BRITISH STANDARD

BS 2752:2003

Chloroprene rubber compounds — Specification

ICS 83.060

BSI
British Standards

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to PRI/54, Rubber compounds, upon which the following bodies were represented:

British Rubber Manufacturers Association Ltd.

Chemical Industries Association

Ministry of Defence

RAPRA Technology Ltd.

Tun Abdul Razak Research Centre

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 18 June 2003

Amendments issued since publication

Amd. No.	Date	Comment

The following BSI references relate to the work on this British Standard:
Committee reference PRI/54
Draft for comment 02/122016 DC

ISBN 0 580 41852 9

Contents

Foreword

This British Standard has been prepared under the direction of PRI/54, Rubber compounds. It supersedes BS 2752:1990 which is withdrawn.

One technical change has been made, namely the inclusion of the larger type 1 dumbbell of BS 903-A2 as an alternative to the type 2 dumbbell for the measurement of tensile strength and elongation at break (Table 2). This edition otherwise comprises an editorial revision of the 1990 standard, in which the presentation has been changed to align the text with other British Standards in the group.

It is emphasized that this British Standard covers chloroprene rubber compounds for general purpose applications and does not require the special compounding which is necessary to achieve improvement in any one specific property.

Other British Standards in this group for rubber compounds are as follows:

BS 1154, *Specification for natural rubber compounds.*

BS 1155, *Specification for natural rubber compounds for extrusion*.

BS 2751, *Specification for general purpose acrylonitrile-butadiene rubber compounds*.

BS 3227, *Specification for butyl rubber compounds (including halobutyl compounds)*.

BS 6014, *Specification for ethylene propylene rubber compounds*.

BS 6996, *Specification for mineral oil resistant acrylonitrile-butadiene rubber compounds*.

The following British Standards are also relevant to this standard.

BS 3558, *Glossary of rubber terms*.

BS 3734-1, *Rubber — Tolerances for products — Part 1: Dimensional tolerances*.

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 to ii, pages 1 to 5 and a back cover.

The BSI copyright notice displayed in this document indicates when the document was last issued.

1 Scope

This British Standard specifies compositional and physical property requirements for five chloroprene rubber compounds of hardness range 40 IRHD to 80 IRHD, designated C40, C50, C60, C70 and C80.

These compounds are intended for the manufacture of items in the form of extrusions, mouldings, moulded or calendered sheet and for items cut or punched from sheet.

NOTE 1 The compounds do not necessarily have good electrical insulating properties.

NOTE 2 The chloroprene rubber compounds specified in this standard are not required to be compounded to be resistant to ozone attack and their resistance to ozone is not tested.

Potential users should seek technical advice if they are unsure as to whether ozone resistance is required for their application. The inherent level of resistance in chloroprene rubber may not be sufficient.

2 Normative references

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

BS 903-A1:1996, *Physical testing of rubber — Part A1: Determination of density.*

BS 903-A2:1995, *Physical testing of rubber — Part A2: Method for determination of tensile stress–strain properties.*

BS 903-A6:1992, *Physical testing of rubber — Part A6: Method for determination of compression set at ambient, elevated or low temperatures.*

BS 903-A13:1990, *Physical testing of rubber — Part A13: Determination of stiffness at low temperature (Gehman test).*

BS 903-A19:1998, *Physical testing of rubber — Part A19: Rubber, vulcanized or thermoplastic — Accelerated ageing and heat resistance tests.*

BS 903-A26:1995, *Physical testing of rubber — Part A26: Method for Determination of hardness (hardness between 10 IRHD and 100 IRHD).*

BS 903-A37:1997, *Physical testing of rubber — Part A37: Determination of adhesion to and corrosion of metals.*

BS ISO 1817:1999, *Rubber, vulcanized — Determination of the effect of liquids.*

3 Classification

Compounds shall be classified according to their vulcanized hardness, in international rubber hardness degrees (IRHD), and designated by grade as shown in Table 1.

Table 1 — Compound classification

Grade designation	Hardness after vulcanization (IRHD)
C40[a]	40^{+5}_{-4}
C50	50^{+5}_{-4}
C60	60^{+5}_{-4}
C70	70^{+5}_{-4}
C80	80^{+5}_{-4}

[a] Compound C40 is not necessarily suitable for extrusion.

