



SLOVENSKI STANDARD
SIST EN 1402-7:2004

01-maj-2004

BUXca Yý U
SIST ENV 1402-7:1998

Neoblikovani ognjevzdržni izdelki - 7. del: Preskusi predhodno izdelanih oblikovancev

Unshaped refractory products - Part 7: Tests on pre-formed shapes

Ungeformte feuerfeste Erzeugnisse - Teil 7: Prüfungen an Fertigteilen

Produits réfractaires non façonnés - Partie 7: Essais sur pièces pré-formées

Ta slovenski standard je istoveten z: EN 1402-7:2003

ICS:

81.080 Ognjevzdržni materiali Refractories

SIST EN 1402-7:2004 **en**

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 1402-7:2004

<https://standards.iteh.ai/catalog/standards/sist/55b4732f-af41-47a8-97d9-142f421e0f87/sist-en-1402-7-2004>

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 1402-7

October 2003

ICS 81.080

Supersedes ENV 1402-7:1998

English version

Unshaped refractory materials - Part 7: Tests on pre-formed shapes

Produits et matériaux réfractaires - Partie 7: Essais sur pièces pré-formées

Ungeformte feuerfeste Erzeugnisse - Teil 7: Prüfungen an Fertigteilen

This European Standard was approved by CEN on 20 June 2003.

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 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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
<https://standards.iteh.ai/catalog/standards/sist/55b4732f-af41-47a8-97d9-142f421e0f87/sist-en-1402-7-2004>



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

Management Centre: rue de Stassart, 36 B-1050 Brussels

Contents

	page
Foreword.....	3
1 Scope	4
2 Normative references	4
3 Terms and definitions.....	4
4 Principle.....	7
5 Apparatus	7
6 Inspection by attributes	9
6.1 Preparation of the test piece.....	9
6.2 Measurement of dimensions	9
6.3 Measurement of angles	10
6.4 Measurement of warpage.....	10
6.5 Measurement of corner defects.....	11
6.6 Measurement of edge defects	12
6.7 Measurement of craters and bubbles	13
6.8 Measurement of cracks	14
6.9 Measurement of protrusions and indentations	15
6.10 Measurement of fins	15
6.11 Segregations	15
6.12 Friability	15
7 Inspection by variables	16
7.1 Destructive test methods	16
7.1.1 General.....	16
7.1.2 Physical properties.....	16
7.1.3 Moisture content (see NOTE 2 of 7.1.4).....	16
7.1.4 Loss on ignition	16
7.2 Non-destructive test methods	17
7.2.1 Ultrasonic testing.....	17
7.2.2 Determination of the resonant frequency by mechanical shock.....	19
7.2.3 Rebound hammer.....	21
7.2.4 Mass	22
7.2.5 Bulk density.....	22
8 Test report	22
Bibliography	24

Foreword

This document (EN 1402-7:2003) 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 2004, and conflicting national standards shall be withdrawn at the latest by April 2004.

This document supersedes ENV 1402-7:1998.

EN 1402 "Unshaped refractory products" consists of eight parts:

- Part 1 *Introduction and classification*
- Part 2 *Sampling for testing*
- Part 3 *Characterization as received*
- Part 4 *Determination of consistency of castables*
- Part 5 *Preparation and treatment of test pieces*
- Part 6 *Measurement of physical properties*
- Part 7 *Tests on pre-formed shapes*
- Part 8 *Determination of complementary properties*

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

EN 1402-7:2003 (E)

1 Scope

This European Standard specifies methods for the testing of as-delivered pre-formed shapes. It applies to shapes fabricated from dense and insulating castables and ramming materials as defined in EN 1402-1.

NOTE Acceptance values for the individual test methods described should be agreed between the parties involved.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 1402-1, *Unshaped refractory products – Part 1 Introduction and classification.*

EN 1402-6, *Unshaped refractory products – Part 6: Measurement of physical properties.*

3 Terms and definitions

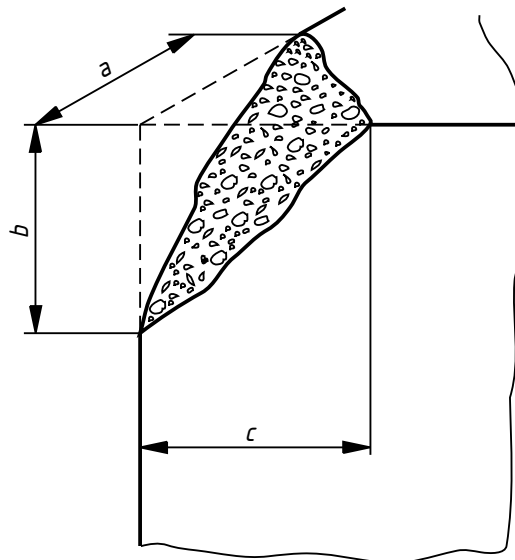
For the purposes of this European Standard, the following terms and definitions apply.

3.1

corner defect

missing corner, defined by the three dimensions a , b and c as indicated in Figure 1

<https://standards.iteh.ai/catalog/standards/sist/55b4732f-af41-47a8-97d9-142f421e0f87/sist-en-1402-7-2004>



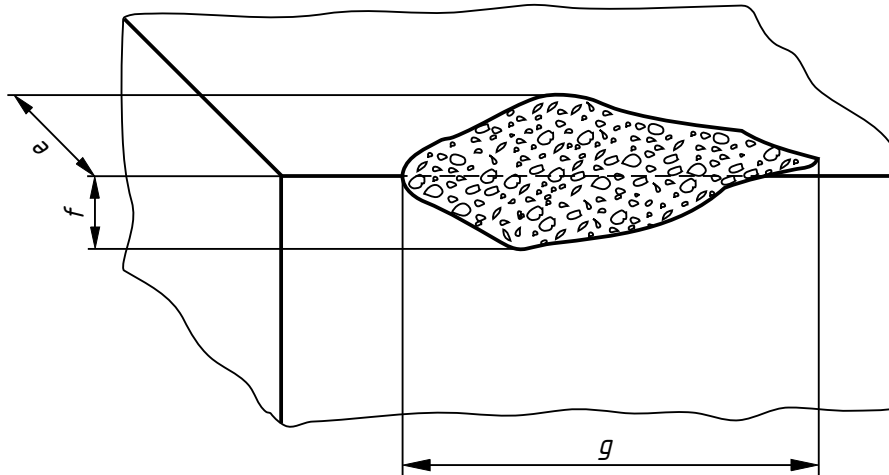
Key

a , b and c Three dimensions defining the missing corner

Figure 1 — