

**SPECIFICATION —
TIMBER FOR USE IN AIRCRAFT
PROPELLERS**

EFFECTIVE: Forthwith

SUB-SECTIONS

- | | |
|-----------------------------|----------------------------|
| 1 — Applicability | 6 — Density |
| 2 — Approved timbers | 7 — Brittleness |
| 3 — Quality | 8 — Marking |
| 4 — Seasoning | Appendixes I and II |
| 5 — Moisture content | |

1 — APPLICABILITY

This Section of Air Navigation Orders specifies the requirements to be observed in the selection of timber for use in the manufacture of laminated wooden propellers.

2 — APPROVED TIMBERS

Approved types of timber are listed in Appendix I. The Secretary may approve additional types on the provision of satisfactory evidence regarding their suitability for use in propellers.

3 — QUALITY

3.1 — The timber shall be clearly identified with respect of species and shall be of known origin.

3.2 — The timber shall be in the form of selected planks which shall be free from warp. Sloping grain is permitted but not exceeding one in twelve, as determined by the splitting test or alternatively as described in Appendix II.

Note: Deviation of grain due to knots of permissible size may be disregarded.

3.3 — The timber shall be clean and free from obvious and incipient decay and from knots, shakes, splits, seasoning checks, internal checks, fractures, brittle heart, compression failures, bark pockets, gum pockets or gum veins, callus tissue, insect attack, wane or want, but the following imperfections are permitted:

- (a) pin-knots not exceeding 3 mm diameter and not closer than 50 mm;
- (b) pin-holes not exceeding 1.5 mm diameter, not more than three in any 10 000 sq. mm of surface area and no two of which are closer than 50 mm to each other; and
- (c) small, isolated imperfections which do not significantly affect the strength of the timber, such as wavy grain, interlocked grain, flecks, spots, fine drying checks and blemishes.

4 — SEASONING

The timber shall have been either air-dried or kiln-dried to a moisture content within the limits specified in sub-section 5. Mountain ash and alpine ash after seasoning to twelve per cent moisture content shall be reconditioned for six hours at 100°C (saturated conditions) following which the material shall be air or kiln dried to the requirements of sub-section 5.

5 — MOISTURE CONTENT

The moisture content of each plank shall be determined by means of an electrical resistance type moisture meter or other approved method. Tests shall be made at points approximately 300 mm from each end and at the mid length. The three readings shall lie between ten per cent and fifteen per cent and the individual readings shall not vary more than two per cent moisture content in any one plank. The average moisture content shall not vary more than three per cent between planks.

Note: An acceptable alternative method of determining moisture content is given in Appendix II.

6 — DENSITY

With a moisture content within the limits specified in sub-section 5, the measured density of each plank shall not be less than the value given in Appendix I for the particular timber.

Note: An acceptable method for determining density is given in Appendix II.

7 — BRITTLENESS

In order to detect brittleness, two samples from each plank shall be tested for impact resistance in an Izod testing machine. The Izod values obtained for the standard specimen shown in Figure I of Appendix II shall not be less than 6.5 Joules.

Note: Details of the Izod test method are given in Appendix II. This test may be carried out by the propeller manufacturer subject to approval by the Secretary.

8 — MARKING

Each plank accepted as complying with this specification shall be ink stamped with the following particulars:

- (a) the standard name of the timber (i.e. Maple, Queensland; Coachwood; Mahogany, Honduras etc); and
- (b) the number — ANO 108.29.

APPENDIX I

TIMBERS APPROVED FOR USE IN AIRCRAFT PROPELLERS

TIMBERS	MINIMUM DENSITY Kilograms/cubic metre
1 — Ash, Mountain/Ash Alpine (<i>Eucalyptus regnans</i>)/ (<i>Eucalyptus delegatensis</i>)	601
2 — Ash, Silver, Northern (<i>Flindersia pubescens</i>)	633
3 — Ash, Silver Queensland (<i>Flindersia bourjotiana</i>)	577
4 — Beech, Myrtle (<i>Nothofagus cunninghamii</i>)	671
5 — Birch, White (<i>Schizomeria ovata</i>)	604
6 — Bollywood (<i>Litsea reticulata</i>)	449
7 — Coachwood (<i>Ceratopetalum apetalum</i>)	577
8 — Mahogany Honduras (<i>Swietenia macrophylla</i>)	513
9 — Maple, Queensland (<i>Flindersia brayleyana/pimenteliana</i>)	513
10 — Oak, Silky Southern (<i>Grevillea robusta</i>)	615
11 — Pine, Bunya (<i>Araucaria bidwillii</i>)	420
12 — Pine, Hoop (<i>Araucaria cunninghamii</i>)	455
13 — Pine, Klinki (<i>Araucaria hunsteinii</i>)	385
14 — Sassafras (<i>Doryphora sassafras</i>)	543
15 — Spruce, Sitka (<i>Picea sitchensis</i>)	384

APPENDIX II

A — ALTERNATIVE METHOD FOR THE DETERMINATION OF SLOPE OF GRAIN

The direction of splitting is probably the best guide to the slope of the grain. Splinters prised out from the surface of a piece of wood with a pocket knife will also reveal the grain direction and a drop of ink placed on a face of the piece of wood will spread most readily in the direction of the grain. A swivel handled scribe may also be used to determine the slope of grain in wood.

