BRITISH STANDARD

BS 7193:1989

Incorporating Amendment No. 1

Specification for

Lined lightweight rubber overshoes and overboots

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Rubber Standards Policy Committee (RUM/-) to Technical Committee RUM/7, upon which the following bodies were represented:

Association of County Councils
Association of Metropolitan Authorities
British Fire Services' Association
British Footwear Manufacturers' Federation
British Rubber Manufacturers' Association
Chief and Assistant Chief Fire Officers' Association
Department of Health and Social Security
Engineering Equipment and Materials Users' Association
Home Office
Institution of Fire Engineers
Malaysian Rubber Producers' Research Association
Ministry of Defence
RAPRA Technology Ltd.
SATRA Footwear Technology Centre
Tropical Growers' Association

This British Standard, having been prepared under the direction of the Rubber Standards Policy Committee, was published under the authority of the Board of BSI and comes into effect on 30 March 1990

The following BSI references relate to the work on this standard:
Committee reference RUM/7
Draft for comment 87/44516 DC

ISBN 0 580 17769 6

Amendments issued since publication

Amd. No.	Date of issue	Comments
6606	December 1990	Indicated by a sideline in the margin

Contents

Foreword

This British Standard has been prepared under the direction of the Rubber Standards Policy Committee. It is a revision of BS 5451:1977. The remainder of the BS 5451:1977 specification dealing with boots with defined electrical properties is now contained in BS 5145:1989. On publication of the revisions of both standards, BS 5451:1977 will be withdrawn.

NOTE This revision has been published under a new BS number in order to avoid confusion with BS 5145.

Electrically conducting lightweight rubber overshoes and overboots should be used if it is necessary to minimize electrostatic build up by dissipating electrostatic charges in the shortest possible time, e.g. when handling explosives, and where risk of electric shock from any electrical apparatus has been completely eliminated. In order to ensure that the footwear is definitely conducting, an upper limit of resistance of $1.5 \times 10^5\ \Omega$ is specified.

Antistatic lightweight rubber overshoes and overboots should be used if it is necessary to minimize electrostatic build-up by dissipating electrostatic charges in situations where portable electrical equipment may be used or where electrical defects from other causes may develop. In such application it is necessary to ensure a minimum value of resistance to protect against a severe electric shock or ignition of the rubber. Experience has shown that for antistatic purposes the discharge path through a product should normally have an electrical resistance of less than $10^8\ \Omega$ at any time throughout its useful life. A value of $7.5 \times 10^4\ \Omega$ is specified as the lowest limit of resistance of a product when new, in order to ensure adequate protection against dangerous electric shock or ignition in the event of any electrical apparatus becoming defective when operating at voltages up to 250 V.

During service the electrical resistance of overshoes and overboots made from conducting or antistatic material may change significantly due to flexing and contamination. It is therefore necessary to ensure that the product is capable of fulfilling its desired function of dissipating electrostatic charges and also of giving any desired protection during the whole of its life. The user is therefore recommended to carry out the test for electrical resistance at regular and frequent intervals. If in doubt, the manufacturer should be consulted for frequency of testing.

In a building where conducting or antistatic overshoes and overboots are in use, the resistance of the flooring should be such that it does not invalidate the protection against electric mains shock or static electricity provided by the footwear. A specification for conducting flooring is given in BS 3187.

WARNING. In use, no insulating element should be introduced between the inner side of the overshoes and overboots and the foot of the wearer.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

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

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 6, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This British Standard specifies requirements for lined lightweight rubber overshoes and overboots with defined electrical properties.

NOTE The titles of the publications referred to in this standard are listed on the inside back cover.

2 Definitions

For the purposes of this British Standard the following definitions apply.

2.1
backstrip

internal or external strip of fabric or rubber covering the back centre line of the overshoe or overboot

2.2
top binding

narrow strip of rubber or other material along the top of the overshoe or overboot to give a finished appearance

2.3
counter

a) Heel area of the upper.

b) Reinforcement for stiffening the heel area of the upper.

2.4
filler

material used to fill any cavity between insole and outsole

2.5
foxing strip

reinforcement strip to protect the bottom edge of the upper

2.6
heel piece

internal reinforcement for stiffening the heel counter area

2.7
insole

bottom inside component of the overshoe or overboot adjacent to the bottom of the foot

2.8
outsole

bottom outside component providing the walking surface of the overshoe or overboot

2.9
toecap

external reinforcement of the overshoe or overboot upper in the toe area

2.10
upper

that part of the overshoe or overboot above the outsole covering the foot and leg

NOTE The illustrations in Figure 1 show the general locations of parts, not all of which are necessarily included in the construction or implied in the specification, and are intended to combine the features of different styles. In the case of moulded overboots, the terms indicate a particular area of the overboot, rather than a separate part.

3 Fabrics

The lining of an overshoe or overboot shall consist of one or more plies of fabric(s) forming the leg and vamp lining. They shall be free from such defects as would detract from the serviceability of the finished product. When tested in accordance with Appendix A, the strength of the one fabric, or the composite strength if more than one fabric, shall be as given in Table 1.

Table 1 — Minimum coated fabric strengths for lightweight overshoes and overboots

Type of fabric	Breaking strength per 25 mm width	
	Along the length of material	Across the breadth of material
	N	N
Woven	250	250
Knitted	180	180

4 Minimum thickness

4.1 Upper and foxing strip

When determined as described in Appendix B, the combined thickness of rubber and fabric shall be not less than 0.75 mm at any point round the top circumference, ignoring any of the top binding, and not less than 1.5 mm at any point round the foxing strip.

4.2 Soling

4.2.1 *Minimum thickness*. The minimum thickness of soling shall not be less than 2.5 mm at any point when measured in accordance with **4.2.2**.

4.2.2 *Method of measurement of soling thickness*. Cut the overboot or overshoe through the centre of the sole longitudinal and perpendicular to the surface. Measure the thickness of the sole over any pattern from the lower surface of the filler at three widely separated points along the cut, using a graduated eyepiece with 0.1 mm scale spacing.

5 Reinforcements

The top of an overshoe or overboot shall be finished off by a binding or other suitable means.

NOTE Eyelets, if fitted, should be resistant to corrosion and should be securely fixed.

6 Physical properties of soling

6.1 Tensile and elongation requirements before ageing

The outsole shall be reduced to sheets or pieces in accordance with the method described in BS 5131-2.7. The sheets or pieces shall be of sufficient size and thickness to be able to stamp a maximum of ten type 1 or type 2 dumb-bell test pieces as specified in BS 903-A2. The tensile strength and elongation at break of the test pieces shall then be determined in accordance with BS 903-A2.

The type of dumb-bell test piece used shall be stated when quoting results.

Three test pieces shall be tested and the median value of the three test results shall be in accordance with the values given in Table 2. If the median of the results is below, and the highest individual value above the appropriate values given in Table 2, then two further test pieces shall be tested. The median of the five results shall be in accordance with the values given in Table 2.

Table 2 — Tensile strength and elongation at break of outsole

	Minimum tensile strength	Minimum elongation at break
	MPa	%
Outsole	8.5	250

6.2 Tensile requirements after ageing

After submission to the ageing treatment specified in clause **3** of BS 903-A19:1986, using a normal oven, the median values for tensile strength and elongation at break of outsoles determined in **6.1** shall not show changes from the unaged median values greater than the amount specified in Table 3.

Table 3 — Tensile strength and elongation at break after ageing of outsoles

Ageing treatment	Maximum change after ageing	
	Tensile strength	Elongation at break
168 h at 70 ± 1 °C	± 20 % of unaged value	– 30 % + 10 % of unaged value

7 Electrical requirements for conducting and antistatic footwear

7.1 Electrically conducting footwear

The resistance of the overshoe or overboot when new shall not be greater than 1.5×10^5 Ω when determined in accordance with **A.4.15** a) of BS 2050:1978. Every article of footwear shall be tested.

7.2 Antistatic footwear

7.2.1 The resistance of the overshoe or overboot when new shall not be less than 75 kΩ when determined in accordance with **A.4.15** a) of BS 2050:1978. Every article of footwear shall be tested.

7.2.2 The resistance of the overshoe or overboot when new shall not be greater than 100 MΩ when determined in accordance with **A.4.15** b) of BS 2050:1978. Every article of footwear shall be tested.

