

Australian Standard[®]

Methods of test for textiles

Method 2.15: Physical tests— Determination of thickness of textile fabrics

PREFACE

This Standard was prepared by the Standards Australia Committee on Testing of Textiles, to supersede (in part) AS 1587—1973, *Methods of measurement of textile fabrics—Length, width, thickness, mass per unit length and mass per unit area*.

It is one of a series of methods which takes cognizance of the work of a technical committee of the International Organization for Standardization (ISO/TC38, Textiles), and the British Standard BS 2544 has been adapted to suit Australian conditions.

This Standard incorporates both static and dynamic methods enabling either method to be used for obtaining thickness measurements at one or more pressures. The dynamic method has been found to be particularly useful in the thickness measurement and discrimination between pile fabrics. It is currently specified in an Australian Customs By-Law for the designation of flannelette fabrics.

This Standard differs from ISO 5084-1977, *Textiles—Determination of thickness of woven and knitted fabrics (other than textile floor coverings)* in that it incorporates a dynamic test in addition to the static and specifies means of testing fabric that may not lay flat on the reference plate.

It should be noted that at the time that this Standard was published, a Standard for the procedures to be used in sampling textiles was being prepared. It is recommended that, if this Standard is available, it should be consulted where necessary.

METHOD

1 SCOPE. This Standard sets out two methods for the determination of the thickness of textile fabrics as follows:

- (a) Method A, Static thickness—thickness at specific pressure produced under static loading.
- (b) Method B, Dynamic thickness—thickness at specific pressure produced during constant rate of compression.

Method A is applicable to fabrics which adopt a stable thickness state at 30 s loading time (see Clause 7.2(f)). For fabrics which do not adopt this state, Method B is applicable.

These methods are applicable to woven, non-woven and knitted textile fabrics and coated fabrics. They are not applicable to textile floor coverings.

NOTE: For the determination of thickness of textile floor coverings see AS 2111.1.

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

AS

- 1199 Sampling procedures and tables for inspection by attributes
- 2001 Methods of test for textiles
- 2001.1 Method 1: Conditioning procedures
- 2103 Dial gauges and dial test indicators
- 2111 Methods of test for textile floor coverings
- 2111.1 Method 1: Method for the determination of thickness of textile floor coverings
- 2193 Methods for calibration and grading of force measuring systems of testing machines

BS

- 2544 Method for the determination of thickness of textile fabric

3 DEFINITION. For the purposes of this Standard, the definition below applies.

3.1 Thickness—the distance between the face and the back of a textile fabric measured as the distance between a reference plate and a parallel presser-foot while pressure is applied to a fabric.

4 PRINCIPLE. The thickness of a specimen of fabric is measured as the distance between a reference plate and a parallel circular presser-foot.

For Method A, static thickness is measured by application of a recommended pressure relating to fabric type using a deadweight type thickness gauge.

For Method B, dynamic thickness is measured from the curve produced by continuously recording force/compression values at a recommended pressure, using a compression testing machine.

5 APPARATUS.

5.1 Conditioning facility—means of providing and maintaining a standard atmosphere as described in AS 2001.1.

5.2 Thickness tester—either a static thickness tester or a compression testing machine, as follows:

- (a) *Static thickness tester*—a static thickness tester shall incorporate (or be equipped with) the following elements:
 - (i) A presser-foot of area appropriate to the type of fabric to be tested and being such that the ratio of foot diameter to fabric thickness is not less than 5:1.
 - (ii) Either a reference plate with a plane upper surface of diameter or dimensions at least 50 mm greater than that of the presser-foot; or a reference plate of the same or greater dimensions than the presser-foot and surrounded by, and in the same plane as, a fabric support table having dimensions at least 50 mm greater than the presser-foot.
 - (iii) A means for moving the presser-foot in a direction normal to the surface of the reference plate so that its bearing surface is maintained parallel with the reference plate to within 0.2 percent.
 - (iv) A means of applying pressure to the test specimen.
 - (v) An indicator that registers the distance between the bearing surfaces of both the presser-foot and the reference plate to an accuracy of at least 0.1 mm.

NOTES:

- 1. Recommended presser-foot sizes and pressures are given in Appendix A.
- 2. Specifications for dial gauges and dial test indicators are given in AS 2103. Digital devices may also be used.

