

Specification for

Visual strength grading of hardwood

ICS 79.040

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Committees responsible for this British Standard

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- British Timber Merchants' Association
- British Woodworking Federation
- Bureau de Promotion des Industries du Bois
- Council of Forest Industries of British Columbia
- Department of the Environment (Building Research Establishment)
- Forestry Commission
- Institute of Building Control
- Institution of Civil Engineers
- National House-Building Council
- Southern Pine Council
- Timber Research and Development Association
- Timber Trade Federation
- UK Timber Grading Committee
- United Kingdom Softwood Sawmillers' Association

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Foreword

This British Standard has been prepared by Subcommittee B/518/2. It supersedes BS 5756 : 1980, which is withdrawn.

The first edition of this British Standard was published in 1980 with the title *Specification for tropical hardwoods graded for structural use*. It was revised following publication of BS EN 518 : 1995 *Structural timber — Grading — Requirements for visual strength grading standards*. Further changes extend its scope to temperate hardwoods and make it comply with BS 5268 : Part 2.

This British Standard specifies means of assessing the quality of hardwoods for which grade stresses are given in BS 5268 : Part 2.

To ensure that each piece has certain minimum strength properties, this British Standard specifies for tropical hardwoods a single visual strength grade (Structural Tropical Hardwood HS). For temperate hardwoods, this British Standard specifies two visual strength grades (General Structural Temperate Hardwood TH1 and TH2) for timber with a thickness less than 100 mm or cross-sectional area less than 20 000 mm², and two visual strength grades (Heavy Structural Temperate Hardwood THA and THB) for timber with a thickness and cross-sectional area equal to or greater than these values.

A number of characteristics of hardwoods which may be considered defects from an appearance grading point of view, such as stain not associated with decay, and pin holes, can be accommodated in structural material with little or no loss in strength. Certain characteristics such as slope of grain, however, require careful limitation. Consequently specific rules for structural grading are desirable for efficient use.

This British Standard complies with EN 518 *Structural timber — Grading — Requirements for visual strength grading standards*.

Machine strength grading is specified in BS EN 519 *Structural timber — Grading — Requirements for machine strength graded timber and grading machines*.

Annex A specifies the determination of slope of grain, annex B specifies the minimum requirements for the control of strength grading operations and annex C gives guidance on species marking.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 12, an inside back cover and a back cover.

Specification

1 Scope

This British Standard specifies a method of strength grading tropical and temperate hardwood visually for structural use.

For tropical hardwoods, the permissible limits of characteristics for a single visual strength grade of timber are specified, designated 'Structural Tropical Hardwood' (HS) grade. For temperate hardwoods, the permissible limits of characteristics for two visual strength grades are specified for large size timber, designated 'Heavy Structural Temperate Hardwood' (THA and THB), and two visual strength grades for smaller size timber, designated 'General Structural Temperate Hardwood' (TH1 and TH2).

This British Standard applies to hardwoods graded both in the United Kingdom and abroad.

Hardwood, which is graded abroad under the supervision of a certification body approved by the UK Timber Grading Committee¹⁾ and graded and marked in accordance with this British Standard, need not be regraded in the United Kingdom, provided that it is not resawn into smaller sizes.

Where British Standards covering specific end use requirements specify permissible limits varying from those given in this standard, the requirements of those standards will replace or be additional to the requirements of this standard.

NOTE. Additional requirements for laminations are given in BS EN 386.

2 Normative references

This British Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are made at the appropriate places in the text and the cited publications are listed on the inside back cover. For dated references, only the edition cited applies: any subsequent amendments to or revisions of the cited publication apply to this British Standard only when incorporated in the reference by amendment or revision. For undated references, the latest edition of the cited publication applies, together with any amendments.

3 Definitions

For the purposes of this British Standard, the nomenclature in BS 7359 and the definitions of BS 5268 : Part 2, BS 6100 : Part 4, BS EN 336 and BS EN 518 apply, together with the following.

3.1 fissure

Longitudinal separation of the fibres, appearing on a face, edge or end of a piece of timber, and including checks, shakes and splits.

3.2 pin knot

Round or oval knot, sound, intergrown or partially intergrown, with a maximum size of 5 mm.

3.3 sample

A number of specimens of one cross section size and from one parcel.

3.4 thickness

Lesser dimension perpendicular to the longitudinal axis of a piece of timber.

3.5 width

Greater dimension perpendicular to the longitudinal axis of a piece of timber.

3.6 parcel

Quantity of sawn timber of the same target size, quality and description.

3.7 strength class

Classification of timber based on particular characteristic values of bending strength, density and mean modulus of elasticity parallel to the grain.

4 Strength graded timber

4.1 Supervision of strength grading operations

Visual strength grading operations shall be carried out by a grader and/or grading company, under the supervision of a certification body approved by the UK Timber Grading Committee, all of whom shall be assessed in accordance with annex B.

