

Australian Standard[®]

Methods of test for textiles

Part 1: Conditioning procedures

This Australian Standard was prepared by Committee TX/20, Methods of Test for Textiles. It was approved on behalf of the Council of Standards Australia on 5 July 1995 and published on 5 October 1995.

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Australian Chemical Specialities Manufacturers Association
Australian Wool Research and Promotion Organization
AWTA Textile Testing
Commission Dyers and Finishers Association of Australia
CSIRO, Division of Wool Technology
Department of Defence
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This Standard was issued in draft form for comment as DR 92149.

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Methods of test for textiles

Part 1: Conditioning procedures

PUBLISHED BY STANDARDS AUSTRALIA
(STANDARDS ASSOCIATION OF AUSTRALIA)
1 THE CRESCENT, HOMEBUSH, NSW 2140

ISBN 0 7262 9975 8



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PREFACE

This Standard was prepared by the Standards Australia Committee on Testing of Textiles to supersede AS 2001.1—1984, *Methods of test for textiles, Part 1: Conditioning procedures*.

This Standard is one of a series of test methods which take cognizance of the work of a technical committee of the International Organization for Standardization (ISO/TC 38, Textiles) but has been adapted to suit Australian conditions.

This Standard takes particular account of ISO 139—1973, *Textiles—Standard atmospheres for conditioning and testing*, and as such not only specifies a standard reference procedure but three additional procedures to cater for situations where the material is relatively dry, where high volume testing is required and where rapid conditioning is required. Procedures for preconditioning, determining the relative humidity, measuring and verifying the standard atmosphere along with a compliance check sheet are described in the Appendices.

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Originated as AS L5—1959.
Previous edition AS 2001.1—1984.
Second edition 1995.

FOREWORD

This edition differs from the 1984 edition of this Standard in that it clarifies a number of aspects which may have led to misinterpretations. The tolerances for the specified conditions have also been changed to reflect a more realistic set of conditions which can be obtained and measured using the plant/equipment available in most Australian laboratories. In addition, the cycle range has been specified to avoid excessive fluctuations of conditions, even though the average temperature and relative humidity over a 1 h period may meet the specified conditions.

Further, detailed information concerning the use of the aspirated psychrometer for determining relative humidity, and a table for converting the wet and dry-bulb temperatures to percent relative humidity has been provided (see Table B3 in Appendix B).

STANDARDS AUSTRALIA

Australian Standard Methods of test for textiles

Part 1: Conditioning procedures

1 SCOPE This Standard sets out procedures for conditioning samples and specimens of textile materials prior to testing. Four procedures are described as follows:

- (a) Method A—the standard reference method which shall be used in case of dispute.
- (b) Method B—a method for materials which are relatively dry.
- (c) Method C—a method for high volume testing.
- (d) Method D—a method for rapid conditioning.

2 REFERENCED DOCUMENTS The following documents are referred to in this Standard:

ISO

139 Textiles—Standard atmospheres for conditioning and testing

386 Liquid-in-glass laboratory thermometers—Principles of design, construction and use

3 DEFINITIONS For the purpose of this Standard, the definitions below apply.

3.1 Conditioning—a procedure whereby test samples are brought to equilibrium with an atmosphere having a specified temperature and relative humidity.

3.2 Moisture equilibrium—the condition attained when two successive weighings, at an interval of 15 min, of the material or sample freely exposed to the atmosphere in an air-conditioned laboratory or chamber, show a change in mass of not more than 0.1 percent of the last mass recorded.

4 PRINCIPLE The textile material is brought to moisture equilibrium with a standard atmosphere from the dry side by ensuring that it is in approximate equilibrium with an atmosphere of less than 15 percent relative humidity before freely exposing it to the standard atmosphere.

5 APPARATUS The required conditioning apparatus shall be as specified in either Item (a) or (b) below.

- (a) Air-conditioning equipment capable of providing and maintaining a standard atmosphere of 65 ± 3 percent relative humidity at a temperature of $20 \pm 2^\circ\text{C}$ (as specified in Appendices B and C) in a laboratory or chamber.

NOTE: With some air conditioning equipment it may be necessary to control the temperature to within closer tolerances to achieve the specified tolerances for relative humidity.

- (b) A rapid conditioning device capable of rapidly conditioning samples to moisture equilibrium similar to that obtained in the standard atmosphere as specified in Item (a) above.

6 METHODS

6.1 General The procedures for the various methods shall be as specified in Clauses 6.2 to 6.5.

6.2 Method A—Standard reference method The procedure for the standard reference method shall be as follows:

- (a) If necessary remove excess liquid water from the textile material by normal laboratory procedures.
- (b) Precondition the textile material in accordance with Appendix A.
- (c) Remove the textile material from the preconditioner and expose it (in as open a manner as possible) to the standard atmosphere in the air-conditioned laboratory or chamber until moisture equilibrium has been attained.

NOTE: See Clause 3 for the definition of moisture equilibrium.

It is essential that when exposing the material in the oven or in the air-conditioned space, all parts of the material shall be freely accessible to the atmosphere. The following essential requirements shall therefore be observed:

- (i) *Fibre* (e.g. raw or scoured wool)—shall be of approximate uniform density no greater than 20 kg/m³ and arranged so as to expose the maximum surface area, e.g. spread in layers on open wire shelves.

NOTE: Samples held in mesh bags or other containers may take longer to condition.