For further information see 'Sloping Grain in Timber' Trade Circular No. 48 published by the former Division of Forest Products, and available from the Division of Building Research, Commonwealth Scientific and Industrial Research Organisation.

B — ALTERNATIVE METHOD FOR THE DETERMINATION OF MOISTURE CONTENT

Take a small sample of the timber from the appropriate position, weigh it (W_1) to an accuracy of one per cent of its weight and then desiccate it in an oven at a temperature of 100-105°C until the weight is constant (W_0), taking great care to prevent any change in moisture content between the cutting of the sample and the first weighing and also between removal from the oven and the subsequent weighing.

Calculate the moisture content as follows:

$$\text{Moisture content, per cent} = \frac{100(W_1 - W_0)}{W_0}$$

C — METHOD FOR THE DETERMINATION OF DENSITY

Cleanly cut a sample, approximately 2.5 cm long and of the full cross-section of the board or plank, from each end of the piece at a position clear of weathering, where the moisture content is known or is about to be determined.

Make a series of measurements of the length, width and thickness of each sample, obtain the arithmetic mean of each dimension and calculate the volume (V) of the samples in cubic centimetres. From each sample take the weight (W) in grams to an accuracy of \pm one per cent of its weight.

Calculate the density as follows:

$$\text{Density} = \frac{1000W}{V} \text{ kilograms per cubic metre}$$

where — W is in grams

V is in cubic centimetres.

D — BRITTLENESS (IZOD) TEST

Test specimens.

Two samples shall be cut from diagonally opposite edges from one end of the plank. A notched specimen the sides of which are cut radially and tangentially, of the form and dimensions shown in Figure 1 shall be prepared from each of the samples.

Procedure.

The test specimens shall be broken in an Izod impact testing machine, the blow being applied in the direction tangential to the growth rings. The testing machine shall be of a type which will permit the test results being determined to within 0.3 Joule.

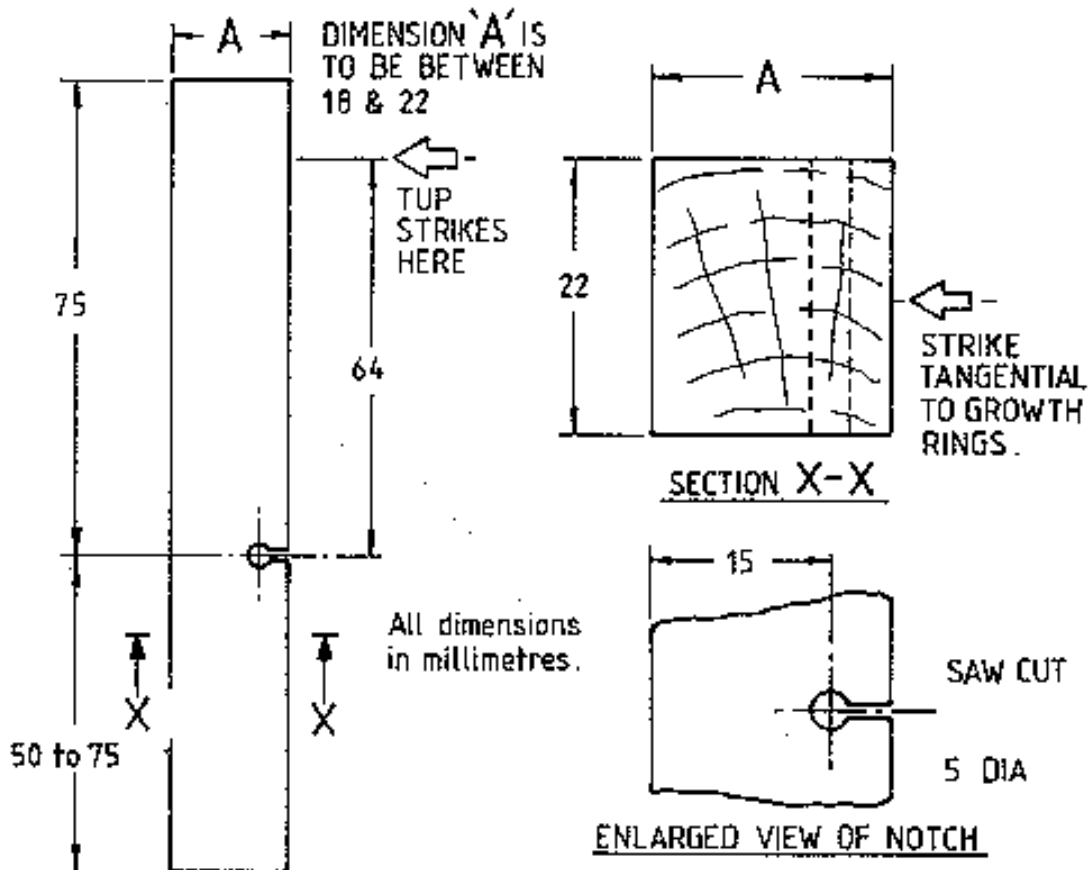


FIG. 1 IMPACT TEST SPECIMEN