FEBRUARY, 1944

EMERGENCY STANDARD
No. (E)3D.803—1944
(Superseding No. (E)2D.803—1941)

STANDARDS ASSOCIATION OF AUSTRALIA.
Headquarters :
Science House, Gloucester and Essex Streets, Sydney.

AUSTRALIAN STANDARD SPECIFICATION FOR AIRCRAFT MATERIAL

(Emergency Series).

HOOP PINE

and

BUNYA PINE

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	September, 1940.
Revised	November, 1941.
Second Revision	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 for aircraft construction.

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) Section 4 applies to the test requirements for material for parts the strength and stiffness of which do not affect the safety of the aircraft.

(iii) Section 5 applies to the test requirements for material for those portions of the aircraft structure the loads of which are laid down in the airworthiness requirements or failure of which would endanger the safety of the aircraft.

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

PART I.

Section 1. Rough Timber.

2. Condition. The timber may be rough or dressed, green or dry.

3. Dimensions. The timber shall be in the form of selected planks 2 in. or less in thickness.

Price 1/–, *post free* 1/2.

4. Quality. The timber shall be free from obvious and incipient decay, blue stain, knots, shakes, splits, seasoning checks, internal checks, compression failures, compression wood, resin and bark pockets, pith streaks, callus tissue, insect attack, wane or want, blemishes due to handling and other injuries, but the following imperfections will be permitted :

(*a*) pin-knots and/or needle traces : not exceeding $\frac{1}{32}$ in. dia. and not closer than 2 in. ;

(*b*) sloping grain as determined by the splitting test : not exceeding 1 in 20 ;

(*c*) spring : not exceeding 1 in 576 ($\frac{1}{4}$ in. in 12 ft.) ;

(*d*) bow : not exceeding 1 in 288 ($\frac{1}{2}$ in. in 12 ft.) ;

(*e*) twist : not exceeding $\frac{1}{4}$ in. in 10 sq. ft. of face area.

5. Colour. The timber shall be of a uniform colour.

6. Density. Although no tests are required on material accepted under this section, it is desirable that the timber shall weigh less than 40 lb. per cu. ft. when dried to a moisture content of 15%.

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

Section 2. Recutting Classes.

8. Recutting Classes. A plank which fails to comply with the requirements of Section 1 because of the occurrence of defects (other than compression wood) prohibited under Clause 4, 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.

9. 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.

10. 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.

11. 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 15 below shall be made after seasoning.

12. 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.

13. 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)3D.803—1944),

(*c*) the grade of timber (Grade A Mech. or Grade B Mech. as appropriate),

(*d*) the inspector's stamp.

Section 3. Preparation of Rough Timber.

14. 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 Appendix A.[1]

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

Section 4. Grade B Mech. Timber.

16. 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 B Mech. timber.

17. 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 17, 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 and the value so obtained shall be adopted.

18. Density. The density of every plank shall be determined and shall be between 29 and 38 lb. per cu. ft.

19. Brittleness Test. A determination of brittleness shall be carried out on specimens from each plank. No specimen shall have an Izod value less than the value specified in Table I for the appropriate moisture content.

TABLE I.

Moisture Content[2]	Izod Value
%	ft. lb.
10	5
11	4¾
12	4½
13	4¼
14	4
15	4
16	4
17	4¼
18	4¾
19	5½
20	6½

Section 5. Grade A Mech. Timber.

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

21. Brittleness Test. The Izod value of the timber, determined by the brittleness test described in Clause 19, shall be not less than the value specified in Table II for the appropriate moisture content.

22. Compression Strength Parallel to Grain. The compression strength parallel to the grain shall be determined for every plank, and shall be not less than the value specified in Table II for the appropriate moisture content.

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[1]If, 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%.

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

TABLE II.

Moisture Content[2]	Izod Value	Compression Strength Parallel to Grain
%	ft. lb.	lb. per sq. in.
10	5¾	8,400
11	5½	8,100
12	5	7,700
13	4¾	7,300
14	4½	7,000
15	4½	6,700
16	4½	6,400
17	4¾	6,100
18	5½	5,800
19	6½	5,600
20	7½	5,300

PART III.

Section 6. Aircraft Quality Timber.

23. Timber which complies with Section 4 or Section 5 shall comply with the further provisions of this section before being released as Grade B or Grade 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, blue stain, knots, shakes, splits, seasoning checks, internal checks, compression failures, compression wood, 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*) pin knots and/or needle traces : not exceeding $\frac{1}{32}$ in. dia. and not closer than 2 in.

(*b*) where applicable, sloping grain as determined by the splitting test : not exceeding 1 in 20.

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

APPENDIX A.

Kiln-Drying Schedules for Hoop Pine and Bunya Pine.

(*a*) *Up to* 1 *in.—Mixed Sawn.*

Moisture Content Change-points (moisture content of wettest sample plank)	Dry Bulb Temperature	Wet Bulb Depression	Remarks
	°F.	°F.	
Green	140	10	
40%	150	15	
30%	160	20	
12%	160	12	Maintain this High Humidity Treatment for 48 hours.

(*b*) *Over* 1 *in. and up to* 2 *in.—Mixed Sawn.*

Moisture Content Change-points (moisture content of wettest sample plank)	Dry Bulb Temperature	Wet Bulb Depression	Remarks
	°F.	°F.	
Green	130	7	
40%	140	12	
30%	150	17	
25%	160	20	
12%	160	12	Maintain this High Humidity Treatment for 48 hours.

NOTES.— (i) Seven sample planks, which shall be representative of the stock in the kiln charge, and no two of which are prepared from the same length of timber, shall be included in each kiln charge and shall be well distributed throughout the charge.

(ii) The moisture content change-points shall be determined by the moisture content of the wettest of the sample planks.

(iii) For stock which has been partly air-dried, the initial kiln-drying conditions used shall be those shown as applicable to the appropriate moisture content change-point. Should the moisture content of the stock lie between two of the change-points shown, the kiln-drying conditions used shall be those applicable to the wetter of the two change-points.

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

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.

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