BS 4682 : Part 2 : 1988

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British Standard Methods of test for

Dimensional stability of textile floor coverings

Part 2. Determination of dimensional changes due to changes in ambient humidity

Méthodes d'essai de la stabilité dimensionnelle des revêtements de sol textiles
Partie 2. Détermination des variations dimensionnelles dues aux modifications d'humidité ambiante

Verfahren zur Prüfung der Maßbeständigkeit von textilen Fußbodenbelägen
Teil 2. Bestimmung der Maßänderung bei wechselnder Raumfeuchtigkeit

Foreword

This Part of BS 4682 has been prepared under the direction of the Textiles and Clothing Standards Committee and is a revision of BS 4682 : Part 2 : 1972, which is withdrawn. In this revision the humidity range of the test atmospheres and the specimen presentation have been modified and simplified.

Changes in relative humidity occur frequently in homes and can give rise to changes in dimensions of textile floor coverings. Dimensional instability of textile floor coverings manifests itself in the form of shrinkage, extension or rucking.

This Part of BS 4682 allows accurate determinations to be made of dimensional changes of the order of 0.1 %.

BS 4682 : Parts 3 and 4 describe methods for the determination of changes due to exposure to heat and immersion in water respectively.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

1 Scope

This Part of BS 4682 describes a method for the determination of dimensional changes of all types of machine-made textile floor coverings due to changes in ambient humidity at constant temperature.

NOTE. The titles of the publications referred to in this standard are listed on page 3.

2 Principle

A measured specimen is allowed to condition for specified periods of time in different ambient humidities. Any consequent changes in dimensions in each direction are determined.

3 Apparatus

3.1 *Mounting boards*, at least two, flat and of the same material as the baseboard (3.5) and measuring at least 50 mm more than the specimen in each direction.

3.2 *Means for providing controlled environments* with atmospheres with relative humidities of 25 ± 5 %, 65 ± 2 % and 75 ± 5 % all at 20 ± 2 °C.

NOTE. Information on the provision of these atmospheres is given in the following texts.

O'Brien, F.E.H. *Journal of Scientific Instruments*, 1948, 9 March, 73

Young, J.F. *Journal of Applied Chemistry*, 1967, 17, 241

3.3 *Humidity-measuring instrument*, accurate to 2 % relative humidity.

3.4 *Temperature-measuring instrument*, accurate to 1°C.

3.5 *Measuring apparatus*, comprising a rigid baseboard accommodating four dial gauge micrometers and metal squares for calibration of the gauge positions as described in BS 5920.

4 Sampling and specimen preparation

4.1 Material in roll form

Take samples and select at least two test specimens measuring not less than 500 mm x 500 mm in accordance with BS 4664 and mark the direction of manufacture.

4.2 Pre-cut carpet tiles

For tiles measuring up to 600 mm x 600 mm, select at least two whole tiles as test specimens that are representative of the bulk. For larger tiles, treat them as material in roll form and select the test specimens in accordance with **4.1**. Whenever possible, identify the direction of manufacture and make all measurements with respect to this.

4.3 Markings

Identify and mark the sides of each specimen as shown in figure 1 and also mark the direction of manufacture if this is identifiable. If the direction of manufacture cannot be identified, make an arbitrary identification of direction.

5 Procedure

5.1 Using one mounting board (**3.1**) for each specimen, place the specimens use-surface uppermost successively in the conditioning atmospheres described in **5.2**.

Allow the required conditioning period to elapse. Measure the relative humidity of the conditioning atmosphere to an accuracy of 2 % (**3.3**) and the temperature to an accuracy of 1 °C (**3.4**) and, using the mounting boards for moving the specimens, measure the dimensions of the specimens (**3.5**) either in the conditioning atmosphere or immediately after removal from it.

NOTE If the working arrangement does not permit the immediate measurement of the specimen dimensions at the end of a stated conditioning period, the specimens may be left in that conditioning atmosphere until measurement is possible.

Measure the dimensions of the specimens, substrate uppermost, to the nearest 0.1 mm in accordance with BS 5920 and record the mean of the two values for each direction. Identify the direction of manufacture as L and that at right angles to it as W.