- (ii) *Silver, roving and the like*—shall be removed from any package and arranged so that all parts of the sample are freely exposed to the air.
- (iii) *Yarns*—shall preferably be in the form of hanks, or wound on open spools or frames that are arranged so that all parts are freely exposed to the air. For tests where unwinding from a package may unduly influence the property to be measured, testing may be performed on the package.
- (iv) *Fabrics, carpets, and the like*—shall be hung, or laid flat, singly on open wire shelves to allow free access of air to all surfaces. If the material must be folded, all surfaces shall be as freely exposed to the air as is practicable. If the dimensional change of the material is to be determined, it is to be noted that the orientation of the material during conditioning may influence the test results. Accordingly, in order to ensure that results are appropriately assessed, the orientation of the material during conditioning shall be specified in the report.

6.3 Method B—Method for relatively dry material Where it can be established that the material has been brought to equilibrium with an atmosphere of relative humidity less than 15 percent and has not subsequently been exposed to moisture or to air of a relative humidity greater than 15 percent, it shall be placed in a sealed container for subsequent exposure to the standard atmosphere in accordance with Clause 6.2(c). The material shall be exposed to the standard atmosphere within 1 h of it having been placed in the container.

6.4 Method C—Method for high rate of routine testing The procedure for a high rate of routine testing shall be as follows:

- (a) If the materials are relatively dry, in accordance with Method B, they need not be preconditioned. Otherwise, they shall be preconditioned as described in Clause 6.2(b).
- (b) Determine the time to condition each of at least 20 samples of material on each of at least 5 days (i.e. at least 100 determinations in all), using the method described in Clause 6.2(c).

NOTES:

- 1 This method may be applied if the rate of testing is high and the materials are highly uniform in size and condition.
 - 2 For any example, the 'time to condition' is the duration of exposure until the last weighing used to establish that moisture equilibrium has been attained.
 - 3 See Clause 3.2 for the definition of moisture equilibrium.
- (c) Determine the average time to condition (T_{av}) for all samples and the standard deviation(s) of the time to condition from the data obtained in Step (b) above.
- (d) For routine testing, the standard exposure time shall be equal to the average time to condition plus 3.5 times the standard deviation, i.e.

$$\text{Standard exposure time} = T_{av} + 3.5 s$$

where

T_{av} = the average time to condition as determined in Step (c)

s = the standard deviation of the time to condition as determined in Step (c) above.

- (e) To monitor the control of exposure conditions, ensure that samples attain moisture equilibrium. Routine checks following the procedures of Steps (a) to (d) above shall be undertaken at intervals of not more than 12 months, or when any characteristic of the samples changes significantly.

NOTE: See Clause 3.2 for the definition of moisture equilibrium.

6.5 Method D—Method when conditioning is required rapidly There may be circumstances when it is necessary to condition materials as rapidly as possible. This involves the use of rapid preconditioners and rapid conditioners. Where the samples or specimens are uniform in size and condition (usually associated with high volumes of testing), the procedure can be standardized and verified against the standard reference method.

The procedures to be used in establishing the conditions of operation shall be as follows:

- (a) Precondition the samples or specimens in accordance with Paragraph A3.2 of Appendix A. No loss of matter (other than water vapour) shall occur, particularly between successive weighings as referred to in Step (c) below.
- (b) At least 100 samples or specimens shall be preconditioned as described in Step (a) above, using the rapid preconditioner. They may be treated in batches of a size and at intervals commensurate with the weighing requirements of Step (c) below.
- (c) The samples or specimens shall be weighed at intervals of 5 min. The time of exposure shall be recorded for each weighing. The 'time to precondition' for each sample or specimen shall be recorded as the exposure time to the last weighing. The last weighing shall be deemed to have been made when two weighings are conducted at an interval equal to 10 percent of the total conditioning time or at least 15 min apart, whichever is greater, show a loss of mass in the sample of not more than 0.1 percent of the last mass recorded.

NOTE: Care should be exercised so that no material is lost from or gained by the sample or specimen during this operation. If the sample or specimen is to be weighed while hot, weighing must be completed within 30 s of removal from the preconditioner. If the sample or specimen is to be allowed to cool before weighing, it must be enclosed in a desiccator or sealed container or sealed in an airtight polyethylene bag of wall thickness 0.071 mm which shall, in turn, be placed inside a similar bag and also sealed.

- (d) Determine the average time to precondition (T) and the standard deviation(s) of the time to precondition from the data obtained in Step (c) above.

- (e) For routine testing, precondition samples or specimens for a time equal to the average time to precondition plus 3.5 times the standard deviation, i.e.—

$$\begin{aligned} &\text{Routine time to precondition when conditioning is required rapidly} \\ &= T + 3.5 s \end{aligned}$$

where

T = the average time to precondition as determined in Step (d)

s = the standard deviation of the time to precondition as determined in Step (d).

- (f) The requirements for rapid conditioning shall be established by a procedure similar to that described in Steps (a) to (e) above, except that the conditioning apparatus shall be used in place of the preconditioning apparatus. Samples or specimens used must first be preconditioned as described in Steps (a) to (e) above. The rapid conditioner shall provide air at standard conditions as specified in Clause 5(a) and Appendix B.
- (g) The procedures for preconditioning and conditioning shall be checked in accordance with Steps (a) to (f) at least once every 12 months or whenever any change occurs in the size or condition of samples or specimens.

7 CROSS-REFERENCE TO THIS STANDARD Other Standards which stipulate conditioning in accordance with this Standard shall report—

- (a) the particular method of conditioning used, i.e. Method A, B, C or D.
- (b) the orientation of the fabric samples during conditioning as required in Clause 6.2(c)(iv).