8 Marking

Footwear shall be indelibly and legibly marked with the following:

a) the size, stamped on the inside;

b) the manufacturer's name or identification;

c) the number of this British Standard, i.e. BS 7193:1989[1)], stamped on the inside;

d) for electrically conducting footwear, each article shall have a red back strip together with a permanent red label bearing the words "Electrically Conducting" bonded, or otherwise securely fixed, in a suitable position to the outside of the footwear. The words "Test regularly" shall appear on each article on or near the label;

[1)] Marking BS 7193:1989 on or in relation to a product represents a manufacturer's declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the standard. The accuracy of the claim is therefore solely the responsibility of the person making the claim. Such a declaration is not to be confused with third party certification of conformity, which may also be desirable.

e) for antistatic footwear, each article shall have a lemon yellow backstrip together with a permanent lemon yellow label bearing the word "Antistatic" bonded, or otherwise securely fixed, in a suitable position to the outside of the footwear. The words "Test regularly" shall appear on each article on or near the label.

9 Labelling

Electrically conducting and antistatic footwear shall have an informative label supplied with each pair of overshoes and overboots. This label shall state:

"Flexing, contamination, damage and wear can cause changes in electrical resistance. TEST REGULARLY."

NOTE During service the electrical resistance of overshoes and overboots made from conducting or antistatic material may change significantly due to flexing and contamination. It is therefore necessary to ensure that the product is capable of fulfilling its desired function of dissipating electrostatic charges and also of giving any desired protection during the whole of its life. The user is therefore recommended to carry out the test for electrical resistance at regular and frequent intervals. If in doubt, the manufacturer should be consulted for frequency of testing.

