reference population of large components and assemblies. The characteristic value is an estimate of the property of the reference population with a consistent level of confidence prescribed in the standard.

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

Since this document is dedicated to large components and assemblies, it has to deal with a specific statistical issue, namely that the characteristic values are to be derived from a very small number of test results.

In some cases, characteristic values determined in accordance with this document may be modified to become a design value.

[Annex A](#) presents a commentary on the provisions in this document.

[Annex B](#) presents examples of the use of the statistical methods.

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Timber structures — Determination of characteristic values —

Part 6: Large components and assemblies

1 Scope

This document specifies methods of determination of characteristic values for a defined population of large components and assemblies, calculated from test values.

It establishes two methods for the determination of characteristic values:

- a) direct calculation from test values;
- b) calculation from a resistance model, which is firstly calibrated from test results, including calculation of error terms.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

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

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1

large components and assemblies

parts of a timber structure consisted of at least two members, assembled together by connections

4 Symbols

$E(.)$	mean value of $(.)$
$Var(.)$	variance of $(.)$
V	coefficient of variation [$V = (\text{standard deviation})/(\text{mean value})$]
V_X	coefficient of variation of X
V_δ	estimator for the coefficient of variation of the error term δ

$\underline{X}$	array of j basic variables $X_1 \dots X_j$
$\underline{X}_m$	array of mean values of the basic variables
$\underline{X}_n$	array of nominal values of the basic variables
$g_{rt}(\underline{X})$	resistance function (of the basic variables X) used as the resistance model
k_n	characteristic fractile factor
m_X	mean of the n sample results
n	number of experiments or numerical test results
r	resistance value
r_e	experimental resistance value
r_{ee}	extreme (maximum or minimum) value of the experimental resistance [i.e. value of r_e that deviates most from the mean value r_{em}]
r_{ei}	experimental resistance for specimen i
r_{em}	mean value of the experimental resistance
r_k	characteristic value of the resistance
r_m	resistance value calculated using the mean values $\underline{X}_m$ of the basic variables
r_n	nominal value of the resistance
r_t	theoretical resistance determined from the resistance function $g_{rt}(\underline{X})$
r_{ti}	theoretical resistance determined using the measured parameters $\underline{X}$ for specimen i
s	estimated value of the standard deviation σ
s_δ	estimated value of σ_δ
δ	error term
δ_i	observed error term for test specimen i obtained from a comparison of the experimental resistance r_{ei} and the mean value corrected theoretical resistance br_{ti}
η_k	reduction factor applicable in the case of prior knowledge
σ	standard deviation $\left[\sigma = \sqrt{\text{variance}} \right]$

5 Reference population

5.1 General

The reference population is the population of large components or assemblies that the test program is designed to represent. Prior to the carrying out of tests, a test plan shall be documented. It shall contain the objectives of the test and all specifications necessary for the selection or production of the

test specimens, the execution of the tests and the test evaluation. The test plan shall cover the following details of the reference population, including structural context for the loading of the specimens:

- objectives and scope;
- prediction of test results;
- specification of test specimens and sampling;
- description of expected restraint and boundary conditions in normal service;
- loading specifications;
- testing arrangement;
- measurements;
- evaluation and reporting of the tests.

The objective of the tests shall be clearly stated, e.g. the required properties, the influence of certain design parameters varied during the test and the range of validity. Limitations of the test and required conversions (e.g. scaling effects) shall be specified.

5.2 Prediction of test results

All properties and circumstances that can influence the prediction of test results should be taken into account, including:

- geometrical parameters and their variability;
- geometrical imperfections;
- material properties;
- parameters influenced by fabrication and execution procedures;
- scale effects of environmental conditions taking into account, if relevant, any sequencing.

The expected modes of failure and/or calculation models, together with the corresponding variables, should be described. If there is a significant doubt about which failure modes can be critical, then the test plan should be developed on the basis of accompanying pilot tests.

Attention shall be given to the fact that a structural assembly can possess a number of fundamentally different failure modes.

6 Sampling

Test specimens shall be constructed, or obtained by sampling, in such a way as to represent the conditions of the real structure.

Factors that shall be taken into account include:

- dimensions and tolerances;
- material and fabrication of prototypes;
- number of test specimens;
- sampling procedures;
- restraints.

The objective of the sampling procedure is to obtain a statistically representative sample.