

---

---

**Carbonaceous materials used in the  
production of aluminium — Cold and  
tepid ramming pastes — Preparation of  
baked test pieces and determination of  
loss on baking**

**iTeh STANDARD PREVIEW**  
*Produits carbonés utilisés pour la production de l'aluminium — Pâtes de  
brasquage froides et tièdes — Préparation d'éprouvettes cuites et  
(standards.iteh.ai) détermination de la perte à la cuisson*

[ISO 20202:2004](https://standards.iteh.ai/catalog/standards/sist/52610029-a4c6-43f6-9258-deb808be601f/iso-20202-2004)

[https://standards.iteh.ai/catalog/standards/sist/52610029-a4c6-43f6-9258-  
deb808be601f/iso-20202-2004](https://standards.iteh.ai/catalog/standards/sist/52610029-a4c6-43f6-9258-deb808be601f/iso-20202-2004)



**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 20202:2004

<https://standards.iteh.ai/catalog/standards/sist/52610029-a4c6-43f6-9258-deb808be601f/iso-20202-2004>

© ISO 2004

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](mailto:copyright@iso.org)  
Web [www.iso.org](http://www.iso.org)

Published in Switzerland

## 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 20202 was prepared by Technical Committee ISO/TC 47, *Chemistry*, Subcommittee SC 7, *Aluminium oxide, cryolite, aluminium fluoride, sodium fluoride, carbonaceous products for the aluminium industry*.

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[ISO 20202:2004](https://standards.iteh.ai/catalog/standards/sist/52610029-a4c6-43f6-9258-deb808be601f/iso-20202-2004)

<https://standards.iteh.ai/catalog/standards/sist/52610029-a4c6-43f6-9258-deb808be601f/iso-20202-2004>

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

ISO 20202:2004

<https://standards.iteh.ai/catalog/standards/sist/52610029-a4c6-43f6-9258-deb808be601f/iso-20202-2004>

# Carbonaceous materials used in the production of aluminium — Cold and tepid ramming pastes — Preparation of baked test pieces and determination of loss on baking

## 1 Scope

This International Standard describes a method of baking green test specimens made by compacting carbonaceous ramming pastes. It includes the baking procedure (heating rate and holding time) and the determination of the loss on baking (relative mass loss).

Baked test specimens of ramming paste need to be prepared for the determination of properties after baking, for instance apparent density, crushing strength and porosity.

## 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 4955, *Heat-resisting steels and alloys* [ISO 20202:2004](https://standards.iteh.ai/catalog/standards/sist/52610029-a4c6-43f6-9258-1d4865f01e7e/iso-4955-2004)  
<https://standards.iteh.ai/catalog/standards/sist/52610029-a4c6-43f6-9258-1d4865f01e7e/iso-4955-2004>

ISO 5725-2, *Accuracy (trueness and precision) of measurement methods and results — Part 2: Basic method for the determination of repeatability and reproducibility of a standard measurement method*

ISO 14422, *Carbonaceous materials used in the production of aluminium — Cold-ramming pastes — Methods of sampling*

ISO 14427, *Carbonaceous materials used in the production of aluminium — Cold and tepid ramming pastes — Preparation of unbaked test specimens and determination of apparent density after compaction*

ASTM E 220, *Standard Test Method for Calibration of Thermocouples by Comparison Techniques*

## 3 Principle

Compacted test specimens of carbonaceous ramming paste are baked in a furnace by raising the temperature at a specified rate to 1 000 °C and holding the temperature at this value for 2 h. The mass of each test specimen is measured before and after baking and the loss on baking calculated.

## 4 Apparatus

**4.1 Balance**, accurate to 0,1 g.

**4.2 Furnace**, e.g. an electrically heated muffle furnace or chamber furnace, with a temperature-control facility enabling it to meet the requirements given in Clause 6.

**4.3 Baking container with cover**, capable of holding the test specimens and made from heat-resistant steel (e.g. X15CrNiSi2521 steel as specified in ISO 4955). The distance between the test specimens and between the test specimens and the container walls shall not be less than 10 mm. An example of a suitable container is shown in Figure 1.

**4.4 Packing material**, consisting of electrographite or calcined petroleum coke, maximum particle size 1 mm.

**4.5 Temperature-measuring device**, capable of determining the temperature to within  $\pm 5^\circ\text{C}$  up to  $1\,000^\circ\text{C}$ , e.g. a type K or S thermocouple calibrated in accordance with ASTM E 220.

## 5 Sampling

Sample the paste in accordance with ISO 14422. Prepare the test specimens in accordance ISO 14427.

## 6 Procedure

Determine the mass  $m_0$  of each unbaked test specimen to the nearest 0,1 g.

Insert the test specimens in the baking container (4.3). Surround the test specimens on all sides by at least 10 mm of packing material (4.4). Insert the container, with its cover fitted, into the furnace (4.2). Heat the furnace in accordance with the heating programme given in Table 1.

iTeh STANDARD PREVIEW  
(standards.iteh.ai)

**Table 1 — Heating programme**

	Temperature range	Heating rate
Initial rate of heating	Room temperature to $500^\circ\text{C}$	$(35 \pm 5)^\circ\text{C}\cdot\text{h}^{-1}$
Subsequent rate of heating	$500^\circ\text{C}$ to $1\,000^\circ\text{C}$	$(100 \pm 10)^\circ\text{C}\cdot\text{h}^{-1}$

Keep the furnace at a final temperature of  $(1\,000 \pm 10)^\circ\text{C}$  for 2 h to ensure that all the test specimens reach this temperature. Then allow the furnace to cool down to room temperature. Take the test specimens out of the baking container. Remove any packing material which may be sticking to the surface of the test specimens. Determine the mass  $m_1$  of each baked test specimen to 0,1 g.

