
**Rubber compounding ingredients —
Carbon black — Determination of solvent-
extractable material**

*Ingrédients de mélange du caoutchouc — Noir de carbone —
Détermination des matières extractibles par les solvants*

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO 6209:2009](https://standards.iteh.ai/catalog/standards/sist/798072c6-7aa1-4109-ab3b-ec5f02628b83/iso-6209-2009)

<https://standards.iteh.ai/catalog/standards/sist/798072c6-7aa1-4109-ab3b-ec5f02628b83/iso-6209-2009>



PDF disclaimer

This PDF file may contain embedded typefaces. In accordance with Adobe's licensing policy, this file may be printed or viewed but shall not be edited unless the typefaces which are embedded are licensed to and installed on the computer performing the editing. In downloading this file, parties accept therein the responsibility of not infringing Adobe's licensing policy. The ISO Central Secretariat accepts no liability in this area.

Adobe is a trademark of Adobe Systems Incorporated.

Details of the software products used to create this PDF file can be found in the General Info relative to the file; the PDF-creation parameters were optimized for printing. Every care has been taken to ensure that the file is suitable for use by ISO member bodies. In the unlikely event that a problem relating to it is found, please inform the Central Secretariat at the address given below.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 6209:2009

<https://standards.iteh.ai/catalog/standards/sist/798072c6-7aa1-4109-ab3b-ec5f02628b83/iso-6209-2009>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2009

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword.....	iv
1 Scope	1
2 Normative references	1
3 Principle	1
4 Extraction solvent.....	1
5 Apparatus and material	2
5.1 Extraction apparatus	2
5.2 Other apparatus and material	2
6 Sampling	2
7 Procedure	5
8 Expression of results	5
9 Test report	6
Annex A (informative) Precision of the test method	7
Bibliography	8

iteh STANDARD PREVIEW
(standards.iteh.ai)

[ISO 6209:2009](https://standards.iteh.ai/catalog/standards/sist/798072c6-7aa1-4109-ab3b-ec5f02628b83/iso-6209-2009)

<https://standards.iteh.ai/catalog/standards/sist/798072c6-7aa1-4109-ab3b-ec5f02628b83/iso-6209-2009>

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 6209 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 fourth edition cancels and replaces the third edition (ISO 6209:1988), which has been technically revised.

The main changes are as follows:

- the extraction time has been reduced to 8 h (instead of 16 h);
- precision data have been included (see Annex A).

iTeh STANDARD PREVIEW
(standards.iteh.ai)

ISO 6209:2009

[https://standards.iteh.ai/catalog/standards/sis/798072c6-7aa1-4109-ab3b-](https://standards.iteh.ai/catalog/standards/sis/798072c6-7aa1-4109-ab3b-ec5f02628b83/iso-6209-2009)

[ec5f02628b83/iso-6209-2009](https://standards.iteh.ai/catalog/standards/sis/798072c6-7aa1-4109-ab3b-ec5f02628b83/iso-6209-2009)

Rubber compounding ingredients — Carbon black — Determination of solvent-extractable material

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.

Carbon blacks may contain polycyclic aromatic hydrocarbons, some of which are known carcinogens. These compounds, when present, are so strongly bound to the carbon black that they are not biologically active. They can, however, be removed by the procedure specified in this International Standard. Care should therefore be taken to avoid skin contact with solvent extracts from such carbon blacks.

1 Scope

This International Standard specifies a method for the quantitative determination of the solvent-extractable material in carbon black for use in the rubber industry. The method is applicable to all types of carbon black.

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 1124, *Rubber compounding ingredients — Carbon black shipment sampling procedures*

ISO 1126:2006, *Rubber compounding ingredients — Carbon black — Determination of loss on heating*

3 Principle

A test portion is extracted for 8 h. The solvent is then eliminated by evaporation and the extract obtained is weighed.

NOTE If the carbon black contains extractable materials which are volatile at the temperature required to eliminate the solvent, or materials which are removed by the preliminary drying, such materials will not be detected by the procedure specified.

This test provides a uniform and precise method for the gravimetric determination of organic-solvent-extractable materials in carbon black. Accuracy and precision are acceptable for most specification or regulatory purposes, or both. However, carbon black with a very low extract (less than 0,02 %) may require a more rigorous extraction procedure.

4 Extraction solvent

The solvent used shall be of recognized analytical grade. The use of toluene is recommended as it is the solvent of choice in most food-contact-related legislation.

5 Apparatus and material

5.1 Extraction apparatus

Use one of the following types of apparatus:

5.1.1 Type 1 extraction apparatus, comprising a 150 cm³ receiver flask, a jacketed Soxhlet extractor and a condenser as shown in Figure 1. The extraction cup has a capacity of 15 cm³ to 30 cm³.

5.1.2 Type 2 extraction apparatus, comprising a 500 cm³ receiver flask, a condenser and an extraction cup suspended from two hooks on the condenser by clean wire as shown in Figure 2. The extraction cup has a capacity of 15 cm³ to 30 cm³.