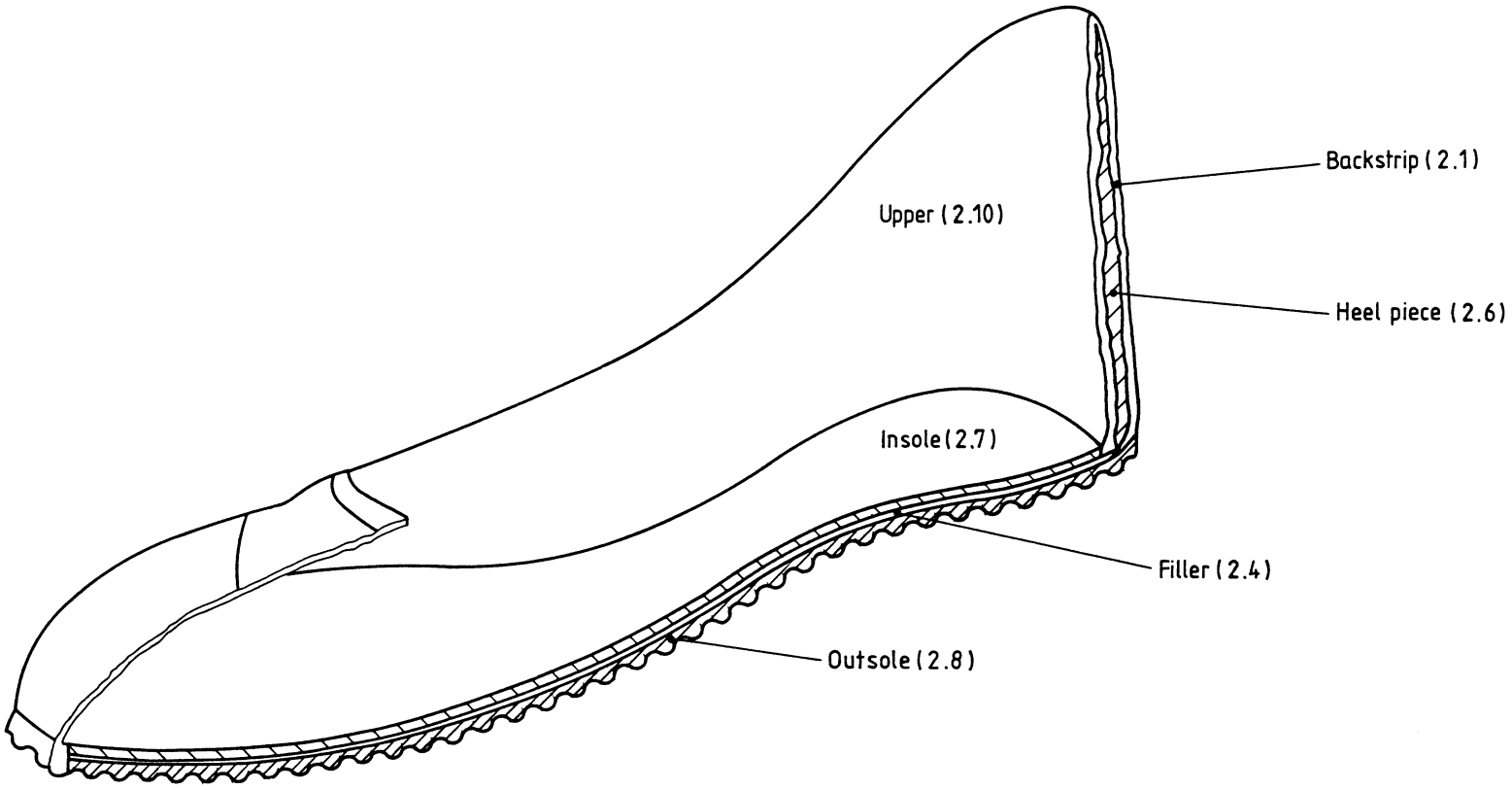

Figure 1 — Component parts of the footwear

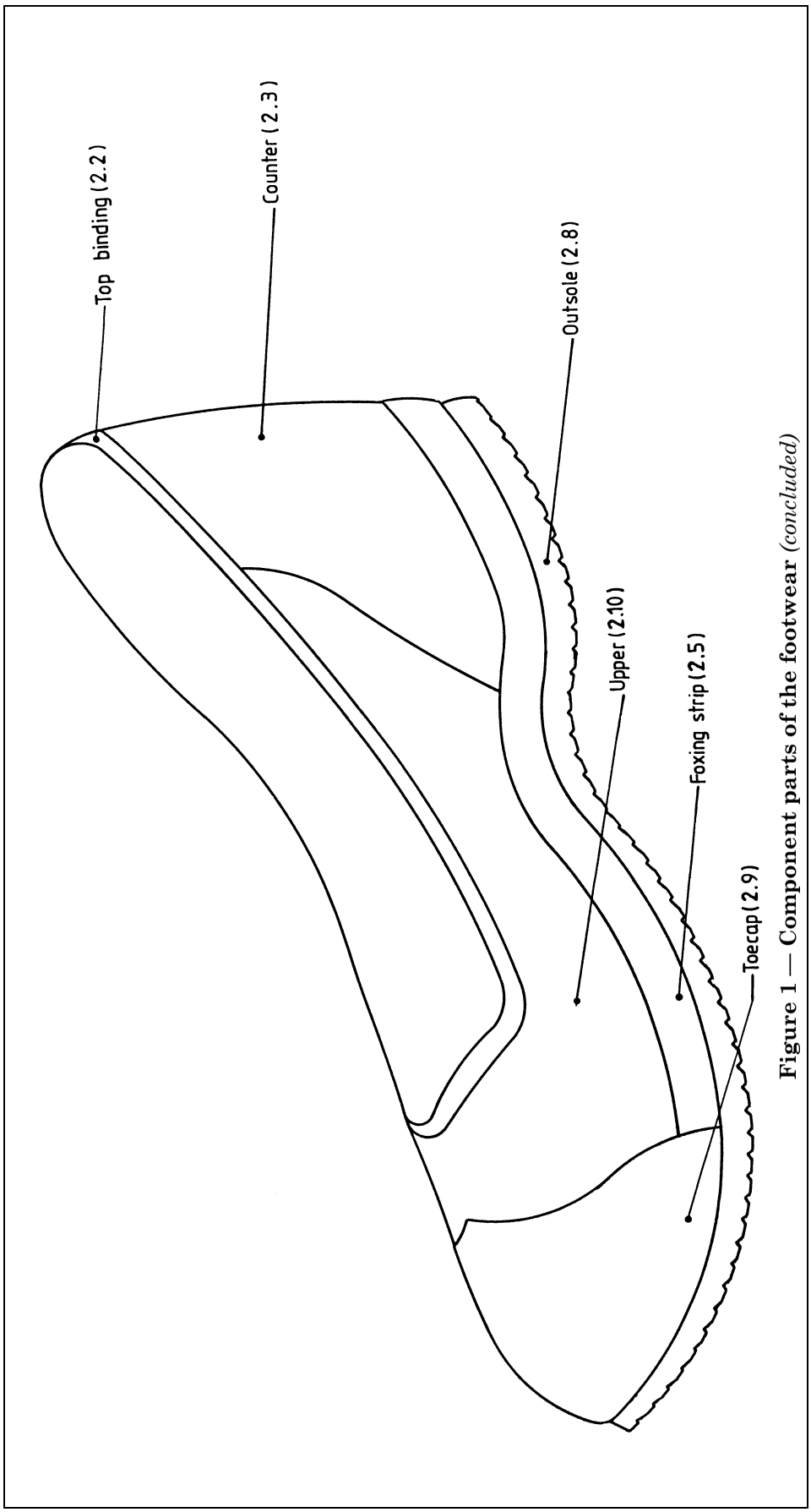

Figure 1 — Component parts of the footwear *(concluded)*

Appendix A Method of preparation and test for fabrics

Cut strip test pieces of rectangular shape, 25 mm wide, from the upper part of the footwear to be tested and through the full thickness of the upper, i.e. including the rubber covering where applicable. These test pieces should cover both length and breadth directions and be of sufficient length to permit a free length of 75 mm between the jaws of the testing machine.

If the height of the product does not permit a sample to be cut giving a free length of 75 mm between the jaws, a free length of 25 mm shall be used.

Determine the breaking strength of the material in both length and breadth directions in accordance with BS 3424-4, using the appropriate preload selected from the following:

1.0 N for a material of mass per unit area up to and including 200 g/m^2;

2.5 N for a material of mass per unit area over 200 g/m^2 up to and including 500 g/m^2;

5.0 N for a material of mass per unit area over 500 g/m^2.

Set the test jaws at 75 mm or 25 mm apart as appropriate.

Express the breaking strength of the material in the length and breadth directions for a test piece 25 mm in width.

Appendix B Method of measuring thickness of upper

Measure the thickness of rubber and fabric using a micrometer dial gauge firmly held in a rigid stand over a flat base plate of diameter at least 50 mm. Use a gauge graduated in divisions of 0.01 mm and which complies with the relevant requirements of BS 907 particularly in respect of accuracy of calibration and which is fitted with a flat contact, square to the plunger and parallel to the base plate, and which operates with a pressure of 20 ± 3 kPa. An area of contact of about 4 mm diameter has been found suitable.

Ensure that test pieces cut from boots are of sufficient area such that no part of the dial gauge contact overlaps the test piece edge.

Publications referred to

