

Physical testing of rubber —

Part 4: Acquisition and presentation of comparable multi-point data

ICS 83.060

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to PRI/22, Physical testing of rubber, upon which the following bodies were represented:

- British Rubber Manufacturers Association Ltd
- Chemical Industries Association
- Materials Engineering Research Laboratory Ltd
- RAPRA Technology Ltd
- Royal Society of Chemistry
- SATRA Technology Centre
- Tun Abdul Razak Research Centre

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Foreword

This British Standard has been prepared under the direction of PRI/22,
Physical testing of rubber.

BS 903-4 has been prepared because designers and users of rubbers find that published data cannot always be readily used to compare the properties of similar materials, especially when the data have been supplied by different sources. Even if the same standard tests have been used, they often allow the adoption of alternative test conditions and the results are not necessarily comparable. The purpose of BS 903-4 is to identify specific methods and conditions of test to be used for the acquisition and presentation of data in order that valid comparisons between materials can be made.

A complementary British Standard BS 903-3 is concerned with single-point data. Such data represent the most basic method for characterizing materials and are useful for the initial stages of material selection. BS 903-4 identifies test conditions and procedures for the measurement and presentation of a more substantial quantity of data. Each property here is characterized by multi-point data that demonstrate how that property depends upon important variables such as time, temperature and environmental effects. These data therefore enable more discriminating decisions to be made regarding a material's suitability for a particular application. Some data are also considered adequate for undertaking predictions of performance in service, although it should be recognized that for purposes of design additional data will often be needed.

BS 903-3 and this British Standard together define the means of acquiring and presenting a core set of comparable data for use in material selection. Use of these standards should result in a rationalization of effort and a reduction of cost associated with the provision of these data. Furthermore, reference to these standards will simplify the development of data models for the computerized storage of data and exchange of data concerning material properties.

Where appropriate, values of test variables (for example, temperature) have been specified in this standard. However, because of the wide range of conditions in which rubbers perform, for some tests the standard gives guidance to the selection of certain test conditions to cover the operating range for a particular rubber and application. Because rubber compounds and their application vary widely, there is no obligation to generate data under all the test conditions given in this standard.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its 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 9 and a back cover.

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1 Scope

BS 903-4 identifies specific test procedures for the acquisition and presentation of comparable multi-point data for selected properties of rubber compounds. The data are generated as a function of important variables such as time, temperature and environmental effects.

Guidance on the interpretation of results is given in Annex A.

2 Normative references

The following references documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 903:A2, *Physical testing of rubber — Part A2: Method for determination of tensile stress strain properties*. (ISO 37)

BS 903:A6, *Physical testing of rubber — Part A6: Method for determination of compression set at ambient, elevated or low temperatures*. (ISO 815)

BS 903:A15, *Physical testing of rubber — Part A15: Method for determination of creep in compression or shear*. (ISO 8013)

BS 903:A26, *Physical testing of rubber — Part A26: Method for determination of hardness (hardness between 10 IRHD and 100 IRHD)*. (ISO 48)

BS 903:A35, *Physical testing of rubber — Part A35: Temperatures, humidities and times for conditioning and testing of test pieces*. (ISO 471)

BS 903:A43, *Physical testing of rubber — Part A43: Method for determination of resistance to ozone cracking (static strain test)*. (ISO 1431-1)

BS 903:A51, *Methods of testing vulcanized rubber — Part A51: Determination of resistance to tension fatigue*. (ISO 6943)

BS 903:A52, *Methods of testing vulcanized rubber — Part A52: Determination of ageing characteristics by measurement of stress at a given elongation*. (BS ISO 6914)

BS 903:A64, *Physical testing of rubber — Part A64: Method for the preparation of, mixing and vulcanization of rubber test mixes*. (ISO 2393)

BS ISO 1817, *Rubber, vulcanized or thermoplastic — Determination of the effects of liquids*. (BS 903-A16)

BS ISO 2230, *Rubber products — Guide to storage*.

BS ISO 3384, *Rubber, vulcanized or thermoplastic — Determination of stress relaxation in compression at elevated temperatures*. (BS 903-A42)

BS ISO 4664, *Rubber — Guide to the determination of dynamic properties*.

BS ISO 4665, *Rubber, vulcanized and thermoplastic — Resistance to weathering*.

ISO 11346, *Rubber, vulcanized or thermoplastic — Estimation of life-time and maximum temperature of use from an Arrhenius plot*.

3 Terms and definitions

For the purposes of this British Standard, the following terms and definitions apply.

3.1

multi-point data

data characterizing a rubber material by means of a number of test results for a property measured over a range of test conditions

3.2

indicative property

property that has been selected to reveal the influence of an environment on a material through a comparison of measurement of the property before and after exposure