5.2 Other apparatus and material

5.2.1 Extraction thimbles, of 15 cm³ to 30 cm³ capacity, of sufficiently fine porosity to retain carbon black. They may be made of greaseless paper, cellulose or alundum and shall be of the appropriate size to fit the extraction cup. Thimbles shall be extracted with solvent and dried before use.

5.2.2 Distillation head and condenser or rotary evaporator.

5.2.3 Gravity-convection oven, capable of maintaining temperatures of 70 °C ± 5 °C for drying the extract and 125 °C ± 5 °C for drying the carbon black prior to extraction.

5.2.4 Cotton wool, greaseless, or **glass wool**, solvent-washed and dried.

5.2.5 Analytical balance, accurate to 0,1 mg.

5.2.6 Heating device, suitable for the extraction apparatus (5.1).

5.2.7 Desiccator.

<https://standards.iteh.ai/catalog/standards/sist/798072c6-7aa1-4109-ab3b-ec5f02628b83/iso-6209-2009>

6 Sampling

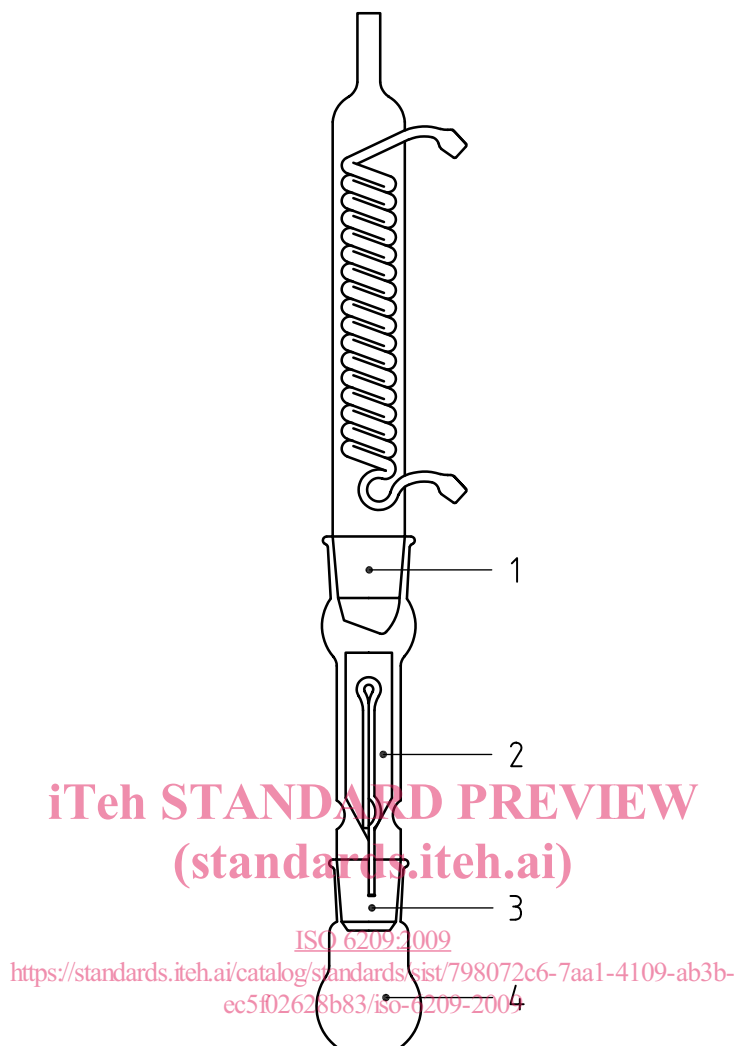
Carry out sampling in accordance with ISO 1124.

Crush all carbon blacks to destroy the pellet configuration before drying.

Dry approximately 20 g of the carbon black sample for 1 h at a temperature of 125 °C ± 5 °C in the oven (5.2.3) as specified in ISO 1126:2006, method 1. Allow to cool to room temperature in a desiccator (5.2.7). Keep the dried sample in the desiccator until ready for testing.

