

STANDARDS ASSOCIATION OF AUSTRALIA.

Headquarters :

Science House, Gloucester and Essex Streets, Sydney.

AUSTRALIAN STANDARD SPECIFICATION FOR AIRCRAFT MATERIAL
(Emergency Series).AUSTRALIAN TIMBERS FOR USE AS
SUBSTITUTES FOR SITKA SPRUCE

This standard forms one of a series prepared by the Standards Association of Australia at the request of Departments of the Commonwealth Government for particular application in time of national emergency. In appropriate cases these specifications will be reviewed for inclusion in the normal series of Australian standards.

First Issued	-	-	-	-	December, 1942.
Revised	-	-	-	-	February, 1944.

The terms and trade and botanical names used in this specification shall be interpreted in accordance with A.S. No. O.1, Terms and Definitions used in Timber Grading Rules, and A.S. No. O.2, Nomenclature of Australian Timbers.

1. Scope. This specification applies to the selection of timber of Australian origin for use in the manufacture of parts of aircraft which have been designed around the properties of sitka spruce complying with the requirements of British Ministry of Aircraft Production Specification No. D.T.D. 36B.

Note.—This specification should not be used in connection with new designs ; in such cases, timber of normal density complying with the appropriate specification for the species should be used.

The specification is divided into three parts.

(a) Part I describes the requirements for the purchase of raw material intended for subsequent preparation as aircraft material.

- (i) Section 1 applies to clear timber which after subsequent preparation and grading under Part II, may be released for the manufacture of aircraft parts.
- (ii) Section 2 provides for the classification of timber into recutting grades, permitting the inclusion of defects which are prohibited under Section 1, but which will be eliminated prior to or during the manufacture of the aircraft parts.

(b) Part II applies to the preparation and testing of the timber and provides for its classification according to its mechanical properties.

- (i) Section 3 applies to the preliminary preparation and inspection of rough timber supplied under Part I.
- (ii) Sections 4, 5, and 7 apply to the test requirements for material suitable for direct substitution for the equivalent grades of spruce provided for in D.T.D. 36B.
- (iii) Section 6 applies to the test requirements for material suitable for use as a substitute for Grade A spruce in stressed parts which are not subject to high impact loading or stress concentrations.

(c) Part III applies to the final inspection of timber included in the finished parts.

2. Timbers. The timber supplied shall be as specified by the purchaser and shall be one of the following species :

hoop pine
bunya pine
Queensland maple
bollywood
silver quandong
silver silkwood

PART I.

Section 1. Rough Timber.

3. **Rough Timber.** Rough timber supplied for grading under Part II of this specification shall comply with the requirements of Section 1 of the appropriate Australian emergency standard for the species, except that the slope of the grain, as determined by the splitting test, shall not exceed 1 in 15.

NOTE.—If on dressing timber accepted under this section it is found that the slope of the grain exceeds 1 in 15 but is not greater than 1 in 12, such pieces may be used in laminated constructions, provided that the thickness of the laminae does not exceed $\frac{3}{8}$ in.

4. **Marking.** Timber supplied under this section shall be marked in the manner directed by the purchaser.

Section 2. Recutting Classes.

5. **Recutting Classes.** A plank which fails to comply with the requirements of Section 1 because of the occurrence of prohibited defects other than compression wood, may be released as recutting quality timber, provided that the maximum number of faults to be eliminated from the plank does not exceed one per 4 sq. ft. of face area of the plank. A fault shall be any prohibited defect or group of prohibited defects occurring in an area not exceeding 36 sq. in. per 4 sq. ft. of face area.

The above provision does not apply to planks containing compression wood, which shall be rejected. A plank may also be rejected if in the opinion of the inspector the faults will affect the use of the plank.

Planks shall be classified according to the percentage of recoverable timber they contain, as follows:

- (a) Class 1 timber shall yield in one piece 100% of timber complying with Section 1.
- (b) Class 2 timber shall yield not less than 80% of timber complying with Section 1 in cuttings 6 ft. or longer and 3 in. or wider.
- (c) Class 3 timber shall yield not less than 60% of timber complying with Section 1 in cuttings 6 ft. or longer and 3 in. or wider.