BS 903, *Methods of testing vulcanized rubber.*

BS 903-A2, *Determination of tensile stress-strain properties.*

BS 903-A19, *Heat resistance and accelerated ageing tests.*

BS 907, *Specification for dial gauges for linear measurement.*

BS 2050, *Specification for electrical resistance of conducting and antistatic products made from flexible polymeric material.*

BS 3187, *Specification for electrically conducting rubber flooring*[2)].

BS 3424, *Methods of test for coated fabrics.*

BS 3424-4:Method 6, *Method for determination of breaking strength and elongation at break.*

BS 5131, *Methods of test for footwear and footwear materials.*

BS 5131-2.7, *The preparation of test pieces from soling materials for physical testing.*

BS 5145, *Specification for lined industrial vulcanized rubber boots*[2)].

[2)] Referred to in the foreword only.

BSI — British Standards Institution

BSI is the independent national body responsible for preparing British Standards. It presents the UK view on standards in Europe and at the international level. It is incorporated by Royal Charter.

Revisions

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover. Tel: 020 8996 9000. Fax: 020 8996 7400.

BSI offers members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

Buying standards

Orders for all BSI, international and foreign standards publications should be addressed to Customer Services. Tel: 020 8996 9001. Fax: 020 8996 7001.

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

Information on standards

BSI provides a wide range of information on national, European and international standards through its Library and its Technical Help to Exporters Service. Various BSI electronic information services are also available which give details on all its products and services. Contact the Information Centre. Tel: 020 8996 7111. Fax: 020 8996 7048.

Subscribing members of BSI are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration. Tel: 020 8996 7002. Fax: 020 8996 7001.

Copyright

BSI
389 Chiswick High Road
London
W4 4AL