BS 5131 : Section 2.11 : 1983
[Resistance of solings to hot contact]
UDC 685.31 : 620.1 : 539.434 : 685.312.12

British Standard Methods of test for

Footwear and footwear materials

Part 2. Solings

Section 2.11 Resistance of solings to short-term contact with a hot surface

Méthodes d'essai des chaussures et des matériaux entrant dans leur confection
Partie 2. Semelles
Section 2.11 Résistance des ressemelages de chaussures à un bref contact thermique avec une source de chaleur

Prüfverfahren für Fußbekleidung und Fußbekleidungswerkstoffe
Teil 2. Sohlen
Abschnitt 2.11 Widerstand von Schuhsohlen gegen kurzzeitigen Kontakt mit einer heißen Fläche

NOTE. It is recommended that this Section should be read in conjunction with the information in the General Introduction to BS 5131, published separately.

1. Scope

This Section describes a method for the visual assessment of the effects on soling materials of short-term contact with a hot surface. This method enables the assessment of the suitability of soling materials for footwear which is used in situations where brief contact with hot objects is likely.

This test should not be used for assessing the effects of long-term exposure at elevated temperatures.

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

2. References

This Section refers to the following publications:

BS 1006 Methods of test for colour fastness of textiles and leather

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

3. Principle

A pre-heated metal block is placed on to the soling material, under constant pressure, for a short fixed period of time and the appearance of the heated part of the surface is examined before and after bending around a mandrel. Depending on the purpose of the test, it may be carried out either:

(a) at one specified temperature; or

(b) over a range of increasing temperatures until visible degradation has occurred.

If the tests are carried out according to (b) it is usually possible to identify a temperature above which significant surface damage of the test piece occurs.

4. Apparatus

4.1 *A cylindrical copper body*, referred to as the bit, of mass 200 ± 20 g and with the lower end reduced to a flat square face with sides of dimension 25.5 ± 1 mm. The bit has a central longitudinal cavity of 6.5 mm diameter, extending to 4 mm from the outer working surface of the square end of the bit, to receive a temperature measuring device. The other dimensions of the bit are shown in figure 2.11/2.

4.2 *A metal heating block*, of mass 530 ± 50 g, which surrounds the cylindrical part of the bit. This heating block contains an electrical resistance heating element and a means of control (an 'on/off' switch is sufficient) to pre-heat the bit to any desired temperature up to a maximum of 400 °C. The dimensions of the heating block are shown in figure 2.11/2.

4.3 *A device for measuring the internal temperature of the bit* close to its square end. A convenient way of measuring the temperature is a mercury-in-glass thermometer reading to 400 °C.

NOTE. For such a thermometer it is recommended that the small space between the thermometer bulb and the wall of the cavity be filled with a metal alloy having a melting point below 150 °C.

4.4 *A means of raising and lowering the bit,* together with the heating block, to bring its face into uniform contact with the test piece, in a horizontal plane and under a uniformly distributed pressure of 20 ± 2 kPa.

4.5 *A self-aligning platform,* of suitable diameter, to receive the test piece and maintain uniform pressure on the test piece.

4.6 *A hinged support with thermally insulated face* on which the face of the bit rests during heating, and which can be moved aside to enable the bit to be lowered on to the test piece.

4.7 *A mandrel* of 10 ± 1 mm diameter.

WARNING. As toxic fumes may be released from some solings during this test it is necessary to site the apparatus in a well ventilated area.

NOTE. The test apparatus shown in figure 2.11/1 is a slightly modified form of that specified in BS 1006, section UK-LA. It is obtainable from the SATRA Footwear Technology Centre, SATRA House, Rockingham Road, Kettering, Northants, NN16 9JH.

5. Preparation and conditioning of test pieces

Prepare a test sheet having a thickness in the range 3.0 to 7.0 mm and cut from it test pieces 30 ± 2 mm wide by 70 mm (minimum) long as described in BS 5131 : Section 2.7. Allow the time interval specified in BS 5131 : Section 2.7 to elapse between test sheet preparation and test piece cutting. For leather specimens condition test pieces for 48 h at 20 °C and 65 % relative humidity before testing.

6. Procedure

Switch on the heating block with the bit resting on the insulating support, and place the test piece on the platform below with its wearing side uppermost. Cover the test piece with aluminium foil to prevent contamination of the heated bit. Use a new piece of foil for each test. When the selected or specified bit temperature is just exceeded switch off the heating block and allow the temperature to fall to within ± 2 °C of the required value, with the bit still resting on its insulating support. Then move the insulating support aside and immediately place the bit centrally on to the test piece, so that its sides are parallel to the sides of the test piece. Leave it in position for 60 ± 1 s without switching the heating block on again and then replace it on the support.

Remove the foil, allow the test piece to cool for at least 10 min and examine the heated part of its surface as described in clause **7.** Where appropriate repeat the test at higher or lower temperatures, as necessary, on fresh test pieces in steps of approximately 20 °C.

7. Assessment of heat damage

Assess the surface of the test piece visually for damage such as melting, charring, cracking or crazing, both before and after bending it round the mandrel. Record the type and severity of the damage.

NOTE. Materials such as polyvinyl chloride, expanded polyurethane and thermoplastic rubbers will soften or melt as the temperature of the bit is increased. In the case of materials such as vulcanized rubber and leather solings, the damage usually takes the form of charring of the surface, often followed by cracking when the test piece is bent round the mandrel.

For leather soles record whether charring or cracking is confined to the grain layer or whether any penetrates into the corium.

8. Test report

8.1 If the purpose of the test is to find out whether the soling material passes or fails a specification which includes one fixed test temperature, the test report shall include the following:

(a) the test material reference;

(b) the reference of the test, i.e. BS 5131 : Section 2.11;

(c) the specified temperature of the test;

(d) the effects on the test piece such as

(1) no visible change,

(2) slight softening/melting/surface cracking, etc.,

(3) severe softening/melting/surface cracking, etc.

(e) passes/fails the specification due to the effects described in (d).

8.2 If the purpose of the test is to establish the temperature above which significant surface damage occurs, the test report shall include the following:

(a) the test material reference;

(b) the reference of the test, i.e. BS 5131 : Section 2.11;

(c) a description of the visible effects of the test at three or four temperatures, separated by 20 °C, bridging the temperature at which distinct degradation was judged to have occurred;

(d) the highest test temperature at which surface damage was found to be negligible.