6. **Marking.** Timber supplied under this section shall, if of Class 2 or Class 3, be marked with the percentage recovery applicable to the class to which the plank conforms.

PART II.

7. Timber supplied under Part I of this specification shall comply with the appropriate provisions of this part before being released for the manufacture of aircraft parts.

8. **Tests—General.** Unless otherwise specified herein, test specimens shall be selected and prepared and the tests carried out in the manner described in A. S. No. (E)CD.800—1944, Standard Methods of Testing Timber for Aircraft Construction.

Unseasoned timber may be submitted for testing. Under these circumstances the visual inspection required under Clause 12 below shall be made after seasoning.

9. **Re-tests.** A plank which does not comply with the test requirements applicable to a particular grade of timber may be sawn down the wide face. If on re-test one part then complies with these requirements that part may be released as that grade.

10. **Marking.** Each plank accepted under this part shall be stamped with the following particulars:

- (a) the supplier's name or distinguishing mark,
- (b) the number of this specification (A.S. No. (E)2D.811—1944),
- (c) the timber species,
- (d) the grade of timber (Grade A Mech., Grade A2 Mech., Grade B Mech., or Grade C Mech., as appropriate),
- (e) the inspector's stamp.

Section 3. Preparation of Rough Timber.

11. **Seasoning.** The timber shall be either air-dried or kiln-dried to the moisture content specified; if kiln-dried, the operation shall be carried out under approved supervision in accordance with the appropriate schedule in the specification for the species.¹

12. **Visual Inspection.** After seasoning, every plank shall be inspected to ensure that it complies with the requirements of Part I.

¹If, however, in the opinion of the inspector, the quality of the timber would be improved by the use of a milder schedule, lower temperatures and/or smaller wet bulb depressions may be used until the moisture content of the wettest sample plank reaches 30%.

Section 4. Grade C Mech. Timber.

13. Timber which complies with Part I shall, after preparation in accordance with the provisions of Section 3, comply with the further provisions of this section before being released as Grade C Mech. timber.

14. **Moisture Content.** The moisture content of every plank shall be determined by means of an approved electrical moisture meter. Tests shall be made at points approximately 18 in. from each end and at the mid-length. The three readings shall be between 15% and 10% and the individual readings shall not vary by more than 2% moisture content in any one plank.

NOTES.— (i) Notwithstanding the above provisions, the moisture content of the timber in an air-seasoning stack or kiln charge which has been seasoned under approved conditions may be determined from representative samples selected from the air stack or kiln charge at the discretion of the inspector, and the moisture content so determined shall be accepted as the moisture content of the stack or charge as a whole.

However, if when this procedure is adopted any sample plank should fail to comply with the requirements of Clause 14, all of the planks in the stack or kiln charge represented by that sample shall be tested.

(ii) In the event of a dispute, the moisture content as determined by the electrical moisture meter may be checked by the oven-drying method described in Appendix A, and the value so obtained shall be adopted.

15. **Density.** The density of every plank shall be determined, and shall be between the maximum and minimum values given in Table I for the appropriate moisture content.

TABLE I.

Moisture Content ²	Density	
	Maximum	Minimum
%	lb. per cu. ft.	lb. per cu. ft.
10	31	23
11	31	24
12	31	24
13	32	24
14	32	24
15	32	24
16	32	24
17	32	24
18	32	24
19	32	24
20	33	25

Section 5. Grade B Mech. Timber.

16. Timber which complies with the requirements of Section 4 shall comply with the further requirements of this section before being released as Grade B Mech. timber.

17. **Brittleness Test.** A determination of brittleness shall be carried out on specimens from each plank. No specimen shall have an Izod value less than 4 ft. lb.

