

STANDARDS ASSOCIATION OF AUSTRALIA.

Headquarters :

Science House, Gloucester and Essex Streets, Sydney.

AUSTRALIAN STANDARD SPECIFICATION FOR AIRCRAFT MATERIAL
(Emergency Series)

FREE MACHINING BRIGHT STEEL BARS

This standard forms one of a series prepared by the Standards Association of Australia at the request of Departments of the Commonwealth Government for use in relation to the supply of materials required for defence purposes. In appropriate cases these specifications will be reviewed for inclusion in the normal series of Australian standards.

1. Chemical Composition.

(a) The chemical composition of the steel shall be :

Carbon	...	...	...	...	...	0.20 per cent. (max.)
Manganese	...	...	...	...	...	1.2 to 1.65 per cent.
Phosphorus	...	...	...	...	...	0.06 per cent. (max.).
Sulphur	...	...	...	...	...	0.20 to 0.30 per cent.
Silicon	...	...	...	...	...	0.30 per cent. (max.).

(b) The complete analysis of every cast shall be supplied by the steel-maker.

2. Manufacture. All surface defects in the blooms, billets or bars which might produce defects in the bars made therefrom shall be removed by rough machining, chipping, grinding or scarfing.

3. Condition. The bars shall be delivered in the bright drawn condition. They may, however, at the manufacturer's option be re-heated after cold working to a temperature not exceeding 620° C. Any heat-treatment must be carried out without forming on the bars a scale of measurable thickness.

4. Freedom from Defects. All bars shall be clean and free from surface defects of manufacture.

5. Margins of Manufacture.

(a) Margins of manufacture, when required, shall be in accordance with the order to the steel-maker.

(b) All bars shall be delivered straight.

6. Selection and Preparation of Test Samples.

(a) Bars from the same cast shall be grouped in parcels of 100 or part thereof.

(b) One test sample shall be cut from one bar selected from each parcel; test pieces shall be cut from this sample for the tensile and bend tests specified in Clause 7.

(c) One tensile test piece shall be prepared from each sample to the dimensions shown in the latest issue of British Standard Specification No. A.4, and shall not be further heat-treated or mechanically worked before testing.

(d) For bars under $1\frac{1}{2}$ in. diameter or width across flats, the tensile test pieces shall be machined concentrically from the test sample.(e) For bars $1\frac{1}{2}$ in. diameter or width across flats and over, the longitudinal axis of the tensile test piece shall be not less than $\frac{9}{16}$ in. from the surface of the test sample.

(f) Should any test piece break outside the middle half of the gauge length, the test may be discarded and another test made.

(g) One bend test piece shall be prepared from each sample. Bars over $\frac{3}{4}$ in. diameter or width across flats may be reduced to $\frac{3}{4}$ in. diameter for this test.

(h) All test pieces shall be marked in such a way as will positively identify them with the parcel of material they represent.

7. Mechanical Properties. Test pieces selected and prepared in accordance with Clause 6 shall comply with the following tests :

(a) *Tensile Test.*

Ultimate tensile strength not less than 28 tons per sq. in.

Elongation on gauge length $4\sqrt{A}$; , , , 14 per cent.

(b) *Bend Test.* Bend test pieces shall withstand a bend through 180° over a radius equal to the diameter or width across flats of the test pieces without showing signs of cracking.

8. Re-tests and Rejection of Material.

(a) If any test piece fails to meet the requirements of Clause 7 :

- (i) the manufacturer may withdraw the parcel represented by the test piece, or
- (ii) two further samples from the same parcel may be selected, one sample of which shall be from the bar from which the original test piece was taken unless that bar has been withdrawn by the manufacturer ; if either sample fails to meet the requirements of Clause 7, the parcel shall be rejected, or
- (iii) the manufacturer may heat-treat and re-submit the parcel for inspection and testing.

(b) Any bar may be rejected for faults in manufacture notwithstanding that it has been passed previously for chemical composition and physical properties.

9. Identification.

(a) Each bar shall be colour identified in accordance with the provisions of Australian Standard No. (E) D.500*.

(b) All bars under 1 in. nominal dimension shall be wired up in bundles, to each of which shall be securely attached a durable tag bearing such marks as will ensure identification of the bars with this specification, with the cast number and with the manufacturer.

(c) Each bar 1 in. and over in any sectional dimension shall be stamped near one end or marked on the colour band with such marks as will ensure identification of the bars with this specification, with the cast number and with the manufacturer.

*A.S. No. (E) D. 500, " Colour Identification of Metallic Materials for Aircraft," in course of preparation.

This specification, prepared by the Special Committee on Aircraft Materials and Components, was approved on behalf of the Council of the Association on 16th April, 1942.

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.