5.2 Make measurements after each stage of the following sequence of conditioning atmospheres:

(a) relative humidity 65 ± 2 %, temperature 20 ± 2 °C for at least 24 h (dimensions L_1 and W_1);

(b) relative humidity 25 ± 5 %, temperature 20 ± 2 °C for 48 h (dimensions L_2 and W_2);

(c) relative humidity 75 ± 5 %, temperature 20 ± 2 °C for 48 h (dimensions L_3 and W_3); and

(d) relative humidity 25 ± 5 %, temperature 20 ± 2 °C for 48 h (dimensions L_4 and W_4).

6 Calculation and expression of results

6.1 Calculate the linear changes (in %) in the direction of manufacture ΔL and of width ΔW of the marked specimens due to changes in relative humidity from

(a) 25 ± 5 % to 75 ± 5 %; and

(b) 75 ± 5 % to 25 ± 5 %

as a percentage of length or width at 65 % relative humidity.

Thus, for the direction of manufacture use the equations

$$(1)\ \Delta L = \left(\frac{L_3 - L_2}{L_1}\right) 100;$$

$$(2)\ \Delta L = \left(\frac{L_4 - L_3}{L_1}\right) 100$$

where

L_1, L_2, L_3 and L_4 are as given in **5.2**.

6.2 Assuming that changes in dimensions are directly proportional to changes in relative humidity, convert changes in dimensions for each change in relative humidity to percentage linear change per 50 % relative humidity change L_c (in %) from the equation

$$L_c = \frac{\Delta L 50}{\Delta R}$$

where

ΔL is the linear change calculated in accordance with **6.1** (in %);

ΔR is the change in relative humidity (in %).

7 Test report

The test report shall include the following information:

(a) a statement that the test procedure was conducted in accordance with this Part of BS 4682, i.e. BS 4682 : Part 2 : 1988;

(b) the relative humidity and temperature of all atmospheres to which the specimens were exposed, the method by which the atmospheres were controlled and the accuracy to which they were controlled;

(c) the percentage linear changes in the direction of manufacture and of width of the specimens calculated in accordance with **6.1** and **6.2** and expressed using a negative sign (−) for shrinkages and a positive sign (+) for extensions.

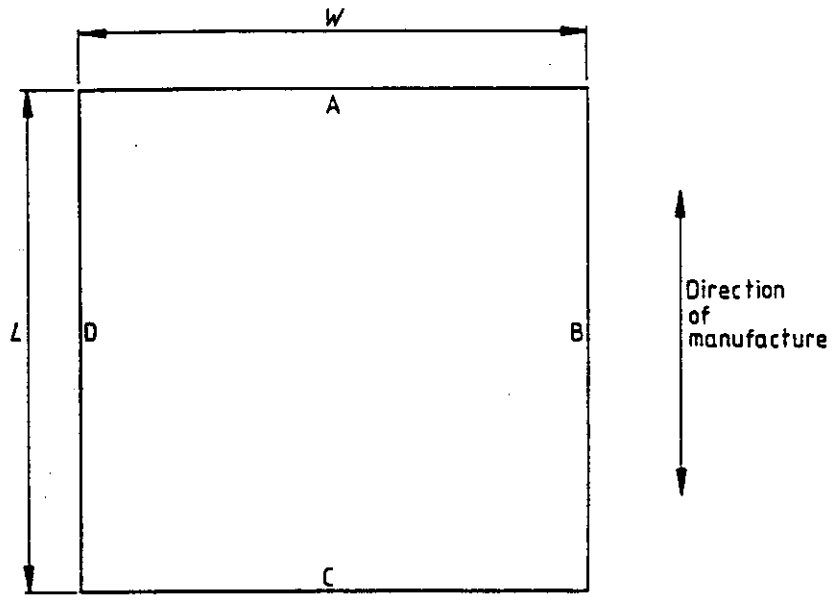

Figure 1. Marking of specimen

Publications referred to

BS 4664 Methods for sampling and cutting specimens of textile floor coverings for physical tests
BS 4682 Methods of test for dimensional stability of textile floor coverings
*Part 3 Determination of dimensional changes after exposure to heat
*Part 4 Determination of dimensional changes after immersion in water
BS 5920 Method for determination of dimensions of textile floor covering test specimens

O'Brien, F.E.H. *Journal of Scientific Instruments*, 1948, 9 March, 73
Young, J.F. *Journal of Applied Chemistry*, 1967, 17, 241

*Referred to in the foreword only.

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The preparation of this British Standard was entrusted by the Textiles and Clothing Standards Committee (TCM/-) to Technical Committee TCM/27, upon which the following bodies were represented:

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