
**Cellular plastic — Cellulose foam
thermal insulation — Material
specification**

*Plastiques alvéolaires — Matériau d'isolation à base de mousse de
cellulose — Spécifications*

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

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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).

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For an explanation on 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 the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 10, *Cellular plastics*.

Introduction

The cellulose foam contains at least 50 % of paper by weight as the raw material, which is expanded with a starch mixture.

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Cellular plastic — Cellulose foam thermal insulation — Material specification

1 Scope

This document specifies material requirements and identifies the test methods to be used to determine these requirements for cellulose foam for thermal insulation for buildings and other applications.

There are four categories of material characterized by the density of the material.

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 844, *Rigid cellular plastics — Determination of compression properties*

ISO 845, *Cellular plastics and rubbers — Determination of apparent density*

ISO 1209-1, *Rigid cellular plastics — Determination of flexural properties — Part 1: Basic bending test*

ISO 1663, *Rigid cellular plastics — Determination of water vapour transmission properties*

ISO 2796, *Cellular plastics, rigid — Test for dimensional stability*

ISO 2896, *Rigid cellular plastics — Determination of water absorption*

ISO 8301, *Thermal insulation — Determination of steady-state thermal resistance and related properties — Heat flow meter apparatus*

ISO 11561, *Ageing of thermal insulation materials — Determination of the long-term change in thermal resistance of closed-cell plastics (accelerated laboratory test methods)*

ISO 12576-1, *Thermal insulation — Insulating materials and products for buildings — Conformity control systems — Part 1: Factory-made products*

ISO 16000-4, *Indoor air — Part 4: Determination of formaldehyde — Diffusive sampling method*

ISO 16000-9, *Indoor air — Part 9: Determination of the emission of volatile organic compounds from building products and furnishing — Emission test chamber method*

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:

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

3.1

cellular foam

cellular material made by combining cellulose material with starch in a manufacturing process

4 General requirements

4.1 Dyes and fluorescent whitening agent

In the event of using the dyestuff for colour collaboration during the manufacturing process, water soluble dye that is not harmful to human body shall be used. Fluorescent whitening agent shall not be used.

4.2 Foreign matters

In the event of pulping, the waste paper for recycling with pulper, films (synthetic resin laminating, glass addition, etc.) shall be removed, and no foreign matters shall be mixed in the process.

4.3 Manufacturing process

All the process shall be designed through sufficient consideration of the possible discharge of hazardous matters, odour, noise, and pollution of water.

4.4 Toxic substance

In the event of using chemical materials during the manufacturing process, hazardous materials shall not be added, and the safety data sheets (SDS) of the raw materials added and their quality management data shall be recorded and kept in a consistent manner.

4.5 Appearance

The material shall be composed of several fine uniform independent air bubbles that have no surface defect.

4.6 Performance

The material shall meet the requirements of [Table 1](#) when the identified test method is used.

Table 1 — Material requirements

Property	Unit	Category				Test method
		I	II	III	IV	
Density (min.)	kg/m ³	20	25	30	35	ISO 845
Compressive strength or compressive stress at 10 % deformation or yield (min.)	kPa	7	7	10	13	ISO 844
Initial thermal conductivity (max.)	mW/(mK)	38	35	33	32	ISO 8301
10 °C mean /28 d min. or 23 °C mean /28 d min.		40	37	35	34	
Long term thermal resistance (min.)	(m ² K)/W	0,70 actual to be declared				ISO 11561
Dimensional change after 48 h at 70 °C (max.)	%	5				ISO 2796
Water vapour permeability (max./min.) 23 °C/0 % to 50 % RH	ng/(m.s.Pa)	9,5/3,5 actual to be declared				ISO 1663
Water absorption (max.)	% by volume	5				ISO 2896

Table 1 (continued)

Property	Unit	Category				Test method
		I	II	III	IV	
Bending load at break (min.)	N	14	16	18	20	ISO 1209-1
Formaldehyde emission (7 d)	mg/(m ² ·h)	0,5				ISO 16000-4
VOCs emission (7 d)	mg/(m ² ·h)	0,125				ISO 16000-9

4.7 Dimension

Dimension tolerance of the material shall be not greater than indicated in Table 2. For length and width, average the value of three specimens measured to within 1 mm using a ruler with the specimens spread flatways. For thickness, average the value of three specimens measured to within 0,1 mm using a thickness gauge.

Table 2 — Dimensions

Tolerance mm			
	thickness	width	length
For product thickness of 20 mm to 100 mm	+5,0	+10	+10
	-3,0	-5	-5

5 Test methods

5.1 Sampling

Enough material shall be selected randomly for the preparation of the test specimens in the required quantity. All samples shall be from the same production or batch. If the material is intended to be coated with a sheet, the samples shall be collected before the sheet is coated.

5.2 Specimen preparation

Prepare the test specimens in the size and quantity as required by the test method. In cases where the test method does not state the quantity, there shall be three specimens prepared and tested.

5.3 Appearance

Inspect the specimens for surface defects such as apparent scratches, deformation, large hollows, etc. Discard all specimens that have surface defects.

5.4 Conditioning of specimens

Condition the test specimens at:

(23 ± 2) °C and (50 ± 10) % relative humidity

or

(23 ± 2) °C and 50⁺²⁰₋₁₀ % relative humidity

or

(23 ± 2) °C and 65⁺²⁰₋₁₀ % relative humidity

for a minimum of 24 h.

5.5 Laboratory conditions when testing is conducted

The laboratory where the testing is conducted shall maintain the temperature of $(23 \pm 5) ^\circ\text{C}$ and the humidity shall be $(50 \pm 20) \%$.

6 Conformity control

For the purposes of sampling and conformity control, the manufacturer shall declare which systems described in ISO 12576-1 are used in the manufacturing process.

7 Marking and labelling

The product shall be marked or the package shall be labelled with the following information:

- a) product name;
- b) dimensions;
- c) manufacturer's name and address;
- d) manufacturing code, lot number, batch number or other means by which to identify the production;
- e) the reference of this document, i.e. ISO 21844.

8 Report

8.1 Test data shall be reported in the form of a table with the columns for:

- a) property;
- b) test result;
- c) pass/fail, and
- d) whether the test results for the property met the requirements of this document.

8.2 In addition to the information specified in the individual test methods report section, all reports describing the testing of the material in accordance with this document shall include the following information:

- a) manufacturer's name, address, production facility address and material designation;
- b) brand name of the material and other material description;
- c) lot number, manufacturing code, batch number or other means by which the production can be identified;
- d) manufacturing date;
- e) sampling information;
- f) copy of ISO/IEC 17025 accreditation of the laboratory performing the test methods in this document;
- g) description of test apparatus, calibration standards used and their source for each test method;
- h) size of specimens used for each test;
- i) report of the average test result of all specimens tested for each method — the values reported shall have the same precision as the requirements listed in [Table 1](#);

- j) list in a table of the measured results compared to the requirements of this document and statement indicating whether the material requirement has either passed or failed;
- k) declaration of conformity with all requirements of this document;
- l) appendix containing the data used to generate the above items.

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