



Australian Government

Civil Aviation Safety Authority

I, WILLIAM BRUCE BYRON, Director of Aviation Safety, on behalf of CASA, make this instrument under subregulation 36A (2) of the *Civil Aviation Regulations 1988*.

[Signed Bruce Byron]

Bruce Byron

Director of Aviation Safety and
Chief Executive Officer

19 December 2007

Civil Aviation Order 108.29 Instrument 2007

1 Name of instrument

This instrument is the *Civil Aviation Order 108.29 Instrument 2007*.

2 Commencement

This instrument commences on the day after it is registered.

3 New Civil Aviation Order 108.29

Civil Aviation Order 108.29 is repealed and a new Civil Aviation Order 108.29 substituted as set out in Schedule 1.

Schedule 1 Civil Aviation Order 108.29

Specification — timber for use in aircraft propellers

1 Application

This Civil Aviation Order 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 Director may approve additional types on the provision of satisfactory evidence regarding their suitability for use in propellers.

3 Quality

- 3.1 The timber must be clearly identified with respect of species and must be of known origin.
- 3.2 The timber must be in the form of selected planks which must be free from warp. Sloping grain is permitted but not exceeding 1 in 12, 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 must 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 3 in any 10 000 sq mm of surface area and no 2 of which are closer than 50 mm to each other;
 - (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 must have been either air-dried or kiln-dried to a moisture content within the limits specified in subsection 5. Mountain ash and alpine ash after seasoning to 12% moisture content must be reconditioned for 6 hours at 100°C (saturated conditions) following which the material must be air or kiln dried to the requirements of subsection 5.

5 Moisture content

The moisture content of each plank must be determined by means of an electrical resistance type moisture meter or other approved method. Tests must be made at points approximately 300 mm from each end and at the mid length. The 3 readings must lie between 10% and 15% and the individual readings must not vary more than 2% moisture content in any 1 plank. The average moisture content must not vary more than 3% 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 subsection 5, the measured density of each plank must 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, 2 samples from each plank must 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 must 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 Director.

8 Marking

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

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

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 1% of its weight and then desiccate it in an oven at a temperature of 100°C-105°C until the weight is constant (W_o), 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:

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

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 $\pm 1\%$ of its weight.

Calculate the density as follows:

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

where: — W is in grams

V is in cubic centimetres.

D — Brittleness (Izod) test

Test specimens

Two samples must be cut from diagonally opposite edges from 1 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 must be prepared from each of the samples.

Procedure

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

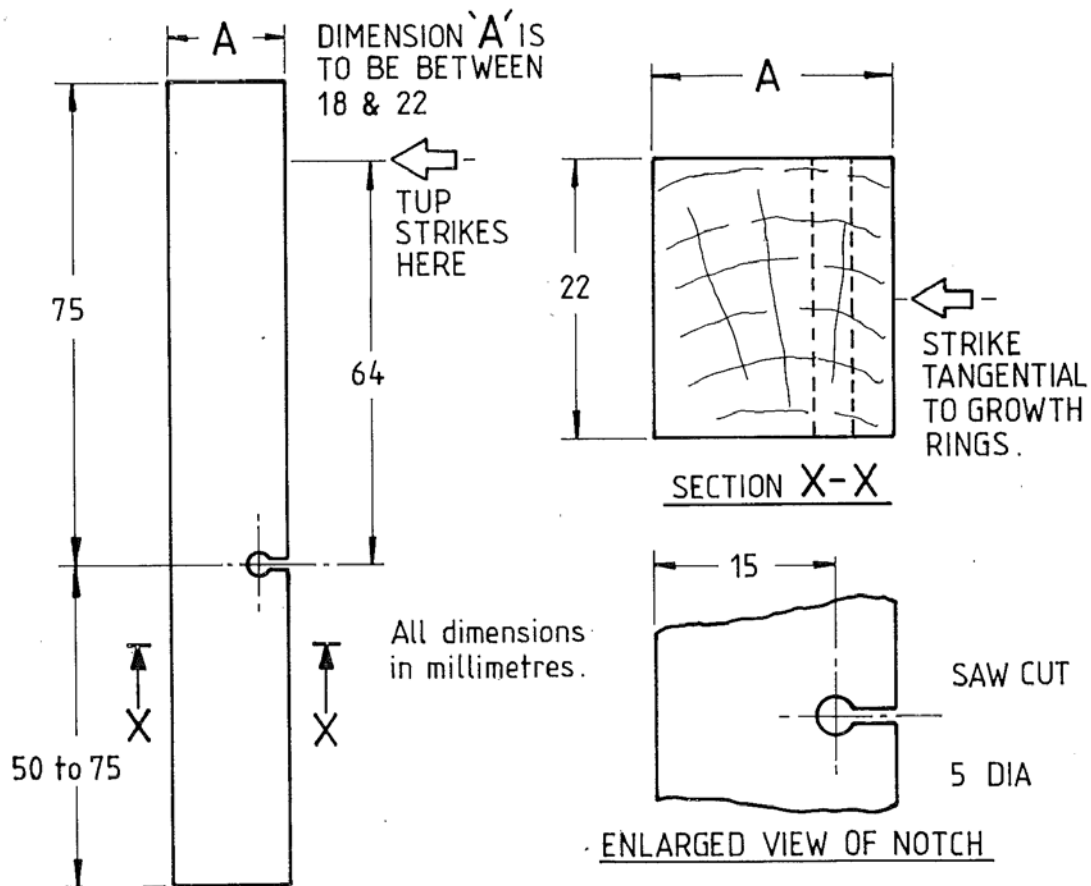


Figure 1 — Impact test specimen