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**Bamboo-based activated carbon — General specifications**

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*Charbon actif à base de bambou — Spécifications générales*

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## Contents

Foreword.....	iv
Introduction.....	v
1 Scope.....	1
2 Normative references.....	1
3 Terms and definitions.....	1
4 Classification.....	2
5 Requirements.....	2
6 Sampling.....	3
7 Test methods.....	3
8 Marking and Labelling.....	4
9 Packaging, transport and storage.....	4
Bibliography.....	11

Foreword.....	iv
Introduction.....	v
1 Scope.....	1
2 Normative references.....	1
3 Terms and definitions.....	1
4 Classification according to size and shape.....	2
5 Requirements.....	2
5.1 Sensory inspection.....	2
5.2 Requirements for physical and chemical properties of bamboo-based activated carbon.....	2
6 Sampling.....	3
7 Test methods.....	3
7.1 Visual inspection.....	3
7.2 Determination of moisture content.....	3
7.3 Determination of ash content.....	3
7.4 Determination of fixed carbon.....	3
7.5 Determination of apparent density.....	3
7.6 Determination of abrasion value.....	4
7.7 Determination of iodine number.....	4
8 Marking and labelling.....	4
9 Packaging, transport and storage.....	4

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iii

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ISO/~~DIS~~ 5946:2022(E)

<b>Annex A (normative) Determination of abrasion value .....</b>	<b>5</b>
<b>Annex B (normative) Determination of iodine number .....</b>	<b>9</b>
<b>Bibliography .....</b>	<b>13</b>

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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 296, *Bamboo and Rattan*.

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).

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## Introduction

Activated carbon is a carbonaceous material with a complex porous structure, manufactured from materials such as coal, wood and coconut shell. It is highly valued for its various applications in the environment, industry, food, pharmaceutical, and agriculture. These applications include water treatment and filtration, air and gaseous purification, beverage, fuel storage, solvent recovery, and electroplating solutions. Bamboo is an alternative renewable source to produce activated carbons. The rapid growth and development of bamboo-based activated carbons make it necessary to establish an international standard to guide production, quality requirements, and international trade.

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## Bamboo-based activated carbon — General specifications

### 1 Scope

This document specifies general requirements and test methods for bamboo-based activated carbon.

### 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 18122, *Solid biofuels — Determination of ash content*

ISO 18134-3, *Solid biofuels — Determination of moisture content — Oven dry method — Part 3: Moisture in general analysis sample*

ISO 18135, *Solid Biofuels — Sampling*

ISO 1953, *Hard coal — Size analysis by sieving*

ISO 21625, *Vocabulary related to bamboo and bamboo products*

ISO 21626-1, *Bamboo charcoal — Part 1: Generalities*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 21625, ISO 21626-1 and the following 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 bamboo-based activated carbon

##### BAC

carbonaceous material made from carbonization of bamboo materials and activation processing

#### 3.2 granular bamboo-based activated carbon

##### GBAC

bamboo-based activated carbons with a particle size of >1,0 mm

#### 3.3

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**powdered bamboo-based activated carbon**

**PBAC**

small bamboo-based activated carbon particles with a size of  $\leq 1,0$  mm

**3.4**

**formed bamboo-based activated carbon**

**FBAC**

product made by mixing bamboo charcoal with or without a binder which is extruded at high pressure into a particular shape and further activation in a specific condition

**3.5**

**Abrasion**

**abrasion**

loss of material from particle surfaces of a solid material or from other surfaces in contact with steel balls under specified conditions, caused by friction between contacting surfaces

[SOURCE: ISO 1213-2:2016, 3.1]

**3.6**

**abrasion value**

resistance to *abrasion* (3.5), measured as the percentage of a sample passing through a specified sieve after tumbling under conditions specified known as ball-pan hardness

[SOURCE: ISO 1213-2:2016, 3.3, —modified— The — the definition has been generalized to apply to bamboo-based activated carbon—]

**4 Classification according to size and shape**

Bamboo-based activated carbon (BAC) shall be classified as:

- (a) powdered bamboo-based activated carbon (PBAC);
- (b) granular bamboo-based activated carbon (GBAC);
- (c) formed bamboo-based activated carbon (FBAC).

