Irish Standard
I.S. EN 993-10:2020

Methods of test for dense shaped refractory products - Part 10: Determination of permanent change in dimensions on heating

I.S. EN 993-10:2020

Incorporating amendments/corrigenda/National Annexes issued since publication:

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National Foreword

I.S. EN 993-10:2020 is the adopted Irish version of the European Document EN 993-10:2020, Methods of test for dense shaped refractory products - Part 10: Determination of permanent change in dimensions on heating

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 993-10

October 2020

ICS 81.080

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English Version

Methods of test for dense shaped refractory products - Part 10: Determination of permanent change in dimensions on heating

Méthodes d'essai pour produits réfractaires façonnés denses - Partie 10: Détermination de la variation permanente de dimensions sous l'action de la chaleur

Prüfverfahren für dichte geformte feuerfeste Erzeugnisse - Teil 10: Bestimmung der bleibenden Längenänderung nach Temperatureinwirkung

This European Standard was approved by CEN on 1 September 2020.

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European foreword

This document (EN 993-10:2020) has been prepared by Technical Committee CEN/TC 187 “Refractory products and materials”, the secretariat of which is held by BSI.

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of an identical text or by endorsement, at the latest by April 2021, and conflicting national standards shall be withdrawn at the latest by April 2021.

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

This document supersedes EN 993-10:1997.

The main change from the previous edition is the addition of precision data in clause 10 derived from a large scale interlaboratory study completed by 10 European laboratories.

Reproducibility and repeatability data are available only for a limited number of testing methods and materials, but may be complemented in subsequent editions.

The series of standards EN 993 'Methods of test for dense shaped refractory products' consists of 20 parts, some of which have been withdrawn and replaced by equivalent standards:

— *Part 1: Determination of bulk density and porosity*
— *Part 2: Determination of true density*
— *Part 3: Test methods for carbon-containing refractories*
— *Part 4: Determination of permeability to gases*
— *Part 5: Determination of cold crushing strength*
— *Part 6: Determination of modulus rupture, ambient temperatures*
— *Part 7: Determination of modulus of rupture, elevated temperatures*
— Part 8: Determination of refractoriness-under-load – withdrawn – replaced by *EN ISO 1893*
— *Part 9: Determination of creep in compression*
— *Part 10: Determination of permanent change in dimensions on heating*
— *Part 11: Determination of resistance to thermal shock (ENV)*
— *Part 12: Determination of pyrometric cone equivalent*
— *Part 13: Specification for pyrometric cones*
— Part 14: Determination of thermal conductivity (hot wire, cross-array) – withdrawn – replaced by *EN ISO 8894-1*
— *Part 15: Determination of thermal conductivity (hot wire, parallel)*
— *Part 16: Determination of resistance to acids*
— *Part 17: Determination of bulk density of granular material (mercury method)*
— *Part 18: Determination of bulk density of granular material (water method)*
— *Part 19: Determination of thermal expansion by a differential method*

— Part 20: Determination of resistance to abrasion at ambient temperature – withdrawn – replaced by *EN ISO 16282*

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

1 Scope

This document specifies three methods for the determination of the permanent change in dimensions on heating of dense shaped refractory products.

NOTE The methods can be applied to materials sensitive to oxidation. However, some of these materials can be affected during the test in such a way as to make the measurement of the dimensional changes impossible to carry out to the required accuracy.

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.

EN 993-1, *Methods of test for dense shaped refractory products - Part 1: Determination of bulk density, apparent porosity and true porosity*

ISO 13385-1, *Geometrical product specifications (GPS) — Dimensional measuring equipment — Part 1: Design and metrological characteristics of callipers*

ISO 5022, *Shaped refractory products — Sampling and acceptance testing*

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:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
permanent change in dimensions on heating
expansion or contraction that remains in a shaped refractory product that is heated to a specified temperature for a specified time and then cooled to ambient temperature

Note 1 to entry: Change is either on the basis of length (ΔL) or volume (ΔV).

[SOURCE: ISO 2477:2005, 3.1]

3.2
dense shaped refractory product
product with specific dimensions, having a true porosity of less than 45 % by volume, when measured in accordance with EN 993-1

3.3
sample
representative collection of items that can be obtained by sampling in accordance with ISO 5022

3.4
item
refractory brick or shape