BRITISH STANDARD

BS 903-C1: 1991
BS 2782-2: Method 231A: 1991

BS 903 Methods of testing vulcanized rubber —

Part C1: Determination of surface resistivity —

BS 2782 Methods of testing plastics —

Part 2: Electrical properties —

Method 231A: Determination of surface resistivity

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Committees responsible for this British Standard

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British Floor Covering Manufacturers' Association

British Plastics Federation

British Rubber Manufacturers' Association Ltd.

EEA (the Association of Electronics, Telecommunications and Business Equipment Industries)

ERA Technology Ltd.

Electrical and Electronic Insulation Association (BEAMA Ltd.)

Federation of Resin Formulators and Applicators Ltd.

Health and Safety Executive

Medical Sterile Products Association

Ministry of Defence

RAPRA Technology Ltd.

Tyre Manufacturers' Conference (Service Committee)

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Foreword

This British Standard, which has been published under the direction of the Plastics and Rubber Standards Policy Committee, supersedes BS 903-C1:1982 and BS 2782-2:Method 231A:1982, which are withdrawn.

In this new edition additional electrode systems (rigid, liquid, soft foam) have been introduced and further information is given on other electrode systems. This standard provides a more exact equation for calculation of surface resistivity than that given in the previous edition and includes information from BS 6233[1)]. The dimensions of the electrodes are aligned with those recommended in BS 6233.

As regards conditioning the test specimens prior to testing, the internationally agreed period for rubber is a minimum of 16 h (see BS 903-A35), but for plastics a minimum of 88 h is usual (see ISO 291). However, for most rubbers and plastics, it is considered that 16 h to 24 h is adequate in the climatic conditions prevailing in the UK.

WARNING NOTE. This British Standard does not necessarily detail all the precautions necessary to meet the requirements of the Health and Safety at Work etc. Act 1974. Attention should be paid to any appropriate safety precautions and the method should be operated only by trained personnel.

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 10, 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)] Identical with IEC 93.

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0 Introduction

Surface resistivity is not a material property in the usual sense, but can be considered to be related to material properties under conditions of test. In many cases the measured value includes the effect of adventitious surface contamination.

Generally the surface resistivity measured on the clean, uncontaminated surface of a homogeneous material is directly related to its volume resistivity. However, for some materials, e.g. laminates, the surface resistivity of a clean surface may be quite unrelated to the volume resistivity of the material.

Surface resistivity tests may be affected by a number of factors including the following: the magnitude of applied voltage, the time of voltage application, the nature and geometry of the electrodes, the thickness of the test specimen, the ambient temperature, humidity and light intensity during conditioning and measurement, and the temperature and moisture content of the test specimen during measurement. A detailed discussion of these effects is given in BS 6233 and they have been taken into account in the preparation of this British Standard.

1 Scope

This British Standard gives a method for determining the electrical surface resistivity of rubbers and plastics from the current flowing between two electrodes mounted on the surface of the material when a voltage is applied between them. Procedures with various types of apparatus are described. All procedures enable the operator to determine surface resistivity when residual charge is negligible. One procedure, using a circuit shown in Figure 5, facilitates the determination of significant residual charge.

The method is suitable for materials with a range of surface resistivity levels of 10^8 Ω or greater. The range of applicability may be extended by the use of appropriate electrode systems and measuring devices.

The method is restricted in application to those materials where inhomogeneities are small in size by comparison with the dimensions of the electrode gap.

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
surface resistance

the quotient of a direct voltage applied between two electrodes on the surface of a specimen and the current between the electrodes at a given time of electrification, neglecting possible polarization phenomena at the electrodes

NOTE The current mainly passes through a surface layer of the test specimen and any associated moisture and surface contaminant, but it also includes a component through the volume of the test specimen.

2.2
surface resistivity

the measured surface resistance calculated to apply to a square

NOTE 1 The size of the square is immaterial.
NOTE 2 The SI unit of surface resistivity is the ohm (Ω). In practice this is sometimes referred to as "ohm per square".

3 Form of test specimen

3.1 General

The test specimen shall be a flat smooth disk or sheet of size greater than the diameter of the annular electrode (see clause **5**).

Test specimens used for comparative tests shall be, as nearly as practicable, of the same thickness.

3.2 Films, sheet materials and laminates

These shall be tested in the thickness supplied.

3.3 Moulding compounds and extrusion compounds

Unless otherwise specified in the material specification, the thickness of the test specimens shall be in the range 0.5 mm to 5 mm.

NOTE Finished items can be tested using the same method providing that there is a sufficiently large flat area available to accommodate the electrodes.

4 Number of test specimens

Three test specimens shall be used unless otherwise stated in the material specification.

5 Specimen holders and electrodes

5.1 General

Three electrodes shall be applied to the specimen:

a) a guarded (current measuring) electrode;

b) an unguarded (voltage supply) electrode;

c) a guard electrode.

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