BRITISH STANDARD

BS 5131 :
Section 2.10 :
1991

Methods of test for

Footwear and footwear materials

Part 2. Solings

Section 2.10 Heat shrinkage of cellular solings

NOTE. It is recommended that this Section should be read in conjunction with BS 5131 : Part 0, published separately.

Méthodes d'essai des chaussures et des matériaux pour chaussures
Partie 2. Semelles
Section 2.10 Retrait thermique des semelles cellulaires

Prüfung von Schuhwerk und Schuhwerkstoffen
Teil 2. Sohlen
Abschnitt 2.10 Wärmeschrumpfung von Zellsohlen

BSI STANDARDS

Foreword

This Section of BS 5131 has been prepared under the direction of the Textiles and Clothing Standards Policy Committee. It supersedes BS 5131 : Section 2.10 : 1980, which is withdrawn.

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

Method

1 Scope

This Section of BS 5131 describes a method for determining the linear shrinkage after heating of test specimens prepared from cellular soling materials, e.g. micro-cellular rubber, cellular polyurethane, semi-expanded rubber, cellular ethylene vinyl acetate (EVA) and other cellular plastics materials. This shrinkage may take place during manufacture of footwear, during storage and wear of completed footwear, or at both these stages.

NOTE. The title of the publication referred to in this standard is given on the inside back page.

2 Principle

The reduction in the distance between two reference points on a test specimen is determined by measuring the distance before and after heating in air under specified conditions. This shrinkage is expressed as a percentage of the initial distance.

3 Apparatus[1)]

3.1 *Steel rule,* marked in millimetres.

3.2 *Templates and scalpel or other sharp knife,* to cut two reference marks in the test specimen either 100 mm or 50 mm apart.

3.3 *Oven,* for heating the test specimens to 70 °C and thermostatically controlled so that they are kept within 1 °C of the required temperature during the heating period.

3.4 *Device capable of measuring the distance between two cuts,* 50 mm apart or 100 mm apart, on a flat surface, to an accuracy of ± 0.2 mm. This may consist of either :

(a) a steel rule, marked in millimetres as in **3.1**, together with a ×5 magnifying glass; or

(b) a travelling microscope or similar optical device with a scale.

4 Preparation of test specimens

Cut three test specimens parallel to the length and three test specimens parallel to the width directions of the sheet or soles in accordance with BS 5131 : Section 2.7.

Using a scalpel or other sharp knife (**3.2**) and a steel rule (**3.1**), cut the test specimens to the dimensions and tolerances given in figure 2.10/1.

Where sufficient material is available, cut each of the six test specimens in accordance with the dimensions and tolerances given for the long test specimen. Where insufficient material for a long test specimen is available, cut a specimen with the dimensions and tolerances given for the short test specimen. For cellular solings, remove excess material so that the thickness of the test specimen is 5.0 ± 0.5 mm. For solings made from semi-expanded materials, remove excess material so that the thickness of the test specimen is 3.0 ± 0.3 mm. Remove the excess material in accordance with clause **7** of BS 5131 : Section 2.7 : 1980.

NOTE. For the control of material in a factory, it is usually more convenient to test the soling material without reducing its thickness to that given above. The test results are, however, affected by the thickness of the material, hence the thicknesses given above are necessary to claim that testing has been carried out in accordance with this standard method of test.

5 Procedure

5.1 Marking

Make two parallel reference cuts (see figure 2.10/1) not more than 0.5 mm deep across the full width of the test specimen on each side of it, 100 ± 5 mm apart for the larger test specimen and 50 ± 5 mm apart for the smaller test specimen.

5.2 Measurement before heat treatment

Keep the test specimens for at least 3 h at room temperature. Measure to within ± 0.2 mm the distance between the reference cuts along the centreline.

NOTE 1. Conditioning in a standard atmosphere, for example, 20 °C and 65 % r.h., is not necessary for this test. However, it is recommended that the atmospheric temperatures in which the measurements are made before and after heating should not differ by more than 4 °C.