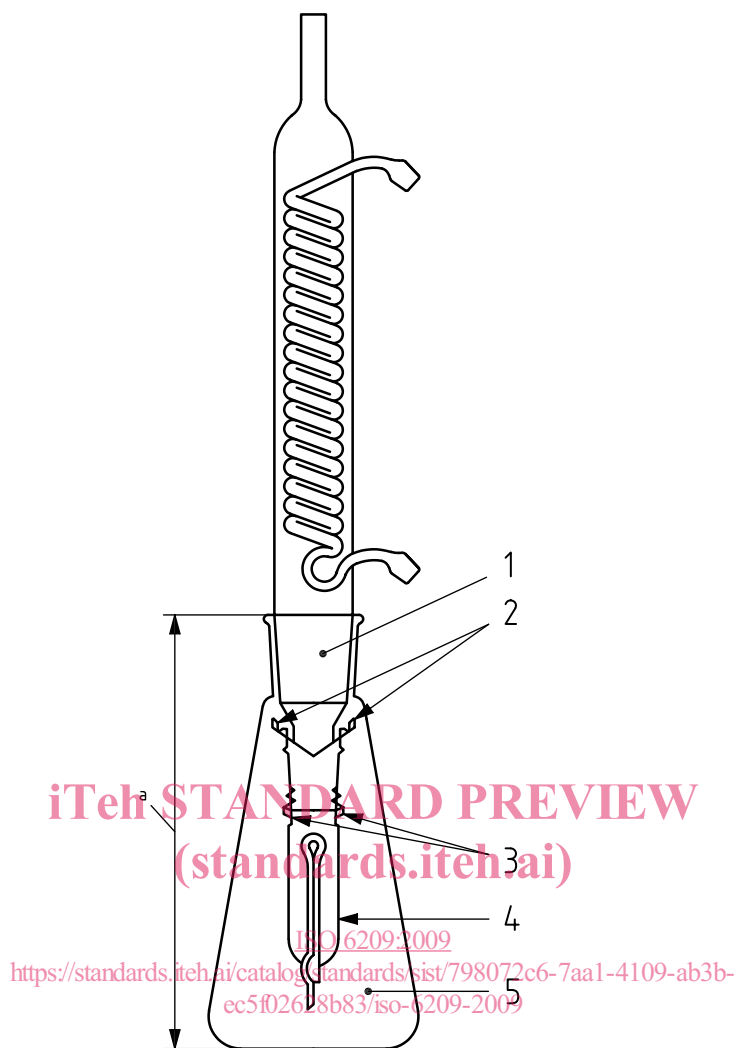
Carbon black shall not be dried at a temperature higher than that specified, nor dried using infra-red lamps, as some of the extractable matter may be driven off, thus affecting the results.

Take duplicate test portions from this dried sample.

**Key**

- 1 34/35 joint
- 2 extraction cup (15 cm³ to 30 cm³ capacity)
- 3 24/29 joint
- 4 receiver flask (150 cm³ capacity)

Figure 1 — Type 1 extraction apparatus



Key

- 1 34/35 joint
- 2 two hooks
- 3 two holes in extraction cup
- 4 extraction cup (15 cm³ to 30 cm³ capacity)
- 5 receiver flask (500 cm³ capacity)

^a 170 mm nominal.

Figure 2 — Type 2 extraction apparatus

7 Procedure

7.1 Take a test portion of about 10 g from the prepared sample, place it in a weighed thimble (5.2.1) and reweigh to the nearest 0,1 mg to obtain the mass of carbon black. Close the opening with a plug of cotton or glass wool (5.2.4).

For carbon blacks with a low extractable-material content (less than 0,02 %, for example), the test portion can be increased to 20 g.

7.2 Weigh the clean, dry receiver flask (see 5.1) to the nearest 0,1 mg and pour in 100 cm³ of solvent (Clause 4).

7.3 Place the extraction thimble containing the test portion in the extraction cup, assemble the apparatus (5.1) and adjust the rate of heating of the heating device (5.2.6) so that the distilled solvent fills the extraction cup about 10 times per hour.

Allow the extraction to proceed for 8 h to 8,5 h.

7.4 Turn off the heating device, allow the apparatus to cool, then remove the extraction cup and discard the thimble.

7.5 Remove the receiver flask, fit the distillation head and condenser (5.2.2) and distill off the bulk of the solvent into a suitable vessel, retaining no more than 5 cm³ in the receiver flask. A rotary evaporator can also be used to remove the solvent.

Discard the distilled solvent.

7.6 Allow the apparatus to cool and then disconnect the receiver flask, which now contains the concentrated extract. Remove most of the remaining solvent by passing a gentle stream of clean, dry air into the flask.

ISO 6209:2009

<https://standards.iteh.ai/catalog/standards/sist/798072c6-7aa1-4109-ab3b-cc510202883/iso-6209-2009>

7.7 Dry the flask and its contents for 2 h at 70 °C ± 5 °C in the oven (5.2.3), cool to ambient temperature in the desiccator (5.2.7) and weigh to the nearest 0,1 mg.

7.8 Carry out a blank test, using the same quantity of solvent and the same type of extraction apparatus as used for the determination, but omitting the test portion.

7.9 Carry out two determinations.

8 Expression of results

The solvent-extractable material, expressed as a percentage by mass, is given by the formula:

$$\frac{(m_2 - m_1) - \Delta m}{m_0} \times 100$$

where

m_0 is the mass, in grams, of the test portion (see 7.1);

m_1 is the mass, in grams, of the empty receiver flask (see 7.2);

m_2 is the mass, in grams, of the receiver flask plus the extract after drying (see 7.7);

Δm is the increase in mass, in grams, of the receiver flask during the blank test (see 7.8).