## 7 Expression of results

Calculate the relative mass loss during the baking process, called the loss on baking, using the following equation:

$$w = \frac{m_0 - m_1}{m_0} \times 100 \tag{1}$$

where

$w$  is the loss on baking, expressed as a mass fraction in %;

$m_0$  is the mass of the green test specimen, in g;

$m_1$  is the mass of the baked test specimen, in g.

Round the results to the nearest 0,1 % (absolute).

## 8 Precision (determined in accordance with ISO 5725-2)

Repeatability ( $r$ ) = 0,9 % (absolute)

Reproducibility ( $R$ ) = 2,3 % (absolute)

The number of degrees of freedom, i.e. number of laboratories (6) × number of samples (4), was 24.

NOTE The precision will be influenced by variability in the material.

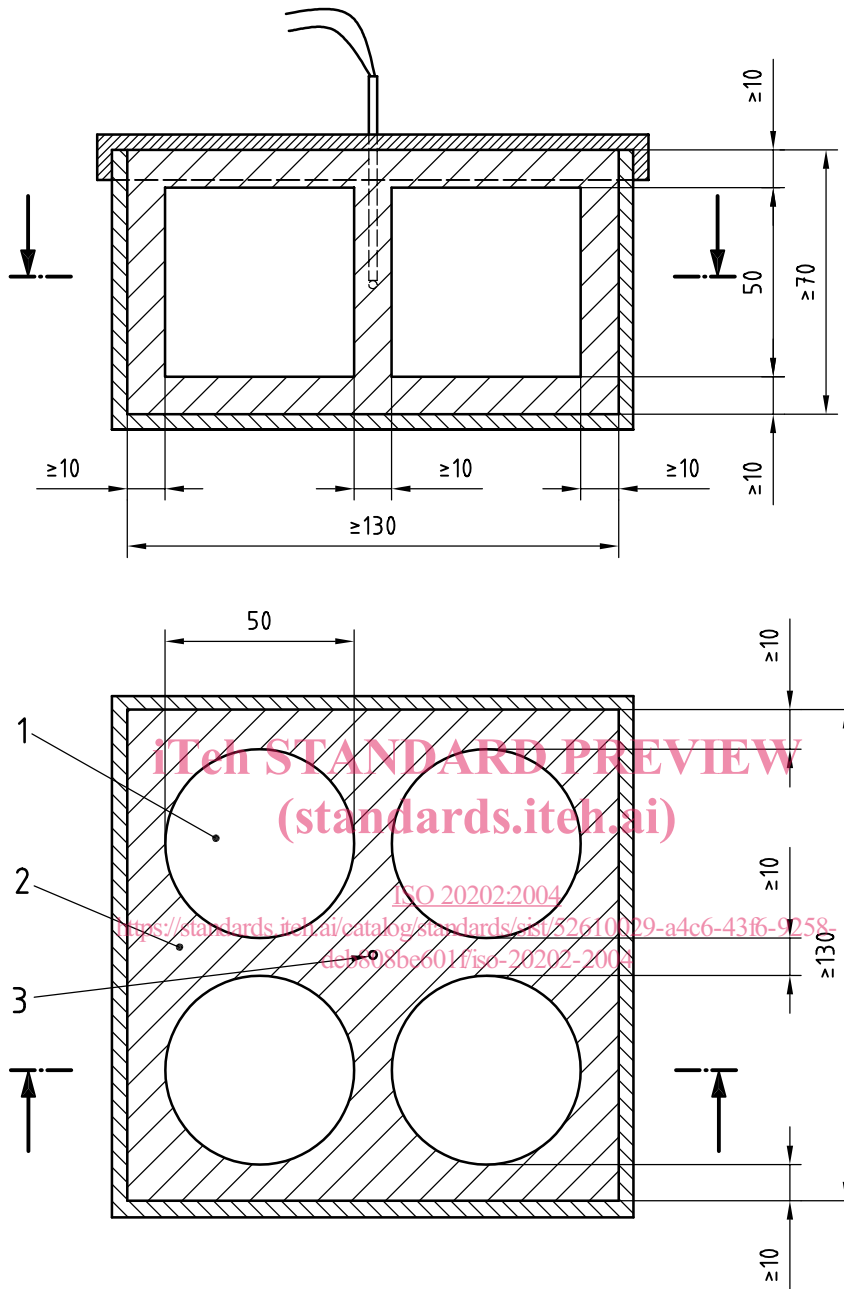
## 9 Test report

The test report shall include the following information:

- a) a reference to this International Standard;
- b) all details necessary for identification of the sample tested;
- c) the temperature used for preparation of the green test specimens;
- d) the results of the test, i.e. the loss on baking;
- e) the date of the test;
- f) details of any unusual features noted during the determination;
- g) details of any operation not included in this International Standard or regarded as optional.

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**  
<https://standards.iteh.ai/catalog/standards/sist/52610029-a4c6-43f6-9258-deb808be601f/iso-20202-2004>

Dimensions in millimetres



**Key**

- 1 test specimen
- 2 packing material
- 3 thermocouple

**Figure 1 — Example of a baking container for four specimens**



**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

ISO 20202:2004

<https://standards.iteh.ai/catalog/standards/sist/52610029-a4c6-43f6-9258-deb808be601f/iso-20202-2004>