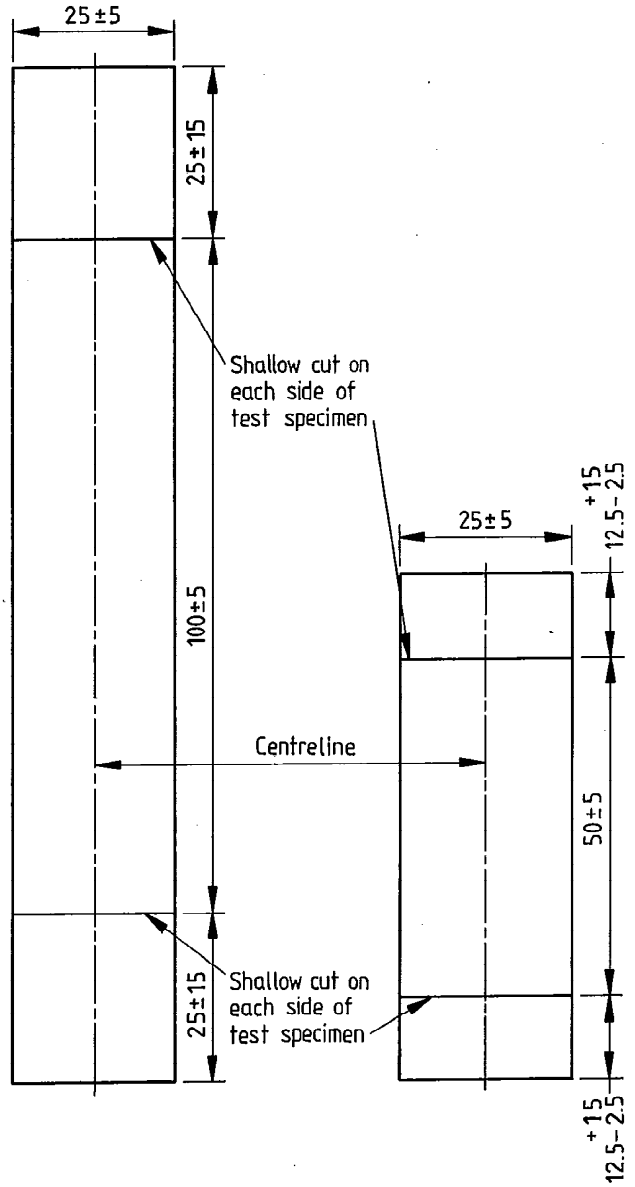
NOTE 2. To assist in measuring, the position of these reference cuts may be indicated using a suitable marking pen.

5.3 Heat treatment

Place the test specimens horizontally (supported in such a way as to ensure adequate air ventilation on all sides) in the oven (**3.3**) for 24 ± 0.5 h.

NOTE. For testing in accordance with this standard, the temperature and time are as given in **3.3** and **5.3** respectively. For factory use where quick results are needed, a temperature of 100 °C for a time of 1 h is often adopted. However, EVA materials cannot be tested in the latter manner since they cannot withstand the higher temperature.

[1)] For information on the availability of suitable apparatus to perform this test, apply to Enquiry Section, BSI, Linford Wood, Milton Keynes, MK14 6LE quoting the number of this standard and the clause number referring to the items concerned. Enclose a stamped addressed envelope for reply.



All dimensions are in millimetres.

Figure 2.10/1 Long and short test specimens for shrinkage, showing dimensions and positions of reference cuts

5.4 Measurement after heat treatment

Remove the test specimens from the oven at the end of the period of heat treatment. Keep the test specimens for at least 30 min at room temperature, (see note 1 of **5.2**). If the test specimens are bowed, hold them flat for measurement. If the measuring cuts have widened, take the point of measurement as the centre of the cut. Measure to within ± 0.2 mm the distance between these cuts along the centreline as described in **5.2** using an appropriate device (**3.4**).

6 Calculation and expression of results

For each test specimen, calculate the shrinkage of the distance between the reference cuts produced by the heat treatment and express this as a percentage of the original distance.

For each of the directions in which the test specimens were cut (i.e. parallel to the length and parallel to the width of the sheet), calculate and report as the percentage shrinkage the average of the individual results.

7 Test report

The test report shall include the following items :

(a) results, expressed in accordance with clause **6**;

(b) dimensions (including thickness) of the test specimens;

(c) temperature and duration of the heat treatment;

(d) nature and full identification of the sample;

(e) reference to this method of test, i.e. BS 5131 : Section 2.10;

(f) date of testing.

Publication(s) referred to

BS 5131 Methods of test for footwear and footwear materials
Section 2.7 The preparation of test pieces from soling materials for physical testing

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Textiles and Clothing Standards Policy Committee (TCM/-) to Technical Committee TCM/39, upon which the following bodies were represented:

British Footwear Manufacturers' Federation
British Leather Confederation
British Rubber Manufacturers' Association
British Steel plc
Consumer Standards Advisory Committee of BSI
Cork Industry Federation
Footwear Components Federation
Footwear Distributors' Federation
Institute of Trading Standards Administration
Iron and Steel Trades Confederation
Lancashire Footwear Manufacturers' Association
Mail Order Traders Association of Great Britain
Ministry of Defence
National Union of Footwear, Leather and Allied Trades
Office of Fair Trading
SATRA Footwear Technology Centre

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

British Adhesives and Sealants Association
British Paper and Board Industry Federation
British Plastics Federation
Multiple Shoe Retailers' Association
RAPRA Rechnology Ltd.

This British Standard, having been prepared under the direction of the Textiles and Clothing Standards Policy Committee, was published under the authority of the Board of BSI and comes into effect on 31 January 1991

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The following BSI references relate to the work on this standard:
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Amendments issued since publication

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