

**Natural stone test methods -  
Determination of linear thermal  
expansion coefficient**

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thermal expansion coefficient

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN 14581:2005 sisaldab Euroopa standardi EN 14581:2004 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 22.02.2005 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN 14581:2005 consists of the English text of the European standard EN 14581:2004.</p> <p>This document is endorsed on 22.02.2005 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
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<p><b>Käsitlusala:</b> This document specifies two methods to determine the linear thermal expansion coefficient of natural stone, respectively based on mechanical length-change measurements (method A) or on the use of bonded electric strain gauges (method B).</p>	<p><b>Scope:</b> This document specifies two methods to determine the linear thermal expansion coefficient of natural stone, respectively based on mechanical length-change measurements (method A) or on the use of bonded electric strain gauges (method B).</p>
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ICS 73.020, 91.100.15

Võtmesõnad:

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ICS 73.020; 91.100.15

English version

## Natural stone test methods - Determination of linear thermal expansion coefficient

Méthodes d'essai pour pierres naturelles - Détermination du coefficient linéaire de dilatation thermique

Prüfverfahren für Naturstein - Bestimmung des linearen thermischen Ausdehnungskoeffizienten

This European Standard was approved by CEN on 12 November 2004.

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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 Central Secretariat has the same status as the official versions.

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## Foreword

This document (EN 14581:2004) has been prepared by Technical Committee CEN/TC 246 "Natural stones", 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 June 2005, and conflicting national standards shall be withdrawn at the latest by June 2005.

This final draft document is one of the series of documents for tests on natural stone.

Test methods for natural stone consist of the following parts:

EN 1925, *Natural stone test methods – Determination of water absorption coefficient by capillarity*

EN 1926, *Natural stone test methods – Determination of compressive strength*

EN 1936, *Natural stone test methods – Determination of real density and apparent density and of total and open porosity*

EN 12370, *Natural stone test methods – Determination of resistance to salt crystallisation*

EN 12372, *Natural stone test methods – Determination of flexural strength under concentrated load*

EN 12407, *Natural stone test methods – Petrographic examination*

EN 13161, *Natural stone test methods – Determination of flexural strength under constant moment*

EN 13364, *Natural stone test methods – Determination of the breaking load at dowel hole*

EN 13373, *Natural stone test methods – Determination of geometric characteristics on units*

EN 13755, *Natural stone test methods – Determination of water absorption at atmospheric pressure*

EN 13919, *Natural stone test methods – Determination of resistance to ageing by SO<sub>2</sub> action in the presence of humidity*

EN 14066, *Natural stone test methods – Determination of resistance to ageing by thermal shock*

EN 14147, *Natural stone test methods – Determination of resistance to ageing by salt mist*

EN 14158, *Natural stone test methods – Determination of rupture energy*

EN 14205, *Natural stone test methods – Determination of Knoop hardness*

EN 14231, *Natural stone test methods – Determination of the slip resistance by means of the pendulum tester*

EN 14157, *Natural stone test methods – Determination of the abrasion resistance*

EN 14579, *Natural stone test methods – Determination of sound speed propagation*

prEN 14580, *Natural stone test methods – Determination of the static elastic modulus*

EN 14581, *Natural stone test methods – Determination of linear thermal expansion coefficient*

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

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## 1 Scope

This document specifies two methods to determine the linear thermal expansion coefficient of natural stone, respectively based on mechanical length-change measurements (Method A) or on the use of bonded electric strain gauges (Method B).

## 2 Normative references

Not applicable.

## 3 Principle

After drying to constant mass, the specimen is subjected to length measurement in a direction "i" whilst maintaining at least two different temperatures. The linear coefficient of thermal expansion between the extreme temperatures is expressed as the unitary change in length for a change of temperature of 1 °C.

## 4 Symbols

$l_{s20}$	Initial length of the specimen at a temperature of $(20 \pm 0,5)$ °C in mm.
$l_{s80}$	Final length of the specimen at a temperature of $(80 \pm 0,5)$ °C in mm.
$\Delta l_s = (l_{s80} - l_{s20})$	Change of length of the specimen in mm. If $\Delta l_s$ is positive, represents an expansion. If negative, a shrinkage (Note 1).
$l_{r20}$	Initial length of the reference sample at a temperature of $(20 \pm 0,5)$ °C in mm.
$l_{r80}$	Final length of the reference sample at a temperature of $(80 \pm 0,5)$ °C in mm.
$\Delta l_r = (l_{r80} - l_{r20})$	Change of length of the reference sample in millimetres.
$\Delta T$	$(60 \pm 1)$ °C, the change in the temperature from $(20 \pm 0,5)$ °C to $(80 \pm 0,5)$ °C.
$\mathcal{E}_r$	Unitary linear thermal expansion of the reference sample in $10^{-6}$ (mm/mm).
$\mathcal{E}_{si} = \frac{\Delta l_s}{l_{s20}}$ (mm/mm).	Unitary linear thermal expansion of the specimen in the direction "i" in $10^{-6}$
$\mathcal{E}_{s1}, \mathcal{E}_{s2}, \mathcal{E}_{s3}$	Unitary linear thermal expansion of the specimen along three orthogonal directions in $10^{-6}$ (mm/mm).
$\alpha_r$	Linear coefficient of thermal expansion of the reference sample in °C <sup>-1</sup> .
$\alpha_i$	Linear coefficient of thermal expansion of the specimen in the direction "i" in °C <sup>-1</sup> .
$\alpha_1, \alpha_2, \alpha_3$	Linear coefficients of thermal expansion of the specimen along three orthogonal directions, in °C <sup>-1</sup> .