

Australian Standard[®]

**Timber—Heavy structural products—
Visually graded**

Part 1: General requirements



This Australian Standard® was prepared by Committee TM-003, Timber Grading. It was approved on behalf of the Council of Standards Australia on 30 November 2009. This Standard was published on 16 December 2009.

The following are represented on Committee TM-003:

- A3P
- Australian Timber Flooring Association
- BRANZ
- CSIRO Manufacturing, and Infrastructure Technology
- Forest and Wood Products Australia
- Forests New South Wales
- Frame and Truss Manufacturers Association Australia
- Master Builders Australia
- New Zealand Timber Industry Federation
- Tasmanian Timber Promotion Board
- Timber and Building Materials Association (NSW)
- Timber Queensland
- University of Technology, Sydney
- Wood Processors Association New Zealand

Additional Interests:

- Dr Geoff Boughton
-

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Timber—Heavy structural products— Visually graded

Part 1: General requirements

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PREFACE

This Standard was prepared by the Australian members of the Joint Standards Australia/Standards New Zealand Committee TM-003, Timber Grading, to supersede AS 3818.1—1998.

After consultation with stakeholders in both countries, Standards Australia and Standards New Zealand decided to develop this Standard as an Australian Standard rather than an Australian/New Zealand Standard.

The objective of this Standard is to provide producers and users of visually graded timber products with general requirements for the specific products covered by the other parts of this series.

The objectives of this revision are as follows:

- (a) To complete an overview of the AS 3818 series, with regard to the consistency and alignment between all Parts.
- (b) To include additional species in Table C1.
- (c) To change the format of this Standard from single to multiple Sections.

This Standard is Part 1 of the AS 3818 series, *Timber—Heavy structural products—Visually graded*, which is composed of the following parts:

AS

3818	Timber—Heavy structural products—Visually graded
3818.1	Part 1: General requirements (this Standard)
3818.2	Part 2: Railway track timbers
3818.3	Part 3: Piles
3818.4	Part 4: Cross-arms for overhead lines
3818.5	Part 5: Mine lift guides
3818.6	Part 6: Decking for wharves and bridges
3818.7	Part 7: Large section sawn hardwood engineering timbers
3818.8	Part 8: Stumps and sole plates
3818.11	Part 11: Utility poles (Revision of AS 2209—1994)

It is intended to produce further parts in this series as follows:

Part 9: Natural round treated hardwood corbels, girders and stringers

Part 10: Building poles

Appendices have been included to give advice on—

- (a) a means for demonstrating compliance;
- (b) relative natural durability;
- (c) species, properties and uses;
- (d) definitions; and
- (e) measurement of characteristics.

The terms ‘normative’ and ‘informative’ have been used in this Standard to define the application of the appendix to which they apply. A ‘normative’ appendix is an integral part of a Standard, whereas an ‘informative’ appendix is only for information and guidance.

CONTENTS

	<i>Page</i>
SECTION 1 SCOPE AND GENERAL	
1.1 SCOPE	4
1.2 APPLICATION	4
1.3 NORMATIVE REFERENCES	4
1.4 DEFINITIONS	5
1.5 MOISTURE CONTENT OF SEASONED TIMBER	5
1.6 PRESERVATIVE TREATMENT	5
1.7 MINIMIZING END SPLITTING	6
SECTION 2 CHARACTERISTICS	
2.1 MEASUREMENT OF CHARACTERISTICS	7
2.2 COMBINATION OF CHARACTERISTICS IN SAWN TIMBER	7
2.3 CHARACTERISTICS OCCURRING ENTIRELY WITHIN THE PRESCRIBED LIMITS FOR WANT AND WANE	8
2.4 MECHANICAL DAMAGE	8
SECTION 3 GRADE LIMITATION AND GRADING	
3.1 BASIS	9
3.2 LIMITATIONS	9
3.3 VARIATIONS IN ASSESSMENT	9
3.4 RESAWING	9
3.5 GRADING CHECK	9
3.6 MOISTURE CONTENT OF PRESERVATIVE-TREATED TIMBER	10
3.7 END TRIMMING	10
3.8 DOCKING OF MULTIPLE LENGTHS	10
SECTION 4 MARKING, INSPECTION, AND STORAGE AND MAINTENANCE	
4.1 MARKING	11
4.2 INSPECTION	11
4.3 STORAGE AND MAINTENANCE	11
APPENDICES	
A MEANS OF DEMONSTRATING COMPLIANCE WITH THIS STANDARD	12
B RELATIVE NATURAL DURABILITY OF THE HEARTWOOD OF SPECIES	14
C SPECIES PROPERTIES AND USES	15
D DEFINITIONS	27
E MEASUREMENT OF CHARACTERISTICS	35
BIBLIOGRAPHY	41

STANDARDS AUSTRALIA

Australian Standard

Timber—Heavy structural products—Visually graded

Part 1: General requirements

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard specifies the general requirements for visual grading of hardwood and softwood intended for the specific products for which grades are defined in the other parts of this series. These general requirements apply at the time of grading.

