

STANDARDS ASSOCIATION OF AUSTRALIA.

Headquarters :

Science House, Gloucester and Essex Streets, Sydney.

AUSTRALIAN STANDARD SPECIFICATION FOR AIRCRAFT MATERIAL
(Emergency Series)

NATURAL RUBBER PRODUCTS

For Use in Conjunction with Castor-Base Hydraulic Fluid

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.

SCOPE.

1. **Scope.** This specification applies to articles made of natural rubber for use in positions where they will be in intermittent or continuous contact with fluid complying with the latest issue of Australian Standard No. (E)D. 2101, "Fluid for Hydraulic and Shock-Absorber Mechanisms (Castor Oil Base)".

MANUFACTURE.

2. **Composition.** In the finished articles the rubber compound shall contain not less than 65% by volume of pure natural rubber and not more than 0.3% of free sulphur.

3. **Manufacture.**

(a) The finished articles shall be of uniform dimensions within the tolerances specified on the relevant drawings.

(b) The articles shall be properly vulcanised and shall comply with the hardness requirements specified on the drawings.

(c) The surfaces of the articles shall be smooth and free from porosity and all defects of manufacture.

TYPE TESTS.

4. **Type Tests.**

(a) Before any manufacturer's type of rubber product manufactured to this specification is approved for use in aircraft, it shall have passed the type tests specified in Clauses 6 and 7 to the satisfaction of the Airworthiness Authority concerned.

(b) In the event of a manufacturer making any specific change in his method of manufacture, either in the formula of the rubber or in the time of curing, the products shall pass a further series of type tests in accordance with Clauses 6 and 7 before being approved for use.

5. **Type Test Samples.** The manufacturer shall provide an adequate number of samples to enable the following type tests to be carried out.

6. **Composition.** The content of free sulphur in the finished products shall comply with the requirement specified in Clause 2.

7. **Ageing Test.** Samples shall be maintained at a temperature of 100° C. ± 2° C. for a period of 48 hours in air, and at the end of this period shall show no embrittlement, cracking, stickiness or marked increase in hardness.

ROUTINE TESTS.

8. Selection of Test Samples.

(a) The inspector shall select at random 1% of the articles in any batch or consignment for testing in accordance with this specification, provided that the number of samples selected shall be not less than two, or

(b) at the request of the inspector, the manufacturer shall prepare at the same time as the articles and from the same material one test sample for each mill batch of rubber to represent the material in that batch.

9. **Hardness Test.** The samples, selected in accordance with Clause 8, shall each comply with the hardness requirements specified in Clause 3 (b).

10. **Swelling Test.** Each of the samples selected in accordance with Clause 8 shall be subjected to the swelling test described in Appendix A. The percentage increase in volume of each sample shall not exceed 25%.

11. **Visual Inspection after Swelling.** At the completion of the swelling test each sample shall be subjected to a visual inspection and shall show no signs of deterioration such as tackiness, cracking or distortion.

12. **Re-tests.** Should any sample fail to comply with the requirements specified in Clauses 9, 10 and 11, a further set of samples consisting of 1% of the articles in the batch or consignment represented by that sample shall be selected at random and tested in the same manner. In the event of any further failure occurring, all of the articles in that batch or consignment shall be rejected.

NOTE.—Re-tests shall not be carried out on samples prepared in accordance with Clause 8 (b).

13. **Packing and Marking.** Articles of the same type and from the same batch shall be grouped in parcels. Each parcel shall bear a tag on which shall be clearly marked the following information :

- (i) the number of this specification,
- (ii) the manufacturer's name or distinguishing mark,
- (iii) the purchaser's part or identification number,
- (iv) the manufacturer's release note number,
- (v) the inspector's stamp.

APPENDIX A.

Method of Determining Swelling.

The initial water displacement of the sample shall be determined by weighing it in air (W_1) and in distilled water at room temperature (W_2), the difference between W_1 and W_2 being the weight of the water displaced by the sample. The sample shall then be blotted dry with filter paper, after which it shall be completely immersed for a period of 72 hours in a quantity of at least 20 times its own volume of *n*-butyl alcohol contained in a suitable covered vessel, and maintained at a temperature of $82^\circ \text{C.} \pm 2^\circ \text{C.}$ The alcohol shall comply with the latest issue of British Standard No. 508, "Normal Butyl Alcohol (Butanol)". At the end of the immersion period the sample shall be cooled to room temperature, removed from the vessel and blotted lightly with filter paper.

The water displacement of the sample shall again be determined by weighing in air (W_3) and distilled water (W_4), the difference between W_3 and W_4 being the weight of the water displaced after swelling.

Assuming that 1 ml. of distilled water weighs 1 g., the increase in volume shall be calculated as follows :

$$\text{Percentage increase in volume} = \frac{(W_3 - W_4) - (W_1 - W_2)}{(W_1 - W_2)} \times 100$$

where W_1 = initial weight in air.

W_2 = " " " " water.

W_3 = weight in air after immersion.

W_4 = " " " " water after "

NOTES.—(i) The weights shall be determined to the nearest milligram.

(ii) In the determination of the weight in water care shall be taken to ensure that all air bubbles adhering to the surface of the specimen are removed before the weight is established.

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 22nd May, 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.