4 Composition

The compounds shall be based solely on slow crystallization rate chloroprene polymer(s) reinforced only with carbon black, vulcanized with metallic oxides and containing at least 2 parts per hundred of rubber by mass (p.h.r.) of a suitable antioxidant.

All ingredients of the mix shall be free from grit and extraneous material.

NOTE 1 Brown factice, up to 10 parts per hundred of rubber by mass, may be used.

No reclaimed rubber or ground vulcanized rubber shall be used.

NOTE 2 Chemical analysis may be carried out on either two-thickness sample sheets or sample items, as practicable, to verify that the composition of the mix conforms to this clause.

The methods described in BS 4181-1, BS 5923-2, BS 7164-2.2, BS 7164-3, BS 7164-5, BS 7164-7.1, BS 7164-13, BS 7164-14, BS 7164-21 and BS 7164-22.1 should be used where relevant.

5 Preparation of test sheet

From each batch of rubber mix, a two-thickness test sheet of the following dimensions shall be prepared for testing.

The sheet shall be approximately 250 mm square with a thicker section along one side 35 mm to 50 mm wide and (6.30 ± 0.15) mm thick. The remainder of the sheet shall be (2.00 ± 0.15) mm thick. The thicker sections of the sheet shall not be additionally vulcanized.

If part of the 6.3 mm section is moulded in the form of cylindrical buttons, complying with the type B test piece defined in BS 903-A6 for the purpose of compression set tests, the mould cavities shall be individually charged with pellets and not by the flow of the excess rubber from the remainder of the mould. The minimum number of buttons moulded shall be nine and they shall be in a group at one end of the 6.3 mm section.

6 Physical properties of the vulcanized test sheet

Test pieces cut from the test sheet (see Clause **5**) shall comply with the relevant requirements given in Table 2 when tested by the methods specified in Table 2.

NOTE Guidance for the preparation and testing of rubber products is given in Annex A.

7 Marking

The compound, as sheet or items, shall be accompanied by the following information (see also BS ISO 2230):

a) number and date of this British Standard, i.e. BS 2752:2003[1)], and grade designation;

b) quarter and year of cure;

c) manufacturer's identity or trade mark;

d) manufacturer's batch number or similar means of production identity.

[1)] Marking BS 2752:2003 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.

Table 2 — Physical properties of two-thickness test sheets

Physical property	Grade designation					Test method in BS 903 parts or BS ISO series and type of test piece where appropriate
	C40	C50	C60	C70	C80	
Hardness after vulcanization (IRHD)	40^{+5}_{-4}	50^{+5}_{-4}	60^{+5}_{-4}	70^{+5}_{-4}	80^{+5}_{-4}	Part A26, method N, two plies, 6.30 mm and 2.00 mm, with the thicker ply on top
Density (Mg/m^3)	Agreed value ± 0.02[a]					Part A1, method A
Minimum tensile strength (MPa)	9	12	13	13	13	Part A2, type 1 or type 2 dumbbells
Minimum elongation at break (%)	450	400	250	200	100	
Maximum compression set (%)	30	30	25	25	25	Part A6, type B test piece Lubricated, 24^{0}_{-2} h at (70 ± 1) °C
Resistance to liquids						BS ISO 1817, 24^{0}_{-2} h at (40 ± 1) °C
Volume change (%) after immersion in liquid B	–0 +100	–0 +80	–0 +70	–0 +70	–0 +60	
Resistance to low temperature Temperature in °C at which the stiffness shall not exceed 70 MPa	–40	–40	–30	–30	–30	Part A13, using ethyl alcohol/CO_2 cooling medium
Adhesion to and corrosion of metals	There shall be no corrosion or pitting of the metals, and the vulcanizates shall not adhere to the metal surfaces or show any sign of liquid exudation. Discoloration of the metal surfaces shall not be considered cause for rejection.					Part A37, using carbon steel and copper. (168 ± 2) h, (70 ± 1) °C
Resistance to accelerated ageing	–0	–0	–0	–0	–0	Part A19, air-oven method A, (168 ± 2) h, (70 ± 1) °C
Change in hardness degrees (IRHD)	+7	+7	+7	+7	+7	Part A26, method N, measurement before and after ageing on the same 2 plies each 2.00 mm thick
Maximum change in tensile strength (% of original value)	–12	–12	–12	–12	–12	Part A2, type 1 or type 2 dumbbells
Maximum change in elongation at break (% of original value)	–20	–20	–20	–20	–20	

[a] No values are specified for density, but it is recommended that a value be established for each composition. This may provide a useful check when a series of batches of the same composition has to be tested for compliance with this British Standard.

