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**Paper, board, pulps and cellulose  
nanomaterials — Determination of  
residue (ash content) on ignition at  
525 °C**

*Papier, carton et pâtes et nanomatériaux à base de cellulose —  
Détermination du résidu (cendres) après incinération à 525 °C*

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# Contents

Page

Foreword.....	iv
<b>1 Scope.....</b>	<b>1</b>
<b>2 Normative references.....</b>	<b>1</b>
<b>3 Terms and definitions.....</b>	<b>1</b>
<b>4 Principle.....</b>	<b>2</b>
<b>5 Apparatus.....</b>	<b>3</b>
<b>6 Sampling and preparation of test specimen.....</b>	<b>3</b>
6.1 Sample amount.....	3
6.2 Paper, board and pulp sampling.....	3
6.3 Cellulose nanomaterial sampling.....	3
<b>7 Procedure.....</b>	<b>4</b>
7.1 General.....	4
7.2 Measurement of moisture or dry matter content.....	4
7.3 Incineration.....	5
7.3.1 General.....	5
7.3.2 Incineration of paper, board and pulps.....	5
7.3.3 Incineration of cellulose nanomaterials.....	5
7.4 Measurement of residue (ash) mass.....	5
<b>8 Expression of results.....</b>	<b>5</b>
<b>9 Test report.....</b>	<b>6</b>
<b>Annex A (informative) Precision.....</b>	<b>7</b>
<b>Bibliography.....</b>	<b>9</b>

[ISO 1762:2019](https://standards.iteh.ai/standards/iso/a047a1d6-e554-4d2e-9713-5e360c816269/iso-1762-2019)

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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](http://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](http://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](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 6, *Paper, board and pulps*.

This fourth edition cancels and replaces the third edition (ISO 1762:2015), which has been technically revised. The main changes compared to the previous edition are as follows:

- Scope revised to cover cellulose nanomaterials instead of only paper, board and pulps;
- A definition of cellulose nanomaterial, along with additional instructions for sampling, sample preparation, and incineration for cellulose nanomaterials have been incorporated;
- Additional instructions are given on how to express results when a sample has low ash content.

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](http://www.iso.org/members.html).

# Paper, board, pulps and cellulose nanomaterials — Determination of residue (ash content) on ignition at 525 °C

## 1 Scope

This document describes the determination of the residue (ash content) on ignition of paper, board, pulps and cellulose nanomaterials at 525 °C. It is applicable to all types of paper, board, pulp and cellulose nanomaterial samples.

This document provides measurement procedures to obtain a measurement precision of 0,01 % or better for residue (ash content) on ignition at 525 °C.

Determination of residue (ash content) on ignition at 900 °C of paper, board, pulps and cellulose nanomaterials is described in ISO 2144.

In the context of this document, the term “cellulose nanomaterial” refers specifically to cellulose nano-object (see 3.2 to 3.4). Owing to their nanoscale dimensions, these cellulose nano-objects can have intrinsic properties, behaviours or functionalities that are distinct from those associated with paper, board and pulps.

## 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 186, *Paper and board — Sampling to determine average quality*

ISO 287, *Paper and board — Determination of moisture content of a lot — Oven-drying method*

ISO 638, *Paper, board and pulps — Determination of dry matter content — Oven-drying method*

ISO 7213, *Pulps — Sampling for testing*

## 3 Terms and definitions

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

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

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

### 3.1

#### **residue on ignition ash content**

ratio of the mass of the residue remaining after a test specimen of paper, board, pulp or *cellulose nanomaterial* (3.2) is ignited at 525 °C ± 25 °C to the oven-dry mass of the test specimen before ignition

Note 1 to entry: This property has been referred to as either “residue on ignition” or “ash content” in earlier editions of this document.

### 3.2

#### **cellulose nanomaterial**

material composed predominantly of cellulose, with any external dimension between approximately 1 nm and 100 nm, or a material having internal structure or surface structure in the nanoscale, with the internal structure or surface structure composed predominantly of cellulose

Note 1 to entry: The terms nanocellulose and cellulosic nanomaterial are synonymous with cellulose nanomaterial.

Note 2 to entry: Some cellulose nanomaterials can be composed of chemically modified cellulose.

Note 3 to entry: This generic term is inclusive of cellulose nano-object and cellulose nanostructured material.

Note 4 to entry: See also definitions of cellulose, nanoscale, cellulose nano-object and cellulose nanostructured material in ISO/TS 20477:2017.

[SOURCE: ISO/TS 20477:2017, 3.3.1, modified — “1 nm to 100 nm” changed to “1 nm and 100 nm”; abbreviations deleted from Note 1 to entry; Note 4 to entry added.]

### 3.3

#### **nano-object**

discrete piece of material with one, two or three external dimensions in the nanoscale

Note 1 to entry: The second and third external dimensions are orthogonal to the first dimension and to each other.

[SOURCE: ISO/TS 80004-1:2015, 2.5]

### 3.4

#### **cellulose nano-object**

nano-object composed predominantly of cellulose

[SOURCE: ISO/TS 20477:2017, 5.2]

### 3.5

#### **nanoscale**

length range approximately from 1 nm to 100 nm

Note 1 to entry: Properties that are not extrapolations from larger sizes are predominantly exhibited in this length range.

[SOURCE: ISO/TS 80004-1:2015, 2.1]

## 4 Principle

The test specimen is weighed in a heat-resistant crucible and ignited in a muffle furnace at  $525\text{ °C} \pm 25\text{ °C}$ . The moisture or dry matter content of a separate test specimen is also measured. The percentage ash is then determined, on a dry (moisture-free) basis, from the mass of residue after ignition and the moisture or dry matter content of the sample.

The ash may consist of

- a) mineral matter in the paper, board, pulp and cellulose nanomaterial and various residues from chemicals used in its manufacture;
- b) metallic matter from piping and machinery;
- c) fillers, pigments, coatings or residues from various additives.

In samples containing calcium carbonate, there is practically no decomposition of carbonate by ashing at  $525\text{ °C}$ . Other fillers and pigments such as clay and titanium dioxide are also unaffected by ashing at  $525\text{ °C}$ . Accordingly, the residue on ignition provides a good estimate of the total inorganic matter in the sample, provided that the sample does not contain other minerals which decompose at or below this