18. **Compression Strength Parallel to Grain.** The compression strength parallel to the grain shall be determined for every plank. The ultimate compression strength of the timber shall be not less than the value specified in Table II for the appropriate moisture content.

TABLE II.

Moisture Content ²	Compression Strength Parallel to Grain.
%	lb. per sq. in.
10	5,000
11	4,800
12	4,600
13	4,400
14	4,200
15	4,000
16	3,800
17	3,600
18	3,400
19	3,200
20	3,000

Section 6. Grade A2 Mech. Timber.

19. Timber which complies with the provisions of Section 5 shall comply with the further provisions of this section before being released as Grade A2 Mech. timber.

²Moisture content as determined by the oven-drying method.

20. Brittleness Test. The Izod value of the timber, determined by the brittleness test described in Clause 17, shall be not less than 4 ft. lb.

21. Compression Strength Parallel to Grain. The ultimate compression strength of the timber, determined by the test described in Clause 12, shall be not less than the value specified in Table III for the appropriate moisture content.

TABLE III.

Moisture Content ²	Compression Strength Parallel to Grain
%	lb. per sq. in.
10	6,300
11	6,000
12	5,700
13	5,400
14	5,200
15	5,000
16	4,800
17	4,500
18	4,300
19	4,200
20	4,000

Section 7. Grade A Mech. Timber.

Note.—This grade of timber should be specified only for parts in which its use is absolutely essential. It is recommended that Grade A2 Mech. timber be used in all parts for which Grade A spruce is specified which are not subject to high impact loading or stress concentrations.

22. Timber which complies with the provisions of Section 6 shall comply with the further provisions of this section before being released as Grade A Mech. timber.

23. Brittleness Test. The Izod value of the timber, determined by the brittleness test described in Clause 17 above, shall be not less than 5 ft. lb.

PART III.

Section 8. Aircraft Quality Timber.

23. Timber which complies with Sections 4, 5, 6 or 7 shall comply with the further provisions of this section before being released as Grade C, B, A2 or A aircraft quality timber.

The inspection required under Clause 24 shall be made during and/or at the completion of the manufacture of the aircraft parts to ensure that any faults in the timber permitted under Section 2 are completely eliminated from the final products.

24. Quality. The timber in the finished parts shall be free from obvious and incipient decay, knots, shakes, splits, seasoning checks, internal checks, brittle heart, compression failures, compression wood, figured grain, gum veins, resin and bark pockets, pith streaks, callus tissue, insect attack, wane or want, blemishes due to handling and other injuries. The presence of the following imperfections will be at the discretion of the inspector:

- (a) (i) For hoop pine and bunya pine, pin knots and/or needle traces: not exceeding $\frac{1}{32}$ in. dia. and not closer than 2 in.;
- (ii) For timber other than hoop pine and bunya pine, pin-knots: not exceeding $\frac{1}{8}$ in. dia. and not closer than 2 in. nor more than six in any 1 sq. ft. of face area;
- (b) pin-holes: not exceeding $\frac{1}{16}$ in. dia. and not closer than 2 in. nor more than six in any 1 sq. ft. of face area;
- (c) where applicable, sloping grain as determined by the splitting test—
 - (i) in material in solid constructions and in laminated constructions in which the thickness of the laminae exceeds $\frac{7}{8}$ in.: not exceeding 1 in 15;
 - (ii) in laminated constructions in which the thickness of the laminae does not exceed $\frac{7}{8}$ in.: not exceeding 1 in 12.

25. Marking. The finished part shall be marked in the manner directed by the inspector.

For the purposes of this specification the term "Inspector" shall be interpreted in the manner directed by the Australian Airworthiness Authority concerned.

This specification, prepared by the Special Committee on Aircraft Materials and Components, was approved on behalf of the Council of the Association on 24th January, 1944.

NOTE.

In order to keep abreast of progress in the industries concerned, Australian standards are subject to periodical review. Suggestions for improvement, addressed to the Headquarters of the Association, will be welcomed.

²Moisture content as determined by the oven-drying method.