NOTES:

- 1 Guidance on means for demonstrating compliance with this Standard is given in Appendix A.
- 2 Information on the natural durability of timber species is given in Appendix B.

1.2 APPLICATION

The specification for any product shall consist of the general requirements given in this Standard together with the relevant product description given in the appropriate part of this series.

NOTE: To use this Standard for grading structural timber products, the procedure is as follows:

- (a) Part 1 gives the general requirements for all the products covered by this series of Standards.
- (b) Appendix C lists species appropriate for the visual grades given in the parts of this series.
- (c) For each product, one of the other parts of the series specifies product requirements including grade descriptions, tolerances, and similar. In some cases, stress grades have been given for use in structural design in accordance with AS 1720.1.

1.3 NORMATIVE REFERENCES

The following referenced documents are indispensable for the application of this Standard:

NOTE: Documents referenced for informative purposes are listed in the Bibliography.

AS

- | | |
|--------|--|
| 1604 | Specification for preservative treatment |
| 1604.1 | Part 1: Sawn and round timber |
| 1720 | Timber structures |
| 1720.1 | Part 1: Design methods |
| 1720.2 | Part 2: Timber properties |
| 3818 | Timber—Heavy structural products—Visually graded (all Parts) |

AS/NZS

- | | |
|--------|--|
| 1080 | Timber—Methods of test |
| 1080.1 | Part 1: Moisture content |
| 1080.2 | Part 2: Slope of grain |
| 2878 | Timber—Classification into strength groups |
| 4491 | Timber—Glossary of terms in timber related standards |

1.4 DEFINITIONS

For the purpose of this Standard, the definitions given in AS/NZS 4491 and those in Appendix D apply. Where the definitions in Appendix D differ from those in AS/NZS 4491, for the purposes of this Standard those in Appendix D apply.

1.5 MOISTURE CONTENT OF SEASONED TIMBER

NOTE: Most of the timber products covered by this series of Standards can only be supplied in an unseasoned state, as the lead time required when ordering and the cost for seasoned timber in big sizes would be prohibitive. Some timbers may be available seasoned and for some applications seasoned timber may be desirable (see Note 3 below).

Where seasoned timber is specified, the moisture content, anywhere within the piece, shall be not more than 15 percent.

The moisture content of the timber shall be determined in accordance with AS/NZS 1080.1.

NOTES:

- 1 Attention is drawn to the consumer protection provisions of the *Timber Utilization and Marketing Act 1987* in Queensland and the *Timber Marketing Act 1977* in New South Wales, regarding the special considerations applying to seasoned timber in those States. The requirements of these Acts may be more stringent than those in this Standard.
- 2 Where this maximum moisture content is unsuitable for a particular location or purpose, the required moisture content and an acceptable range are a matter for agreement between the purchaser and the supplier.
- 3 The design properties for F-grades for seasoned timber apply only when the average moisture content is less than 15 percent. At a higher moisture content, AS 1720.1 provides a modification factor for partially seasoned timber, which adjusts the properties to allow for an increase in moisture content from its seasoned state due to variations in equilibrium moisture content in use.
- 4 Attention is drawn to the need to consider any circumstances that may require seasoning to a particular moisture content outside the range specified above, e.g. in areas of high or low equilibrium moisture content. Information on the equilibrium moisture content applicable to species under particular use conditions can be obtained from State Forestry Departments, timber organizations and the CSIRO.

1.6 PRESERVATIVE TREATMENT

1.6.1 General

When structural timber products graded in accordance with the appropriate parts of this Standard are preservative treated, treatment shall be in accordance with AS 1604.1 (see Notes 1, 2 and 3).

Appropriately treated sapwood has the same, or better, durability as the heartwood of a piece of timber and, therefore, is not limited in the same way as untreated sapwood (see Note 4).

