
**Structural timber — Visual strength
grading — Basic principles**

*Bois de structure — Classification visuelle selon la résistance —
Principes de base*

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO 9709:2005](https://standards.iteh.ai/catalog/standards/sist/a4688173-6aad-45dc-8c85-78e9947fe43/iso-9709-2005)

[https://standards.iteh.ai/catalog/standards/sist/a4688173-6aad-45dc-8c85-
78e9947fe43/iso-9709-2005](https://standards.iteh.ai/catalog/standards/sist/a4688173-6aad-45dc-8c85-78e9947fe43/iso-9709-2005)



PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO 9709:2005](#)

<https://standards.iteh.ai/catalog/standards/sist/a4688173-6aad-45dc-8c85-78e9947fe43/iso-9709-2005>

© ISO 2005

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

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.....	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Symbols and abbreviated terms	1
5 General	1
5.1 Visual strength-graded timber	1
5.2 Visual strength-grading operations	1
5.3 Visual strength-grading principles of quality control	2
6 Resource and sawn timber input requirements	2
6.1 General	2
6.2 Input requirements	2
6.3 Control of inputs	3
6.4 Reprocessing of previously graded material	3
7 Visual strength-grading requirements	3
7.1 Grader requirements	3
7.2 Grading process	3
7.3 Check on visual grading process	4
8 Visual graded timber structural properties	4
8.1 General	4
8.2 Initial evaluation	4
8.3 Periodic evaluation	5
9 Product identification	5
10 Documentation	5
Annex A (informative) Example of a visual strength-grading timber standard — based on the need for design values where a high degree of certainty of structural properties is required	6
Annex B (informative) Example of a visual strength-grading timber standard — based on the need for design values where a high degree of certainty of structural properties is <i>not</i> required	19
Bibliography	25

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

ISO 9709 was prepared by Technical Committee ISO/TC 165, *Timber structures*.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[ISO 9709:2005](https://standards.iteh.ai/catalog/standards/sist/a4688173-6aad-45dc-8c85-78e9947fe43/iso-9709-2005)

<https://standards.iteh.ai/catalog/standards/sist/a4688173-6aad-45dc-8c85-78e9947fe43/iso-9709-2005>

Introduction

The general principle of this International Standard is that any type of visual strength-grading procedure is acceptable, provided it is defined, controlled, and documented to the extent required to reflect the degree of certainty of structural properties intended for the structural application of the product. The body of this International Standard specifies the essential features common to all visual strength-grading operations. The requirements are minimal so as to ensure maximum scope and flexibility in the application of a standard applied to the visual strength-grading process as applied to timber. The annexes provide a detailed example of a conformance standard resulting in strength properties having a high degree of engineering reliability and a simple to apply standard resulting in strength properties where a high degree of engineering reliability is not required.

This International Standard was based initially on the European Standard EN 518, *Structural timber — Grading — Requirements for visual strength-grading standards* and modified to bring it into conformance with ISO procedures and requirements.

The bibliography lists a number of additional standards referenced during the development of this International Standard.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[ISO 9709:2005](https://standards.iteh.ai/catalog/standards/sist/a4688173-6aad-45dc-8c85-78e9947fe43/iso-9709-2005)

<https://standards.iteh.ai/catalog/standards/sist/a4688173-6aad-45dc-8c85-78e9947fe43/iso-9709-2005>

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO 9709:2005](https://standards.iteh.ai/catalog/standards/sist/a4688173-6aad-45dc-8c85-78e9947fef43/iso-9709-2005)

<https://standards.iteh.ai/catalog/standards/sist/a4688173-6aad-45dc-8c85-78e9947fef43/iso-9709-2005>

Structural timber — Visual strength grading — Basic principles

1 Scope

This International Standard establishes the basic principles for rules and procedures governing the visual sorting of timber for use in structural applications.

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.

ISO 13910, *Structural timber — Characteristic values of strength-graded timber — Sampling, full-size testing and evaluation*

iTeh STANDARD PREVIEW

3 Terms and definitions (standards.iteh.ai)

For the purposes of this document, the terms and definitions given in ISO 13910, and in Annexes A and B apply. The terms and definitions given in Annexes A and B are representative of those in rules and procedures governing the visual sorting of timber for use in structural applications.