- (b) *Compression testing machine*—compression testing machine, complying with the requirements of Grade B machines as specified in AS 2193, which shall also be equipped with the following elements:

- (i) A presser-foot of area appropriate to the type of fabric to be tested and being such that the ratio of foot diameter to fabric thickness is not less than 5:1.
- (ii) A reference plate with plane upper surface of diameter or dimensions at least 50 mm greater than that of the presser-foot.
- (iii) A means of moving the presser-foot at a constant rate in a direction normal to the surface of the reference plate so that its bearing surface is maintained parallel with the reference plate to within 0.2 percent.
- (iv) A means of continuously recording the pressure on the specimen and the distance between the presser-foot and the reference plate. The error in measurement on the chart for a forward and reverse movement shall not exceed 0.1 percent.

NOTE: Recommended presser-foot sizes and pressures are given in Appendix A.

5.3 Holding ring—test specimen holding ring with an internal diameter of 40 mm greater than the diameter of the presser-foot. The holding ring shall exert sufficient pressure to ensure that the test specimen lies flat on the reference plate.

5.4 Timing device—stopwatch or suitable timing device accurate to at least 0.5 s.

5.5 Brushing device—as described in Appendix B, for raising the pile or nap on fabrics having a pile or nap.

6 SAMPLE AND TEST SPECIMENS. Care should be taken to ensure that the operator's hands are dry. Excessive handling of the specimen should be avoided.

6.1 Sample.

6.1.1 Lot sampling. A lot sample shall be selected in accordance with the relevant material specification.

Where there is no material specification, the sample shall be selected using a sampling plan determined in accordance with AS 1199.

NOTE: To provide a sampling plan with a meaningful producer's risk and consumer's risk, an adequate specification needs to take into account the variability between rolls of fabric, and between specimens from a swatch taken from a roll of fabric.

6.1.2 Laboratory sample. A sample shall be taken from the outside of each roll of fabric in the lot sample, after first discarding all fabric that contains creases, fold marks, delamination and disturbed weave.

6.2 Conditioning. The fabric sample shall be conditioned in accordance with AS 2001.1. The test specimens shall be prepared from the sample and subsequent testing conducted in the standard atmosphere.

6.3 Test specimens.

6.3.1 Number of specimens. Unless otherwise specified in a relevant product Standard, ten specimens or test areas shall be selected from each region of thickness.

6.3.2 Dimensions. Cut test specimens shall be used whenever possible. The dimensions of cut specimens shall be less than those of the fabric support table and greater than those of the selected presser-foot and, when used, larger than those of the holding ring. Uncut test specimens shall have dimensions greater than the dimensions of the selected presser-foot.

6.3.3 Selection. Specimens and test areas shall be selected so as to be representative of each region of thickness of the fabric, and free from creases, faults and areas which have been previously tested or clamped.

7 PROCEDURE.

7.1 General. Test specimens shall be conditioned and tested in the standard atmosphere (see Clause 5.1).

7.2 Method A—Static thickness. The procedure for each test specimen shall be as follows:

- (a) Select and clean the presser-foot (see Clause 5.2(a)(i)), fabric support table (see Clause 5.2(a)(ii)), holding ring (see Clause 5.3) and reference plate (see Clause 5.2(a)(ii)).

NOTE: Recommended presser-foot sizes are given in Appendix A.

- (b) With the presser-foot loaded so as to exert pressure on the reference plate, set the indicator (see Clause 5.2(a)(v)) to zero.

NOTE: Recommended pressures are given in Appendix A.

- (c) Lift the presser-foot and position the test specimen, without tension, on the reference plate. Ensure that the area chosen for the test is free from creases and is in full contact with the reference plate. Do not attempt to flatten out any creases as this may affect the result.
- (d) Where it is suspected that the specimen is not in full contact with the reference plate, place the holding ring on the test specimen.
- (e) Gently lower the presser-foot to apply pressure to the test specimen.
- (f) Record the indicator reading at 30 s and 40 s. If there is no significant change (i.e. $\pm 1\%$) the result shall be considered to be valid.
- (g) Repeat Steps (a) to (f) for the remaining test specimens or test areas.

7.3 Method B—Dynamic thickness. The procedure for each test specimen shall be as follows:

- (a) Select and clean the presser-foot (see Clause 5.2(b)(i)) and reference plate (see Clause 5.2(b)(ii)). When pile or nap fabrics are being tested select a presser-foot with a diameter of not less than 25 mm.