NOTES:

- 1 In New South Wales the *Timber Marketing Act 1977* and in Queensland the *Timber Utilization and Marketing Act 1987* require prior approval of a preservative treatment and registration of a brand before timber offered for sale in either of those States can be described as preservative treated. Detailed information about the requirements of such legislation can be obtained from the State Forestry Departments concerned or from timber organizations.
- 2 In most hardwoods, the heartwood cannot be successfully treated and purchasers should not expect that treatment of the sapwood will necessarily afford any protection to the heartwood.
- 3 Information on natural durability of heartwood is given in Appendix B.
- 4 Sapwood of all species is likely to decay when in ground contact or fully exposed to the weather unless treated in accordance with AS 1604.1 to meet the appropriate degree of hazard. It follows that sapwood of any species that has been treated to the appropriate hazard level is as durable as, or more durable than, the heartwood of that species for that hazard level.

1.6.2 Sapwood susceptible to Lyctid borers

The sapwood of many hardwood species is susceptible to attack by Lyctid borers. Susceptibility ratings are given in the appropriate parts of this series. Lyctid-susceptible sapwood may be rendered immune from such borer attack if given suitable preservative treatment (see AS 1604.1). Attention is drawn to the special requirements of the *Timber Utilization and Marketing Act 1987* in Queensland and the *Timber Marketing Act 1977* in New South Wales, in regard to the sale and use, in those States, of timber containing Lyctid-susceptible sapwood and the legal acceptability of any particular preservative treatment.

NOTE: Treatment of sapwood against Lyctid attack will not necessarily be effective against fungal organisms that cause decay. In many species where the heartwood cannot be penetrated by the treatment, the treatment of the sapwood will not necessarily afford protection to the heartwood.

1.7 MINIMIZING END SPLITTING

In order to minimize the extent of end splitting over time, end sealing and end plating may be specified.

NOTE: The purchaser may specify the end sealant used and the time of application.

SECTION 2 CHARACTERISTICS

2.1 MEASUREMENT OF CHARACTERISTICS

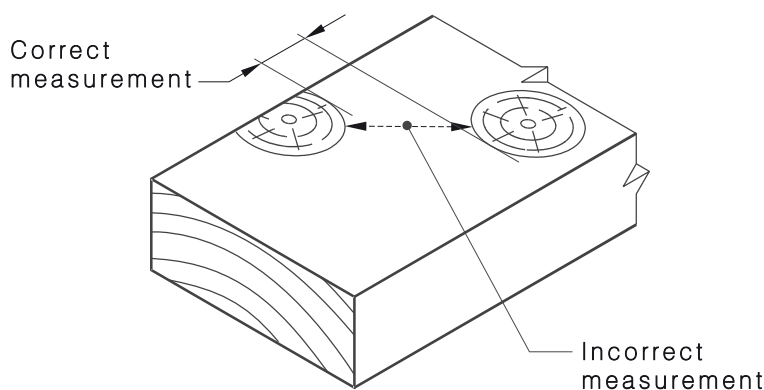
Measurement of characteristics shall be as given in Appendix E.

2.2 COMBINATION OF CHARACTERISTICS IN SAWN TIMBER

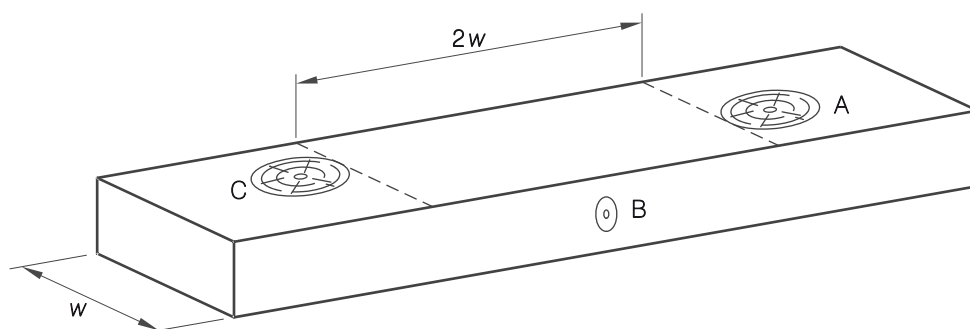
Combination of characteristics is applicable only when grading sawn timber products.

A combination of characteristics shall be permitted if the combination is less than that of one characteristic of the maximum permissible size.

A combination exists when two or more characteristics have less than the lesser of 150 mm and twice the width of the piece between them. The distance between them shall be measured parallel to the arrises between lines drawn at 90 degrees to the arrises just touching the closest edges of the characteristics (see Figure 2.1). Combinations shall be assessed for characteristics on the same surface and for those on different surfaces.