4.2 Sizes

Unless otherwise specified, timber graded to this standard shall conform to BS EN 336 with respect to permissible deviations and processing reductions applicable to constructional timber. It shall have a minimum cross-sectional area of 2000 mm² and a minimum thickness of 20 mm. For temperate hardwoods, additional requirements are given in clause 7.

NOTE. Dimensional limits for laminations are given in BS EN 386.

4.3 Processed timber

If the grading has been carried out before processing, provided the processing reduction from the target size is not greater than 3 mm on sizes less than or equal to 100 mm, or not greater than 5 mm on sizes greater than 100 mm, the grade shall not be considered to have been changed.

4.4 Resawing or surfacing

Where graded timber is resawn or surfaced to an extent beyond the limits of 4.3, the timber shall be regraded if it is to conform to this British Standard.

¹⁾ UK Timber Grading Committee, Timber Trade Federation, Clareville House, 26-27 Oxendon Street, London W1D 1BS.

4.5 Cross cutting

Cross cutting shall be permitted provided that each resulting piece conforms to this British Standard.

4.6 Moisture content

4.6.1 Determination

The moisture content shall be determined in accordance with BS EN 336.

4.6.2 Dry graded timber

The fissures and distortion of a batch of timber being strength graded shall be assessed when the batch has an average moisture content of 20 % or less, with no reading to exceed 24 % moisture content.

4.6.3 Wet graded timber

Because thick timber is difficult to dry, **4.6.2** shall not apply to timber that has a target thickness of 100 mm or more. Neither shall **4.6.2** apply to timber that is specified for use in contact with water or in climatic conditions leading to a timber moisture content higher than 20 % (corresponding to service class 3, as defined in BS 5268 : Part 2).

4.7 Acceptance limits for visually graded timber

When, on inspection of a representative sample of a parcel of graded timber, it is ascertained that not more than 10 % of the pieces exceed the permissible limits of the grade and, provided that not more than 3 % of the pieces in the sample exceed the permissible limits by more than one third, the parcel shall be considered as conforming to the grade.

Where the parcel contains less than 10 pieces, the permissible limits shall not be exceeded.

4.8 Abnormal defects

Any piece which contains abnormal defects such as brittleheart, compression failure, tension wood, damage, combinations of knots, insect damage, fungal decay and/or other characteristics, which may cause a decrease in strength properties to an amount which threatens its serviceability, shall be excluded from the grade.

Any piece which contains an abnormal defect or defects shall be accepted to the grade if the reduction in strength caused by the abnormal defect or defects is obviously less than that caused by the defects admitted by the grade, as long as these abnormal defects are of a type which will not progress after conversion.

5 Measurement of characteristics

5.1 Slope of grain

Slope of grain shall be assessed as the inclination of the wood fibres (grain) to the longitudinal axis of the piece. The slope shall be expressed as the number of units of length over which unit deviation occurs. It shall be measured over a distance sufficiently great to determine the general slope, disregarding local deviations. The slope of grain shall be measured as follows:

- a) by taking a line parallel to the surface fissures; or
- b) by the use of a grain detector (scribe) (see annex A).

NOTE. Interlocked grain is a normal feature of certain tropical hardwoods and care should be taken to avoid confusing it with sloping grain. However, in doubtful cases, where, in the grader's judgement, interlocked grain occurs to an undesirable extent in relation to the cross-sectional dimension of the piece, bearing in mind the normal slope of grain limitation, the piece should be rejected. In addition, table 1 requires the piece to be rejected (see annex A) when the slope of the interlocked grain exceeds 1 in 4.

5.2 Knots

The limiting dimension of any type of knot shall be taken as the distance between lines containing and touching the knot and parallel to the arris (see figure 1a), except that where a knot can be seen on both edge and face, the appropriate method of the following shall be used.

If the knot emerges from within the cross section onto an arris, and neither of the exposed sections of the knot is definitely elongated, the knot shall be measured on both edge and face by taking the distance between the arris and lines touching the knot and parallel with the arris. The greater of the two measurements shall be the limiting dimension and this shall be related to the thickness of the piece (see figure 1b).

A knot showing on both edge and face but cut so that one of its exposed sections is definitely elongated shall be measured only on the surface upon which the elongated portion does not appear, using one of the methods described above. The limiting dimension shall be related to the thickness or width upon which the knot measurement is taken (see figures 1c and 1d).

Tightly grouped pin knots shall be treated as a single knot with the same outer dimensions as that described by the grouped pin knots.

NOTE. Single pin knots may be ignored.

5.3 Fissures

The limits for the length of fissures are given in tables 1, 2 and 3. Measurement shall be taken at the time of grading.

NOTE. The length of a fissure is influenced by moisture content. Precise limits to cover all conditions and applications cannot therefore be given and guidance only is provided as to what might be considered acceptable limits at 20 % moisture content.