INTERNATIONAL STANDARD

ISO 22389-1

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Timber structures — Bending strength of I-beams —

Part 1: Testing, evaluation and characterization

Structures en bois — Résistance à la flexion des poutres en I —

Partie 1: Essais, évaluation et caractérisation

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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.

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.

ISO 22389-1 was prepared by Technical Committee ISO/TC165, *Timber structures*.

ISO 22389 consists of the following part, under the general title *Timber structures — Bending strength of I-beams:*

— *Part 1: Testing, evaluation and characterization*

Component performance and manufacturing requirements is to form the subject of a part 2.

This part of ISO 22389 is based, with permission of ASTM International, on ASTM D 5055, *Standard Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists*, copyright ASTM International.

Introduction

Prefabricated wood-based I-beams are being produced in many countries under different national standards and these products are being exported from one country to another. While the national standards have many similarities, there are also many areas of dissimilarity. Consequently, there is need for the development of an International Standard to establish consistency between these standards to ensure the suitability of prefabricated wood-based I-beams for structural end-use applications regardless of country of manufacture or country of end use. It is intended that the development of this part of ISO 22389 will have value to industry, consumers, governments and distributors.

Timber structures — Bending strength of I-beams —

Part 1: Testing, evaluation and characterization

1 Scope

This part of ISO 22389 specifies the requirements for prefabricated wood-based I-beams used as structural members in bending applications.

It gives procedures for establishing and evaluating structural capacities of prefabricated wood-based I-beams. The capacities considered are shear, moment, stiffness, bearing, and flange tension and compression. Procedures for establishing common details are given and certain end-use considerations specific to wood-based I-beams are itemized.

Wood-based I-beams tested according to this part of ISO 22389 are intended for use under covered conditions and utilize components that are able to resist the effects of moisture on structural performance due to construction delays or other conditions of similar severity, but are not intended to be permanently exposed to the weather.

This part of ISO 22389 is not applicable to fire performance, formaldehyde requirements and biological durability. It does not cover manufacturing requirements for prefabricated wood-based I-beams.

NOTE Procedures set out in this part of ISO 22389 are applicable to I-beams defined by a standard or a manufacturer's specification that includes requirements for the flanges, webs and bonding, and production controls, including ongoing conformity assessment.

This part of ISO 22389 does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this part of ISO 22389 to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use. A specific precautionary statement is given in 5.1.5.

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 20152-1, *Timber structures — Bond performance of adhesives — Part 1: Basic requirements*

EN 789, *Timber structures — Test methods — Determination of mechanical properties of wood based panels*

ASTM D2915, *Standard Practice for Evaluating Allowable Properties for Grades of Structural Lumber*

ASTM D5456, *Standard Specification for Evaluation of Structural Composite Lumber Products*

3 Terms and definitions

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

3.1
prefabricated wood-based I-beam
structural member manufactured using sawn or structural composite lumber flanges and structural panel webs, forming an "I" cross-sectional shape, bonded together with a structural wood adhesive that possesses the moisture resistance suitable for the conditions specified

NOTE 1 These members are primarily used as joists in floor and roof construction.

NOTE 2 Suitable moisture resistance means resistance under covered conditions and possible exposure to moisture due to construction delays or other conditions of similar severity, but not permanent exposure to the weather.

3.2
characteristic strength and stiffness
population 5th percentile strength value at a 75 % confidence level or the 50th percentile (mean) for bending stiffness value when determined using the test specified in this part of ISO 22389

3.3
structural composite lumber
composite of wood elements bonded with a structural wood adhesive that possesses the moisture resistance suitable for the conditions specified and intended for structural use in dry service conditions

NOTE 1 Examples of wood elements include wood strands, strips, veneer sheets or a combination thereof.

NOTE 2 Suitable moisture resistance means resistance under covered conditions and possible exposure to moisture due to construction delays or other conditions of similar severity, but not permanent exposure to the weather.

4 Materials

4.1 Flange stock

When the flange material is structural composite lumber, the following properties shall be determined in accordance with ASTM D5456 or EN 789:

a) modulus of elasticity;

b) tension parallel to grain;

c) compression parallel to grain;

d) compression perpendicular to grain.

NOTE National standards or governing codes can be applicable to all flange material.

End joints in purchased flange stock are permitted, provided such joints conform to the general intent and 5.8.

4.2 Web material

Web materials covered by this part of ISO 22389 are intended for end-use conditions specified in the Scope (third paragraph) and 3.1, Note 2.

NOTE Manufacturing or performance standards of wood-based panels recognized by national standards or governing codes can be applicable to web materials.

4.3 Adhesives

Adhesives used to fabricate components as well as the finished products shall conform to ISO 20152-1.

NOTE National standards or governing codes can be applicable.

5 Product evaluation

5.1 General

Product evaluation shall be conducted for establishing the characteristic capacities of prefabricated wood-based I-beams for use in building design. In addition, product evaluation shall be conducted for certain common I-beam details since they often influence the I-beam characteristic capacities.

5.1.1 Sample size

The number of specimens specified in this part of ISO 22389 is a minimum. The use of a larger number of samples may be evaluated using ASTM D2915 or an applicable International Standard[1)].

5.1.2 Specimens

Materials and fabrication procedures of specimens shall be as typical of intended production as can be obtained at the time of manufacturing the specimens. Specimens shall be tested at indoor ambient laboratory conditions, which shall be reported.

It is recommended that preliminary tests be conducted to aid the selection of representative specimens.

5.1.3 Test accuracy

Tests in accordance with this part of ISO 22389 shall be conducted in a machine or apparatus calibrated to an error not exceeding ±2,0 %.

5.1.4 Test methods

Methods generally applicable to the full-size I-beam tests required in this part of ISO 22389 shall consider the following:

a) the methods are applicable to both product evaluation and quality control;

b) load rate shall be as specified in the following subclauses;

c) delays between load increments are not required.

5.1.5 Test safety

All full-scale mechanical tests are potentially hazardous and appropriate safety precautions shall be observed at all times. Appropriate lateral restraint shall be provided at all times during full-size I-beam tests to prevent lateral buckling.

1) It is intended to develop an International Standard on the evaluation of characteristic values for structural timber.