(a) Method of measurement of distance between characteristics



NOTES:

- 1 Given that A is 90 percent of its allowance, B is 15 percent of its allowance, and C is 85 percent of its allowance, the combination of B and C complies with the rules for combinations but the combination of A and B does not comply with the rules for combinations.
- 2 C and B are in combination; A and B are in combination; A and C are not in combination.

(b) Examples of combinations

FIGURE 2.1 COMBINATIONS OF CHARACTERISTICS

If bow, spring, twist and cup are present in the piece, they shall be measured separately and shall be deemed not to be in combination with each other or with any other characteristic.

Example 1:

Considering the case of two knots in combination, if the first knot is only 30 percent of the maximum permitted size for a knot then the second knot may be up to 70 percent of the maximum permitted size for a knot.

Example 2:

Considering the case of overgrowth of injury and a knot in combination, if the overgrowth of injury is only 70 percent of the maximum permitted allowance then the knot may be up to 30 percent of the maximum permitted size for a knot.

2.3 CHARACTERISTICS OCCURRING ENTIRELY WITHIN THE PRESCRIBED LIMITS FOR WANT AND WANE

Irrespective of the limits imposed by the grade descriptions, a characteristic or combination of characteristics occurring wholly within the limits prescribed for want and wane and resulting in no greater reduction in effective dimension shall be permitted.

NOTE: This does not apply to enclosed termite galleries as they may extend well beyond the visible portion of the gallery.

2.4 MECHANICAL DAMAGE

Damage caused by hooks, ropes, forklifts and the like shall be accepted provided that their effect is no more serious than that of a permissible characteristic.

SECTION 3 GRADE LIMITATION AND GRADING

3.1 BASIS

Grading to the grades in the parts of this Standard is based on assessing the characteristic or group of characteristics within a piece, which is considered to have the greatest limiting effect on the grade of that piece, when assessed in accordance with the grade rules. Each piece shall be inspected on all surfaces and the ends.

3.2 LIMITATIONS

The grade descriptions given in the other parts of this series for particular products limit all characteristics known to have a significant effect on strength and describe material on the lower limit of that grade. Each parcel shall contain a range of material such that not all of the material is near the lower limits of the grade.

3.3 VARIATIONS IN ASSESSMENT

Within any parcel a maximum variation of 5 percent between the gradings of pieces by individual inspectors or graders shall be acceptable if none of the pieces in the disputed 5 percent falls more than one grade below the designated grade. If grading to the lowest grade, no piece in the disputed 5 percent shall have characteristics that exceed the maximum allowed in the grade by more than 10 percent.

3.4 RESAWING

If the cross-section of the piece of timber is reduced by longitudinal sawing or dressing, the original grading shall be nullified.

3.5 GRADING CHECK

A grading check of timber may be required some time after the initial grading.

Where the purpose of the check is to estimate the accuracy of the previous grading, reasonable allowance shall be made for changes in characteristics of the timber that are the result of moisture change. These changes in characteristics include but are not limited to—

- (a) reduction in dimensions (shrinkage);
- (b) increase in distortion (bow, spring, twist and cup);
- (c) increase in, or development of, seasoning checks, splits, end splits and shakes; and
- (d) increase in, or development of, loose gum veins.

NOTES:

- 1 Changes in the characteristics of timber due to moisture change can be minimized from the time that it is milled by correct downstream protection, handling, transport and storage until it is placed in service. These procedures include end grain sealing, wrapping, maintaining block packs and level storage, and sealing the timber with pale coloured sealers (paints, etc.) immediately upon removal from packs and placing in service.
- 2 Where timber is loosely packed or packs are broken and exposed to the weather, it is likely the timber will be adversely affected by moisture change.
- 3 Defects may arise due to moisture change. For example, the formation of large checks affecting the structural adequacy of the piece or excessive twist affecting the utility of the piece. Such defects in a piece may be cause to reject the piece with respect to its final application.

3.6 MOISTURE CONTENT OF PRESERVATIVE-TREATED TIMBER

Some preservative treatment processes increase the moisture content of timber considerably and may affect the structural properties. Unless such timber is redried to the moisture content range for seasoned timber, it does not conform to the requirements of this Standard for seasoned timber.

NOTE: Where preservative treated timber is re-dried using temperatures in excess of 80°C, grading in accordance with this Standard may not be valid.

3.7 END TRIMMING

The original grade of the piece shall not be affected by subsequent end trimming except that the original grading may be nullified in those areas that are designated distances from the end of the piece (e.g. the ground line on a pole).

3.8 DOCKING OF MULTIPLE LENGTHS

When grading a piece of timber that is to be supplied as a multiple of a shorter ordered length, it shall be graded as if it were in the shorter lengths.