4 Symbols and abbreviated terms

For the purposes of this document, the symbols and abbreviated terms given in ISO 13910 and in Annex A apply. The symbols and abbreviated terms given in Annex A are representative of those in rules and procedures governing the visual sorting of timber for use in structural applications.

5 General

5.1 Visual strength-graded timber

Visual strength-graded timber is sawn wood that has been sorted into structural or non-structural grades according to visual criteria. The visual criteria identify physical features that may affect timber strength.

5.2 Visual strength-grading operations

A typical visual strength-grading operation shall be comprised of a visual grader who sorts an input resource into one or more output grades (see Figure 1). Some of the timber may not meet the requirements of the minimum specified grade.

In addition to the structural requirements, nonstructural or utility requirements may also be specified.

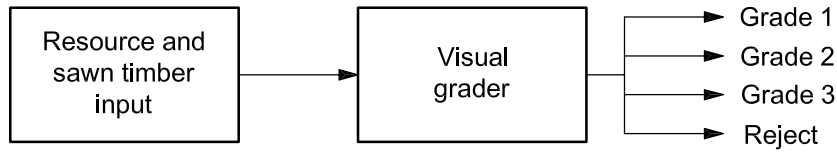


Figure 1 — Schematic of visual strength-grading operation

5.3 Visual strength-grading principles of quality control

Visual grading is one element of quality control operations. This International Standard requires that the quality control related to the visual grading operation is undertaken by placing checks on the three components of the grading operation: 1) the resource and sawn timber inputs; 2) the visual sorting process; and 3) the graded timber output (see Figure 1).

NOTE In theory it is possible to control quality either

- a) by control on the resource input and the visual sorting operation, or
- b) by checks of the visual sorting operation and of the quality of the output grades.

However, in practice it is not feasible to rely solely on the checks on the output grades because of the high variability and complexity of timber, and because of the large sample sizes that may be required to reliably measure the 5-percentile strength values.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

6 Resource and sawn timber input requirements

[ISO 9709:2005](https://standards.iteh.ai/catalog/standards/sist/a4688173-6aad-45dc-8c85-78e9947fe43/iso-9709-2005)

6.1 General

<https://standards.iteh.ai/catalog/standards/sist/a4688173-6aad-45dc-8c85-78e9947fe43/iso-9709-2005>

The input resources shall be identified in terms of all parameters that may affect the output of the visual grade sorting operation.

6.2 Input requirements

6.2.1 Resource

The parameter that shall be identified is the timber species or mixture of species.

Other parameters that may be identified are

- a) silvicultural practices used,
- b) log source,
- c) log size,
- d) cutting pattern used to manufacture sawn timber from logs, and
- e) any other parameters deemed to be important.

6.2.2 Sawn timber

Parameters that shall be specified are

- a) condition (such as seasoned, unseasoned, etc.),

- b) moisture content and moisture content range, and
- c) any other parameters deemed to be important.

6.3 Control of inputs

A periodic check on the resource and sawn timber inputs should be defined and specified.

6.4 Reprocessing of previously graded material

If major reprocessing of previously graded material is permitted, then any requirements for re-grading of the material should be specified.

7 Visual strength-grading requirements

7.1 Grader requirements

The grader shall be qualified to grade timber accurately at the necessary operational speeds and to evaluate the visual quality of all grades and sizes that the grader will encounter in commercial visual grading operations.

7.2 Grading process

7.2.1 General

The grading process shall be specified. During grading, methods shall be in place to ensure that the timber species and the timber moisture content comply with the requirements specified.

The detail required in the standard is directly related to the reliability of the stated/claimed structural properties.

- Annex A, an informative annex, provides a detailed example of a conformance standard resulting in strength properties having a high degree of engineering reliability.
- Annex B, an informative annex, provides an example of a conformance standard resulting in strength properties where a high degree of engineering reliability is not required.

7.2.2 Rules to satisfy the structural requirements

To ensure adequate structural properties, limitations shall be specified on one or more of the following features:

- a) knots (type, size and location);
- b) slope of grain;
- c) rate of growth;
- d) fissures (shake, checks, and/or splits);
- e) moisture condition; and
- f) any other features that are deemed to be important.

7.2.3 Rules to satisfy the utility requirements

To ensure adequate visual quality, limitations may be specified on one or more of the following features:

- a) crookedness;
- b) dimensions and tolerances;
- c) fungal decay;
- d) insect damage;
- e) sapstain;
- f) squareness;
- g) white speck; and
- h) any other features that are deemed to be important.

