

BS EN ISO 10545-8:2014



BSI Standards Publication

## Ceramic tiles

Part 8: Determination of linear thermal expansion (ISO 10545-8:2014)

**bsi.**

...making excellence a habit.™

**National foreword**

This British Standard is the UK implementation of EN ISO 10545-8:2014. It supersedes BS EN ISO 10545-8:1996 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/539, Ceramic tiles and other rigid tiling.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2014. Published by BSI Standards Limited 2014

ISBN 978 0 580 81947 6

ICS 91.100.23

**Compliance with a British Standard cannot confer immunity from legal obligations.**

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 June 2014.

**Amendments issued since publication**

Date	Text affected
------	---------------

---

English Version

Ceramic tiles - Part 8: Determination of linear thermal expansion  
(ISO 10545-8:2014)

Carreaux et dalles céramiques - Partie 8: Détermination de  
la dilatation linéique d'origine thermique (ISO 10545-  
8:2014)

Keramische Fliesen und Platten - Teil 8: Bestimmung der  
linearen thermischen Dehnung (ISO 10545-8:2014)

This European Standard was approved by CEN on 7 May 2014.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

## Foreword

This document (EN ISO 10545-8:2014) has been prepared by Technical Committee ISO/TC 189 "Ceramic tile" in collaboration with Technical Committee CEN/TC 67 "Ceramic tiles" the secretariat of which is held by UNI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 2014, and conflicting national standards shall be withdrawn at the latest by December 2014.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 10545-8:1996.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

### Endorsement notice

The text of ISO 10545-8:2014 has been approved by CEN as EN ISO 10545-8:2014 without any modification.

# Contents

Page

Foreword .....	iv
<b>1 Scope .....</b>	<b>1</b>
<b>2 Principle .....</b>	<b>1</b>
<b>3 Apparatus .....</b>	<b>1</b>
<b>4 Test specimens .....</b>	<b>1</b>
<b>5 Procedure .....</b>	<b>1</b>
<b>6 Expression of results .....</b>	<b>2</b>
<b>7 Test report .....</b>	<b>2</b>

## 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 on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 189, *Ceramic tile*.

This second edition cancels and replaces the first edition (ISO 10545-8:1994), which has been technically revised.

ISO 10545 consists of the following parts, under the general title *Ceramic tiles*:

- *Part 1: Sampling and basis for acceptance*
- *Part 2: Determination of dimensions and surface quality*
- *Part 3: Determination of water absorption, apparent porosity, apparent relative density and bulk density*
- *Part 4: Determination of modulus of rupture and breaking strength*
- *Part 5: Determination of impact resistance by measurement of coefficient of restitution*
- *Part 6: Determination of resistance to deep abrasion for unglazed tiles*
- *Part 7: Determination of resistance to surface abrasion for glazed tiles*
- *Part 8: Determination of linear thermal expansion*
- *Part 9: Determination of resistance to thermal shock*
- *Part 10: Determination of moisture expansion*
- *Part 11: Determination of crazing resistance for glazed tiles*
- *Part 12: Determination of frost resistance*
- *Part 13: Determination of chemical resistance*
- *Part 14: Determination of resistance to stains*

- *Part 15: Determination of lead and cadmium given off by glazed tiles*
- *Part 16: Determination of small colour differences*





# Ceramic tiles —

## Part 8:

# Determination of linear thermal expansion

## 1 Scope

This part of ISO 10545 defines a test method for determining the coefficient of linear thermal expansion of ceramic tiles.

## 2 Principle

Determination of the linear thermal expansion coefficient for the temperature range from ambient temperature to 100 °C.

## 3 Apparatus

**3.1 Suitable thermal expansion apparatus**, capable of a rate of heating of  $(5 \pm 1)$  °C/min with uniform distribution of heat. Certain types of apparatus require a soaking time at 100 °C.

**3.2 Vernier calipers**, or other suitable device.

**3.3 Drying oven**, capable of being operated at  $(110 \pm 5)$  °C. Microwave, infrared or other drying systems may be used provided that it has been determined that equal results are obtained.