SECTION 4 MARKING, INSPECTION, AND STORAGE AND MAINTENANCE

4.1 MARKING

If the timber is branded, labelled, stamped or otherwise marked to indicate that it complies with this Standard, the following items shall be included:

- (a) The number of the part of this Standard series to which it is graded (e.g. AS 3818.2).
- (b) Identification of the source of grading.
- (c) The grade of the timber (if there is more than one grade described).
- (d) Identification of the species, species group or species mixture.
- (e) If graded as seasoned, the word 'SEASONED' or the letter 'S'.
- (f) If preservative treated, branding in accordance with AS 1604.1.

NOTES:

- 1 Legislation in some States of Australia requires one or more of Items (a) to (f) to be marked on each piece of timber.
- 2 Legislation in some States of Australia requires that if timber is marked with any or all of Items (a) to (f), the timber must comply with that marking.
- 3 Manufacturers making a statement of compliance with a part of the AS 3818 series on product, packaging or promotional material related to that product are advised to ensure that such compliance is capable of being verified.

4.2 INSPECTION

When required by the purchaser, certificates of inspection shall be issued by the inspector. The certification shall indicate the product and grade to which the timber has been inspected, the date and place of inspection and the number of pieces (or volume of timber) inspected. The inspector shall brand each piece with an identifying mark.

4.3 STORAGE AND MAINTENANCE

NOTES:

- 1 Structural timber products covered by this series usually form part of a structure in which they would be expensive and often difficult to replace. It is obviously desirable that timber be carefully and properly stored after purchase and prior to use to avoid degrading the material.
- 2 For heavy engineering structures, a proper inspection and maintenance procedure should be adopted after the structure has been built, to facilitate a long service life for the timbers.
- 3 Ease of inspection for termite and fungal invasion and for maintenance should be considered in design.

APPENDIX A

MEANS OF DEMONSTRATING COMPLIANCE WITH THIS STANDARD

(Informative)

A1 SCOPE

This Appendix sets out the following different means by which compliance with this Standard can be demonstrated by the manufacturer or supplier:

- (a) Evaluation by means of statistical sampling.
- (b) The use of a product certification scheme.
- (c) Assurance using the acceptability of the supplier's quality system.
- (d) Other such means proposed by the manufacturer or supplier and acceptable to the customer.

A2 STATISTICAL SAMPLING

Statistical sampling is a procedure, which enables decisions to be made about the quality of batches of items after inspecting or testing only a portion of those items. This procedure will only be valid if the sampling plan has been determined on a statistical basis and the following requirements are met:

- (a) The sample needs to be drawn randomly from a population of product of known history. The history needs to enable verification that the product was made from known materials at essentially the same time, by essentially the same processes and under essentially the same system of control.
- (b) For each different situation, a suitable sampling plan needs to be defined. A sampling plan for one manufacturer of given capability and product throughput may not be relevant to another manufacturer producing the same items.

In order for statistical sampling to be meaningful to the customer, the manufacturer or supplier needs to demonstrate how the above conditions have been satisfied. Sampling and the establishment of a sampling plan should be carried out in accordance with AS 1199.1, guidance to which is given in AS 1199.0.

A3 PRODUCT CERTIFICATION

The purpose of product certification is to provide independent assurance of the claim by the manufacturer that products comply with the stated Standard.

The certification scheme should meet the criteria described in HB 18.28 in that, as well as full type testing from independently sampled production and subsequent verification of conformance, it requires the manufacturer to maintain effective quality planning to control production.

The certification scheme serves to indicate that the products consistently conform to the requirements of the Standard.

A4 SUPPLIER'S QUALITY MANAGEMENT SYSTEM

Where the manufacturer or supplier can demonstrate an audited and registered quality management system complying with the requirements of the appropriate or stipulated Australian or international Standard for a supplier's quality management system or systems, this may provide the necessary confidence that the specified requirements will be met. The quality assurance requirements need to be agreed between the customer and supplier and should include a quality or inspection and test plan to ensure product conformity.

Information on establishing a quality management system is set out in AS/NZS ISO 9001 and AS/NZS ISO 9004.

A5 OTHER MEANS OF ASSESSMENT

If the above methods are considered inappropriate, determination of compliance with the requirements of this Standard may be assessed from the results of testing coupled with the manufacturer's guarantee of product conformance.

Irrespective of acceptable quality levels (AQLs) or test frequencies, the responsibility remains with the manufacturer or supplier to supply products that conform to the full requirements of the Standard.