7.3 Check on visual grading process

A periodic check shall be required to assess the accuracy of the grading process. If a check indicates that the process is inadequate, then appropriate measures may be specified to modify the process so that the process is adequate.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

8 Visual graded timber structural properties

8.1 General

ISO 9709:2005
<https://standards.iteh.ai/catalog/standards/sist/a4688173-6aad-45dc-8c85-78e9947fe43/iso-9709-2005>

The critical properties of strength-graded timber are structural properties. These structural properties may be incorporated in the visual strength-grading standard or may be in other appropriate standards referencing the grades determined using the criteria of the visual strength-grading standard. These properties shall be as defined and measured as specified in the test methods in ISO 13910.

The structural design properties shall be determined from tests on timber having a defined moisture content, if the tests are conducted on timber having a moisture content that differs from that specified by the procedure conforming to this International Standard, the properties resulting from the tests shall be adjusted (using sound engineering principles) so that the structural design properties reflect the intent of these basic requirements and/or the applicable associated design codes.

8.2 Initial evaluation

Once the grading operation has been selected, evidence shall be provided that the resultant output grades have the structural properties stated for the material. This evidence may be linked to other mills carrying out equivalent sorting procedures.

For cases where such evidence is not available or it is not appropriate to link the evidence to other mills, an initial test program should be specified. The requirements for this test program should be based on sound sampling principles and the tests for the structural properties shall be based on the test procedures specified in 8.1.

For cases where a high degree of certainty of the structural properties is not required, then the structural properties of the material may be based on other mechanical or physical properties representative of the grade being evaluated providing these properties have been defined and related to the test procedures as specified in 8.1 and continue to be used as the basis of the sorting process.

8.3 Periodic evaluation

Direct measurement of the structural properties of full-size timber shall be undertaken if there is a reason to expect that the structural properties of visually graded lumber have changed and may also be specified to be undertaken at periodic specified intervals.

9 Product identification

A product identification mark on the timber shall be specified to indicate the document conforming to this International Standard on which the sorting is based, the grade and/or strength class, and the producer responsible. The product identification mark may also include other information deemed important.

Each piece of timber shall be marked except for high quality strength-graded timber intended for structural as well as appearance purposes. For this high quality appearance timber, each shipment shall be accompanied by documentation containing the product identification requirements specified in the standard.

10 Documentation

Documentation requirements shall include:

- a) the standard on which the visual strength-grading process is based;
- b) specifications of the resource input;
- c) specifications of the visual grade sorting process;
- d) specifications for the timber grade criteria;
- e) methods for assigning and confirming a grade; and
- f) specifications for the identification of the product.

Documentation requirements may include:

- g) specifications and control checks of the resource input;
- h) specifications and control checks of the visual grade sorting process;
- i) specifications and control checks of the structural properties;
- j) materials identifying the allocation of responsibilities for quality control operations; and
- k) other specifications or materials deemed to be important.

Annex A (informative)

Example of a visual strength-grading timber standard — based on the need for design values where a high degree of certainty of structural properties is required

This is one of a number of possible systems provided as an example only - not a system proposed for universal usage. This example is a practical implementation of the visual strength-grading principles defined in the main body of ISO 9709, as applied to the following case:

- rectangular timber;
- for structural applications;
- requiring strength characteristic values within 5 % of the expected values.

The layout corresponds to that of an International Standard (not a normal Annex) to clearly show how an International Standard in this domain should look. It includes both

- normative elements (Scope, Normative references, Terms and definitions, Symbols and abbreviated terms, Requirements, Sampling, Test methods), and
- supplementary informative elements (Bibliography).

Informative annexes (like this Annex A) and normative annexes may also form part of an International Standard.

NOTE The Scope does not usually form part of an annex, but is included in this example for completeness purposes.

A.1 Scope

This standard provides an example of the grading procedures for producing visually sorted strength and stiffness graded rectangular timber for structural applications requiring strength characteristic values within 5 % of the expected values.

It is applicable for timber that is graded in the seasoned state.

It may be applicable for timber that is graded in the unseasoned state providing the structural design properties for the timber are modified to reflect the intent of this standard and/or to the associated design codes.

A.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.

ISO 9709, *Structural timber — Visual strength grading — Basic principles*

ISO 13910, *Structural timber — Characteristic values of strength-graded timber — Sampling, full-size testing and evaluation*