**3.4 Desiccator**

## 4 Test specimens

Cut two test specimens at right angles from the central portion of one tile so that their lengths are suitable for the apparatus. The ends of the test specimens shall be ground flat and parallel.

If necessary, grind the test specimens so that the length of any side in cross-section is less than 6 mm and the area of cross-section is greater than 10 mm<sup>2</sup>. The minimum length of the test specimens should be 25 mm. In the case of glazed tiles, the glaze shall not be ground off the test specimens.

## 5 Procedure

It is necessary to make a previous calibration of the apparatus with a standard test specimen. The dimensions of the standard test specimen shall be the same as the dimensions of the test specimen.

Dry the test specimens at  $(110 \pm 5)$  °C until they reach constant mass, i.e. when the difference between two successive weightings at intervals of 24 h is less than 0,1 %. Allow them to cool in the desiccator (3.4) at ambient temperature.

Using vernier calipers (3.2), determine the lengths to an accuracy of 0,002 times the length.

Place a test specimen in the apparatus (3.1) and record the ambient temperature.

Initially, and throughout the heating procedure, measure the length to an accuracy of 0,01 mm. Take temperature and length measurements at temperature intervals of no more than 15 °C.

The rate of heating shall be  $(5 \pm 1)$  °C/min.

## 6 Expression of results

The linear thermal expansion coefficient,  $\alpha_l$ , is expressed in  $10^{-6}$  per degree Celsius ( $10^{-6}/^{\circ}\text{C}$ ), to the first decimal place, in accordance with the expression:

$$\alpha_l = \frac{1}{L_0} \times \frac{\Delta L}{\Delta T}$$

where

$L_0$  is the length of the test specimen at the ambient temperature;

$\Delta L$  is the increase in length of the test specimen between ambient temperature and 100 °C;

$\Delta T$  is the rise in temperature.

## 7 Test report

The test report shall specify the following:

- a) reference to this part of ISO 10545, i.e. ISO 10545-8—;
- b) a description of the tiles, including sample preparation;
- c) the linear thermal expansion coefficient for both test specimens.







# British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

BSI is incorporated by Royal Charter. British Standards and other standardization products are published by BSI Standards Limited.

## About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards-based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

## Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at [bsigroup.com/standards](http://bsigroup.com/standards) or contacting our Customer Services team or Knowledge Centre.

## Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at [bsigroup.com/shop](http://bsigroup.com/shop), where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

## Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to [bsigroup.com/subscriptions](http://bsigroup.com/subscriptions).

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member**.

**PLUS** is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit [bsigroup.com/shop](http://bsigroup.com/shop).

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email [bsmusales@bsigroup.com](mailto:bsmusales@bsigroup.com).

## Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

## Copyright

All the data, software and documentation set out in all British Standards and other BSI publications are the property of and copyrighted by BSI, or some person or entity that owns copyright in the information used (such as the international standardization bodies) and has formally licensed such information to BSI for commercial publication and use. Except as permitted under the Copyright, Designs and Patents Act 1988 no extract may be reproduced, stored in a retrieval system or transmitted in any form or by any means – electronic, photocopying, recording or otherwise – without prior written permission from BSI. Details and advice can be obtained from the Copyright & Licensing Department.

## Useful Contacts:

### Customer Services

**Tel:** +44 845 086 9001

**Email (orders):** [orders@bsigroup.com](mailto:orders@bsigroup.com)

**Email (enquiries):** [cservices@bsigroup.com](mailto:cservices@bsigroup.com)

### Subscriptions

**Tel:** +44 845 086 9001

**Email:** [subscriptions@bsigroup.com](mailto:subscriptions@bsigroup.com)

### Knowledge Centre

**Tel:** +44 20 8996 7004

**Email:** [knowledgecentre@bsigroup.com](mailto:knowledgecentre@bsigroup.com)

### Copyright & Licensing

**Tel:** +44 20 8996 7070

**Email:** [copyright@bsigroup.com](mailto:copyright@bsigroup.com)

## BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK



...making excellence a habit.™