BSI Standards Publication

Rubber, vulcanized or thermoplastic — Determination of compression stress-strain properties

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National foreword

This British Standard is the UK implementation of ISO 7743:2017. It supersedes BS ISO 7743:2011, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PRI/22, Testing and analysis of rubber.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 2, *Testing and analysis*.

This fifth edition cancels and replaces the fourth edition (ISO 7743:2011), of which it constitutes a minor revision. The changes compared to the previous edition are as follows:

— the list of normative references has been updated in Clause 2;

— more detailed explanation has been added on the interpretation of the 25 % strain in 12.2.

Introduction

Knowledge of compression stress-strain properties is important in the design of, for instance, bridge bearings, anti-vibration mountings and O-rings. Measurement of compression stress-strain behaviour is also used for the quality control of small O-rings and other small products (i.e. those under 2 mm thick) where hardness cannot easily be measured. Compression tests are also used to detect the presence of porosity in products such as pipe sealing rings. Compression can be uniaxial or biaxial depending on test piece shape and experimental conditions. If there is no friction at the interface between the test piece and the compression device, compression is uniaxial. If friction is significant, the test piece shape affects the nature of the compression. When the thickness of the test piece is small, Saint Venant's principle is not applicable: the boundary condition at the interface influences the stress and strain fields and compression becomes biaxial (the thinner the test piece, the higher the biaxiality). The test piece behaves as if an additional radial compression were applied (friction hampers the radial expansion due to axial compression) and this phenomenon needs to be taken into account when material properties such as moduli are to be derived from compression results.

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WARNING 1 — Persons using this document should be familiar with normal laboratory practice. This document does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and to determine the applicability of any other restrictions.

WARNING 2 — Certain procedures specified in this document might involve the use or generation of substances, or the generation of waste, that could constitute a local environmental hazard. Reference should be made to appropriate documentation on safe handling and disposal after use.

1 Scope

This document specifies methods for the determination of the compression stress-strain properties of vulcanized or thermoplastic rubber using a standard test piece, a product or a part of a product.

Four procedures are given:

— using standard test piece A with the metal plates lubricated (method A);

— using standard test piece A with the metal plates bonded to the test piece (method B);

— using standard test piece B (method C);

— using a product or a part of a product with the metal plates lubricated (method D).

The methods are not suitable for materials that exhibit high set.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 5893 , *Rubber and plastics test equipment — Tensile, flexural and compression types (constant rate of traverse) — Specification*

ISO 18899:2013 , *Rubber — Guide to the calibration of test equipment*

ISO 23529 , *Rubber — General procedures for preparing and conditioning test pieces for physical test methods*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp