

STANDARDS ASSOCIATION OF AUSTRALIA

Headquarters :

Science House, Gloucester and Essex Streets, Sydney.

AUSTRALIAN STANDARD SPECIFICATION FOR AIRCRAFT MATERIAL
(Emergency Series)

MERCERISED COTTON FABRIC

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 mercerised cotton fabric for use as a covering on aircraft.

MATERIAL.

2. **Quality of Yarn.** The yarn used in the manufacture of the fabric shall be evenly spun from good quality combed cotton and shall be mercerised under tension. It shall be gassed, or alternatively, the finished material shall be singed.

The yarn shall be twofold, and shall be free from avoidable defects.

3. **Sizing.** It is recommended that the fabric be woven from unsized warps, but should sizing be necessary the size shall be free from paraffin wax or other unsaponifiable matter.

The size content shall not exceed 2½% of the initial weight of the fabric.

MANUFACTURE.

4. **Weave Details.** The weave shall be plain and uniform and the fabric shall be as free as possible from oil spots and defects of finishing and weaving.

The ends and picks per inch in the finished fabric shall be not less than 80 and 78 respectively. The selvages shall be even and shall have the same tension as the remainder of the fabric.

5. **Width.** The width of the fabric shall be either 42 in. or 58 in., as specified by the purchaser.

The actual width of the fabric shall not differ from the specified width by more than $\frac{3}{4}$ in. in the case of the 42 in. material nor more than 1 in. in the case of the 58 in. material.

6. **Breaking Strength.** The breaking strength shall be not less than 80 lb. per in. width of warp or weft.

7. **Weight.** The weight of the fabric shall not be greater than 4½ oz. per sq. yd.

INSPECTION, IDENTIFICATION AND DELIVERY.

8. **Inspection and Marking.** The fabric shall be closely inspected over the whole length of each roll and accepted material shall be marked by the inspector at the end of each roll. Defects shall be marked by inserting in the selvage opposite each defect a short piece of thread dyed fast red.

9. **Identification.** One warp thread, mercerised and dyed an approved fast blue shall be woven in each selvage of the fabric to identify it with this specification.

In addition, the fabric shall be identified with the manufacturer by the weaving of an additional coloured thread in the selvage, by stamping with the manufacturer's name or distinguishing mark, or by any other approved method agreed upon between the manufacturer and the purchaser.

If stamping or similar identification is adopted, the maximum distance between adjacent stamp marks shall not exceed 6 ft.

10. **Delivery.** The fabric shall be delivered free from creases.

TYPE TEST.

11. Type Test.

(a) Before any manufacturer's type of fabric is approved for use in aircraft it shall have passed the type test specified in Clause 13.

(b) In the event of a manufacturer making a definite change in the structure of his fabric, either in the yarn, in the weave or in the method of finishing, such change shall render the fabric a new type, which shall be submitted for type approval in accordance with the provision of sub-clause (a) above.

12. Type Test Sample. The manufacturer shall submit a suitable sample of fabric for type testing.

13. Type Test Procedure. The sample shall show satisfactory doping potentialities when tested, under practical conditions, on aircraft components in the manner prescribed by the Airworthiness Authority.

ROUTINE TESTS.

14. Selection of Test Samples. A sample 36 in. long and the full width of the fabric shall be selected by the inspector from at least one piece from each weaver's beam.

15. Size Content. The size content shall be determined by the method described in Appendix C. and shall comply with the requirements of Clause 3.

16. Breaking Strength.

(a) The breaking strength shall be determined by the method described in Appendix B. and shall comply with the requirements of Clause 6.

(b) Should any test specimen break properly at a load of less than 75 lb. per in. width, the result shall be discarded and another specimen containing the same longitudinal threads shall be tested, the breaking strength of this specimen being included in the average for the sample. If, however, the substitute specimen also breaks at a load of less than 75 lb. per in. width, the sample shall be deemed to have failed to pass the test.

17. Weight. The weight of the fabric shall be determined by the method described in Appendix A. and shall comply with the requirements of Clause 7.

18. pH Value. The water extract of the fabric when prepared in accordance with the method described in Appendix D. shall have a pH value of not less than 5 nor more than 9.

19. Re-tests. Should a test sample fail to meet any of the requirements of Clauses 15 to 18, the inspector shall select a similar sample from each piece of fabric from the same weaver's beam. Each of these samples shall be subjected to the test or tests with which the original sample failed to comply. Should any of these samples fail to comply with the re-tests, the piece represented by that sample shall be rejected.

APPENDIX A.

Method of determining weight.

A specimen 6 in. square shall be cut or stamped from the sample not nearer to the selvage than 1 in., and shall be weighed under normal atmospheric conditions. The weight of the fabric shall be expressed in ounces per square yard.

Should a dispute arise, the specimen shall be conditioned for not less than 48 hours in an atmosphere with a relative humidity of 65% \pm 2% and a temperature of 70° F. \pm 5° and shall be weighed in the same atmosphere, or where this is not possible it shall be weighed within 2 min. of its removal from that atmosphere.

APPENDIX B.

Method of determining breaking strength.

Ten specimens each 2½ in. wide shall be cut from the sample, five in the direction of the warp and five in the direction of the weft. No two specimens cut in the same direction shall contain the same longitudinal threads.

The threads shall be frayed out from the sides of each specimen so as to reduce the width to 2 in., and each specimen shall be fixed in the jaws of an approved testing machine so that the length between the supports is 7 in. The load shall be uniformly applied at a rate of approximately 160 lb. per min.

The breaking strength of the fabric in the warp and in the weft shall be the averages of the breaking strengths of the five warp and five weft test specimens respectively, and shall be expressed in terms of pounds per inch width.

If a specimen slips in the clamps, breaks in the clamps, breaks at the edge of the clamps, or if for any reason attributable to faulty operation the result falls markedly below the average for the set of specimens, the result shall be discarded and another specimen containing the same longitudinal threads shall be taken, and the result of this break included in the average.

APPENDIX C.

Method of Determining Size Content.

A specimen weighing approximately 10 g. shall be taken from the sample and shall be accurately weighed under the conditions described in Appendix A.

The specimen shall be cut into small pieces and shall be extracted in a Soxhlet apparatus for three hours with a solvent made by mixing three volumes of benzene and two volumes of methyl alcohol. Approximately ten changes of solvent shall occur each hour. The extract, filtered if necessary, shall be evaporated in a tared flask and dried to constant weight at a temperature between 105° C. and 110° C. (221° F. and 230° F.).

After extraction with the solvent the specimen shall be treated with approximately 200 ml. of boiling distilled water for 30 min. The aqueous extract shall be decanted and the residue given a similar extraction with 100 ml. of boiling distilled water. The combined extracts, filtered if necessary, shall be concentrated to a small bulk and then evaporated in a tared dish and dried to constant weight at a temperature between 105° C. and 110° C. (221° F. and 230° F.).

The sum of the weights of the extract with benzene and methyl alcohol and the water extracts shall be taken as the size content and shall be expressed as a percentage of the initial weight of the specimen.

APPENDIX D.

Method of Determining pH Value.

Five grams of the fabric cut into pieces about 1 in. square shall be boiled for 10 min. in 100 ml. of distilled water (pH 6.5-7.5), in a chemically resistant flask. The flask shall then be stoppered and allowed to cool to room temperature. The liquid shall be made up to 100 ml. with recently boiled and cooled distilled water (pH 6.5-7.5) and a portion of the liquid then withdrawn and the pH value determined. In case of dispute the pH value shall be determined by the electrometric method using a glass electrode.

For the purposes of this specification as an Australian standard 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 30th March, 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.