

---

---

**Carbonaceous materials for the  
production of aluminium — Cold and  
tepid ramming pastes — Expansion/  
shrinkage during baking**

*Produits carbonés utilisés pour la production de l'aluminium —  
Pâtes de brasquage froides et tièdes — Expansion/rétrécissement  
durant la cuisson*

iteh standards  
(<https://standards.iteh.ai>)  
Document Preview

[ISO 14428:2019](https://standards.iteh.ai/catalog/standards/iso/45615cac-fc32-4259-bd59-efdabc323bbe/iso-14428-2019)

<https://standards.iteh.ai/catalog/standards/iso/45615cac-fc32-4259-bd59-efdabc323bbe/iso-14428-2019>



iTeh Standards  
(<https://standards.iteh.ai>)  
Document Preview

ISO 14428:2019

<https://standards.iteh.ai/catalog/standards/iso/45615cac-fc32-4259-bd59-efdabc323bbe/iso-14428-2019>



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2019

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

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

Published in Switzerland

# Contents

|   | Page     |
|---|----------|
| Foreword.....   | iv       |
| Introduction.....   | v        |
| <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>1</b> |
| <b>5 Apparatus and materials</b> .....                                | <b>1</b> |
| <b>6 Samples</b> .....  | <b>3</b> |
| <b>7 Procedure</b> .....  | <b>3</b> |
| 7.1 Cleaning.....   | 3        |
| 7.2 Preparation of vitreous silica materials.....                     | 4        |
| 7.3 Calibration.....  | 4        |
| 7.4 Test procedure.....   | 4        |
| <b>8 Results</b> .....  | <b>4</b> |
| 8.1 Calculation of the correction term.....                           | 4        |
| 8.2 Calculation of the expansion/shrinkage.....                       | 5        |
| 8.2.1 Calculation of expansion or shrinkage for each temperature..... | 5        |
| 8.2.2 Calculation of reference points.....                            | 5        |
| 8.2.3 Calculation of shrinkage.....                                   | 5        |
| <b>9 Test report</b> .....  | <b>7</b> |

## Document Preview

<https://standards.iteh.ai>

<https://standards.iteh.ai/catalog/standards/iso/45615cac-fc32-4259-bd59-efdabc323bbe/iso-14428-2019>

## 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 226, *Materials for the production of primary aluminium*.

This second edition cancels and replaces the first edition (ISO 14428:2005), which has been technically revised.

The main changes to the previous edition are as follows:

- **Clause 8:** new calculation concept based on average expansion/shrinkage within newly defined temperature ranges

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).

## Introduction

The expansion/shrinkage of ramming pastes used in the production of aluminium is an important property, because excessive shrinkage can cause cracks in the baked paste serving as a lining material in alumina electrolysis cells. These cracks can cause leakage of the liquid bath, destroying the sidewall lining and the steel shell and thus leading to shutdown of the cell. Ramming pastes change phase from plastic to non-plastic between 400 °C and 600 °C (200 °C and 300 °C for resin binders). The shrinkage which occurs between the temperature at which the paste becomes non-plastic and the operating temperature (950 °C) is an important factor. Apparent shrinkage in the viscous range is due to slumping rather than actual shrinkage.

iTeh Standards  
(<https://standards.iteh.ai>)  
Document Preview

[ISO 14428:2019](https://standards.iteh.ai/catalog/standards/iso/45615cac-fc32-4259-bd59-efdabc323bbe/iso-14428-2019)

<https://standards.iteh.ai/catalog/standards/iso/45615cac-fc32-4259-bd59-efdabc323bbe/iso-14428-2019>

