
**Rubber and rubber products —
Determination of total sulfur content
using an automatic analyser**

*Caoutchouc et additifs pour caoutchouc — Dosage du soufre total à
l'aide d'un analyseur automatique*

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Contents

Page

Foreword.....	iv
1 Scope.....	1
2 Normative references.....	1
3 Terms and definitions.....	1
4 Principle.....	2
5 Requirements for apparatus.....	2
6 Reagents.....	3
7 Instrument (automatic analyser) preparation and calibration.....	3
8 Sampling and preparation of test piece.....	3
9 Procedure.....	4
10 Calculation.....	4
11 Precision.....	4
12 Test report.....	4
Annex A (informative) Precision.....	5
Bibliography.....	6

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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.

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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of 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 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 second edition cancels and replaces the first edition (ISO 15671:2000), which has been technically revised.

The main changes are as follows:

- an alternative detector to determine sulfur dioxide has been added;
- sampling and preparation of the test piece have been added;
- precision statement has been updated in [Annex A](#).

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Rubber and rubber products — Determination of total sulfur content using an automatic analyser

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 an instrumental (automatic analyser) method for the determination of total sulfur in rubber and rubber products.

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 123, *Rubber latex — Sampling*

ISO 124, *Latex, rubber — Determination of total solids content*

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

3 Terms and definitions

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

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

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1

sample

unit selected to represent the material to be analysed

3.2

test piece

actual material used in the analysis

3.3

control sample

material with a recognized content of sulfur, analysed with each set of test pieces

4 Principle

4.1 Specified here is a reliable, rapid, instrumental (automatic analyser) method for determining total sulfur in rubber and rubber products. The sulfur is determined by a single instrumental procedure consisting of weighing a test piece, placing it in the instrument and initiating the (subsequently automatic) analytical process. The analysis may be controlled manually to a limited degree, and a capability to perform computations automatically may be provided by the instrument used to perform the analysis.

4.2 The actual process can vary substantially from instrument to instrument because a variety of means can be used to meet the primary requirements of the method. The method includes the following:

- a) conversion of sulfur-containing materials to sulfur dioxide in an oxygen stream;
- b) determination of the sulfur dioxide by one of three detection schemes, and hence the total sulfur content.

4.3 In the hydrogen peroxide detection configuration, the sulfur dioxide is absorbed in hydrogen peroxide, converting sulfur dioxide to sulfuric acid which is subsequently titrated with standard alkali, enabling the sulfur to be calculated.

4.4 In the iodine solution detection configuration, the sulfur dioxide is absorbed in standard iodine solution, reducing iodine to iodide which is subsequently measured by a polarized dual platinum electrode system, enabling the sulfur to be calculated.

4.5 In the sulfur dioxide detection configuration, the sulfur dioxide is passed through an infrared absorption detector or thermal conductivity detector or any equivalent detector and determined using a sulfur dioxide standard, enabling the sulfur to be calculated.

5 Requirements for apparatus

5.1 Because a variety of instrumental (automatic analyser) component configurations can be used satisfactorily for this method, no specifications are presented with regard to overall system design. Functionally, however, the following requirements are specified for all instruments.

5.2 The conditions for combustion of the sample shall be such that (for the full range of applicable samples) sulfur-containing components shall be converted completely to sulfur dioxide. General instrumental conditions that affect complete combustion include:

- a) availability of the oxidant;
- b) temperature;
- c) time.

5.3 For the configuration described in [4.3](#), a correction shall be made for acidity when chlorine is present by titration of a portion of the absorption solution for chloride, which is calculated as hydrochloric acid and subtracted from the total acidity.

5.4 In the iodine solution and sulfur dioxide detection methods ([4.4](#) and [4.5](#)), the detection system shall determine sulfur without interference and the detector should ideally provide a linear response that correlates directly with sulfur concentration over the full range of possible concentrations from the applicable test samples.