Annex A (informative)
Guidance for the preparation and testing of rubber products

This British Standard specifies requirements for the rubber compounds when tested using a press-cured sample sheet. Where manufactured articles are to be tested, the shape and size can prevent the preparation of some or all test pieces. In this case, agreement between manufacturer and purchaser should be sought on the procedure to verify compliance of the manufactured article. Where standard test pieces can be prepared from the articles they may be used for quality control tests.

Finished rubber items should be free from surface imperfections, voids, inclusions, flow marks, moulding faults and defects which would impair satisfactory performance and should show minimal accelerator bloom.

Finished rubber items should be stored in accordance with BS ISO 2230.

Bibliography

BS 1154:2003, *Specification for natural rubber compounds.*[2)]

BS 1155:2003, *Specification for natural rubber compounds for extrusion.*[2)]

BS 2751:2001, *Specification for general purpose acrylonitrile-butadiene rubber compounds.*[2)]

BS 3227:2003, *Specification for butyl rubber compounds (including halobutyl compounds).*[2)]

BS 3558-1:1997, *Glossary of rubber terms — Part 1: International terms.*[2)]

BS 3558-2:2001, *Glossary of rubber terms — Part 2: Additional British terms.*[2)]

BS 3734-1:1997, *Rubber — Tolerances for products — Part 1: Dimensional tolerances.*[2)]

BS 4181-1:1985, *Identification of rubbers by infra-red spectrometry — Part 1: Method for identification of hydrocarbon, chloroprene, nitrile and chlorosulphonated polyethylene rubbers.*

BS 5923-2:1980, *Methods for chemical analysis of rubber — Part 2: EDTA titrimetric method for determination of zinc content of rubber products.*

BS 6014:2003, *Specification for ethylene propylene rubber compounds.*[2)]

BS 6996:2003, *Specification for mineral oil resistant acrylonitrile-butadiene rubber compounds.*[2)]

BS 7164-2.2:1990, *Chemical tests for raw and vulcanized rubber — Part 2.2: Sample preparation — Vulcanized rubber.*

BS 7164-3:1992, *Chemical tests for raw and vulcanized rubber — Part 3: Methods for determination of solvent extract.*

BS 7164-5:1991, *Chemical tests for raw and vulcanized rubber — Part 5: Methods for determination of ash content.*

BS 7164-7.1:1990, *Chemical tests for raw and vulcanized rubber — Part 7.1: Methods for determination of polymer content — Polyisoprene content.*

BS 7164-13:1994, *Chemical tests for raw and vulcanized rubber — Part 13: Method for determination of total hydrocarbon content.*

BS 7164-14:1996, *Chemical tests for raw and vulcanized rubber — Part 14: Methods for determination of carbon black content.*

BS 7164-21:1996, *Chemical tests for raw and vulcanized rubber — Part 21: Determination of nitrogen content.*

BS 7164-22.1:1994, *Chemical tests for raw and vulcanized rubber — Part 22.1: Determination of chlorine content — Parr bomb method.*

BS ISO 2230:2002, *Rubber products — Guidelines for storage.*

[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: +44 (0)20 8996 9000. Fax: +44 (0)20 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: +44 (0)20 8996 9001. Fax: +44 (0)20 8996 7001. Email: orders@bsi-global.com. Standards are also available from the BSI website at http://www.bsi-global.com.

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: +44 (0)20 8996 7111. Fax: +44 (0)20 8996 7048. Email: info@bsi-global.com.

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: +44 (0)20 8996 7002. Fax: +44 (0)20 8996 7001. Email: membership@bsi-global.com.

Information regarding online access to British Standards via British Standards Online can be found at http://www.bsi-global.com/bsonline.

Further information about BSI is available on the BSI website at http://www.bsi-global.com.

Copyright

BSI
389 Chiswick High Road
London
W4 4AL