

Butadiene rubber (BR) — Solution- polymerized types — Evaluation procedures

ICS 83.060

National foreword

This British Standard is the UK implementation of ISO 2476:2009. It supersedes BS 5047:1997 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PRI/50, Rubber - Raw, natural and synthetic, including latex and carbon black.

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

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 2476 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 3, *Raw materials (including latex) for use in the rubber industry*.

This fifth edition cancels and replaces the fourth edition (ISO 2476:1996), which has been technically revised.

Butadiene rubber (BR) — Solution-polymerized types — Evaluation procedures

WARNING — Persons using this International Standard should be familiar with normal laboratory practice. This standard 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 ensure compliance with any national regulatory conditions.

1 Scope

This International Standard specifies:

- physical and chemical tests on raw rubbers;
- standard materials, standard test formulations, equipment and processing methods for evaluating the vulcanization characteristics of solution-polymerized butadiene rubbers (BR), including oil-extended types (OEBR), and the tensile stress-strain properties of vulcanized mixes.

2 Normative references

The following referenced 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.

ISO 37, *Rubber, vulcanized or thermoplastic — Determination of tensile stress-strain properties*

ISO 247:2006, *Rubber — Determination of ash*

ISO 248, *Rubber, raw — Determination of volatile-matter content*

ISO 289-1, *Rubber, unvulcanized — Determinations using a shearing-disc viscometer — Part 1: Determination of Mooney viscosity*

ISO 1795, *Rubber, raw natural and raw synthetic — Sampling and further preparative procedures*

ISO 2393, *Rubber test mixes — Preparation, mixing and vulcanization — Equipment and procedures*

ISO 3417, *Rubber — Measurement of vulcanization characteristics with the oscillating disc curemeter*

ISO 6502, *Rubber — Guide to the use of curemeters*

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

3 Sampling and further preparative procedures

- 3.1 Take a laboratory sample of approximately 1,5 kg by the method described in ISO 1795.
- 3.2 Prepare test samples in accordance with ISO 1795.

4 Physical and chemical tests on raw rubber

4.1 Mooney viscosity

Determine the Mooney viscosity in accordance with ISO 289-1 on a test sample prepared as indicated in ISO 1795 (preferably without milling). If milling is necessary, maintain the mill roll surface temperature at $35\text{ °C} \pm 5\text{ °C}$. Record the result as ML(1 + 4) at 100 °C.

4.2 Volatile matter

Determine the volatile-matter content in accordance with ISO 248.

4.3 Ash

Determine the ash in accordance with ISO 247.

5 Preparation of test mixes for evaluation of butadiene rubbers

5.1 Standard test formulations

Two standard test formulations are given in Table 1. The materials used shall be national or international standard reference materials (or, if no standard reference material is available, as agreed by the interested parties).

Table 1 — Standard test formulations

Material	Parts by mass	
	Non-oil-extended	Oil-extended
Butadiene rubber	100,00	$100,00 + Y^a$
Zinc oxide	3,00	3,00
IRB ^b	60,00	$0,6 \times (100 + Y)$
Stearic acid	2,00	2,00
ASTM 103 oil ^c	15,00	—
Sulfur	1,50	1,50
TBBS ^d	0,90	$0,009 \times (100 + Y)$
Total	182,40	$167,40 + 1,609Y$
Calculated density, g/cm ³	1,11	—

^a Y = parts of oil, by mass, per 100 parts of base polymer in the oil-extended rubber.

^b Use the current industrial reference black. Dry the material for 1 h at $125\text{ °C} \pm 3\text{ °C}$ and store in a tightly closed container.

^c This oil, density 0,92 g/cm³, is produced by the Sun Refining and Marketing Company and distributed by R.E. Carroll, Inc., 1570 North Olden Avenue Ext, Trenton, NJ 08638-3204, USA. Overseas requests should be directed to Sunoco Overseas, Inc., 1801 Market Street, Philadelphia, PA 19103-1699, USA. This Information is given for convenience of users of this International Standard and does not constitute an endorsement by ISO of the product named. Alternative oils may be used, but might give slightly different results.

^d *N*-tert-butylbenzothiazole-2-sulfenamide. This is supplied in powder form having an initial insoluble-matter content, determined in accordance with ISO 11235, of less than 0,3 %. The material shall be stored at room temperature in a closed container and the insoluble matter checked every 6 months. If this is found to exceed 0,75 %, the material shall be discarded or recrystallized.