
Rubber compounding ingredients — Zinc oxide — Test methods

*Ingrédients de mélange du caoutchouc — Oxyde de zinc —
Méthodes d'essai*

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Contents

Page

Foreword	iv
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Sampling	2
5 Methods of test for the determination of physical and chemical properties	2
5.1 General.....	2
5.2 Matter volatile at 105 °C.....	2
5.3 Water-soluble matter.....	2
5.4 Acidity/alkalinity.....	2
5.5 Residue on sieve.....	2
5.6 Nitrogen-adsorption surface area.....	2
6 Classification and typical values of zinc oxides	3
7 Test report	3
Annex A (normative) Determination of zinc oxide content	4
Annex B (normative) Determination of lead, cadmium, copper and manganese contents	7
Annex C (normative) Determination of acid-insoluble matter	10
Annex D (informative) Zinc oxides used as rubber compounding material — Classification and typical values	12

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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 on 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 3, *Raw materials (including latex) for use in the rubber industry*.

This second edition cancels and replaces the first edition (ISO 9298:1995), which has been technically revised. The main change is the reference to ISO 18852 as the method for the nitrogen adsorption to determine the surface area.

ISO 9298:2017

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WARNING — 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 ensure compliance with any national regulatory conditions.

1 Scope

This document specifies the methods to be used for the evaluation of zinc oxide for use in the rubber industry.

The analytical methods are applicable to all commercial zinc oxides, for example:

- direct type (American process);
- indirect type (French process);
- other types produced by different chemical methods, i.e. precipitation and calcination.

Zinc oxide can also be coated with organic materials, such as fatty acids, oil, wetting agents, etc., in order to improve the dispersion in rubber.

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 787-2, *General methods of test for pigments and extenders — Part 2: Determination of matter volatile at 105 °C*

ISO 787-4, *General methods of test for pigments and extenders — Part 4: Determination of acidity or alkalinity of the aqueous extract*

ISO 787-7, *General methods of test for pigments and extenders — Part 7: Determination of residue on sieve — Water method — Manual procedure*

ISO 787-8, *General methods of test for pigments and extenders — Part 8: Determination of matter soluble in water — Cold extraction method*

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

ISO 18852, *Rubber compounding ingredients — Determination of multipoint nitrogen surface area (NSA) and statistical thickness surface area (STSA)*

3 Terms and definitions

No terms and definitions are listed in this document.

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 <http://www.iso.org/obp>

4 Sampling

Sampling shall be carried out in accordance with ISO 1124 for dry powders.

5 Methods of test for the determination of physical and chemical properties

5.1 General

Surface-coated zinc oxides shall be evaluated by the methods specified in [Table 1](#).

This evaluation shall be done without prior calcination or extraction, since there is little purpose in determining volatile-matter content, content of water-soluble matter or acidity if the coating is removed.

Table 1 — Methods for the evaluation of surface-coated zinc oxides

Property	Units	Test method
Matter volatile at 105 °C	% (m/m)	ISO 787-2
Water-soluble matter	% (m/m)	ISO 787-8
Acidity/alkalinity (H ₂ SO ₄ equiv.)	g H ₂ SO ₄ /100 g	ISO 787-4
Residue on sieve	% (m/m)	ISO 787-7
Nitrogen-adsorption surface area	m ² /g	ISO 18852
Zinc oxide	% (m/m)	Annex A
Lead	% (m/m)	Annex B
Cadmium	% (m/m)	Annex B
Copper	% (m/m)	Annex B
Manganese	% (m/m)	Annex B
Acid-insoluble matter	% (m/m)	Annex C

5.2 Matter volatile at 105 °C

Determine the loss on heating at 105 °C in accordance with ISO 787-2.

5.3 Water-soluble matter

Determine the percentage of water-soluble matter in accordance with ISO 787-8.

5.4 Acidity/alkalinity

Determine the acidity/alkalinity, in cm³ of 0,1 mol/dm³ standard volumetric solution per 100 g of sample, in accordance with ISO 787-4. The result shall be expressed in grams of sulfuric acid per 100 g (g H₂SO₄/100 g) by multiplying the result by 4,9 × 10⁻³.

5.5 Residue on sieve

Determine the sieve residue in accordance with ISO 787-7.

5.6 Nitrogen-adsorption surface area

Determine the surface area in accordance with ISO 18852. The test portion shall be 0,7 g to 1,0 g, or more if indicated by the initial test or past experience.