FBAC can be further subdivided into cylinder BAC, bead BAC, cellular BAC, and other forms.

**5 Requirements**

**5.1 Sensory inspection**

The product shall appear black with no peculiar smell, contaminant, and foreign matter.

**5.2 Requirements for physical and chemical properties of bamboo-based activated carbon**

The bamboo-based activated carbon shall conform to the requirements specified in Table 1.

**Table 1.— Requirements for physical and chemical properties of BAC**

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Entry	Item	Unit	Requirements
1	Moisture content	%	≤10,0
2	Ash content	%	≤15,0
3	Fixed carbon	%	≥70,0
4	Apparent density	g/cm <sup>3</sup>	≥250,0
5	Abrasion value <sup>a</sup>	%	≥80,0
6	Iodine number	mg/g	≥500

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<sup>a</sup> The item is used for GBAC.

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## 6 Sampling

Sampling of bamboo-based activated carbon shall be in accordance with ISO 18135. The sample for analysis shall be randomly chosen from a batch of bulk products with a minimum mass of 2,0 kg.

## 7 Test methods

### 7.1 Visual inspection

Put no less than 100 g of bamboo-based activated carbon on a piece of white paper, then observe and decide the sample by sense of sight.

### 7.2 Determination of moisture content

The moisture content shall be determined in accordance with ISO 18134-3.

### 7.3 Determination of ash content

The ash content shall be determined in accordance with ISO 18122.

### 7.4 Determination of fixed carbon

The fixed carbon shall be determined in accordance with ISO 21626-1.

### 7.5 Determination of apparent density

Bamboo-based activated carbon samples shall be oven-dried at  $(105 \pm 2)$  °C for 3 hours to remove moisture prior to the determination of apparent density. Ground bamboo-based activated carbon samples to powders or particles if necessary.

Load dry bamboo-based activated carbon samples into the funnel and allow to flow freely through the discharge orifice into the receiver with a given volume. Enough samples shall be used so that the samples spill evenly over the side of the receiver. The samples shall then be levelled off using a spatula. Tap the receiver lightly on the side to settle the samples, and remove any excess samples from its external wall. The filled receiver shall then be weighed to the nearest 0,01-g. The apparent density shall then be calculated in compliance with Formula (1):

$$\rho_a = (m_1 - m_0) / V \quad (1)$$

where

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- $\rho_a$  apparent density of bamboo-based activated carbon, expressed in g/cm<sup>3</sup>;
- $m_1$  mass of bamboo-based activated carbon samples-filled receiver, expressed in grams;
- $m_0$  mass of empty receiver, expressed in grams;
- $V$  volume of the receiver, expressed in cm<sup>3</sup>; usually 100 cm<sup>3</sup>, as specified in ISO 60.

The test shall be repeated three times using fresh samples for each test, and an average result obtained and rounded to the nearest 0,01 g/cm<sup>3</sup> for reporting, with an error less than 2,0%. Otherwise, it shall be re-determined.

### 7.6 Determination of abrasion value

The abrasion value shall be determined in accordance with Annex A of this document.

### 7.7 Determination of iodine number

The iodine number shall be determined in accordance with Annex B of this document.

## 8 Marking and ~~Labelling~~labelling

8.1 The following information shall appear on the face of the containers:

- name and address of the manufacturer;
- a reference to this document, i.e. ISO 5946;
- date of production and batch identification;
- net mass;
- grade of the bamboo-based activated carbon.

8.2 A product's use instructions shall be printed on the back of the containers. The information shall include the name of the product, method of usage, storage, and usage precautions.

## 9 Packaging, transport and storage

9.1 The BAC products shall be handled with utmost care during transportation and shipping to avoid damage, moisture, and exposure to sunlight.

9.2 The products shall be stored in a cool, ventilated, dry place (ambient temperature). Exposure to sunlight, moisture, and ignition shall be avoided.

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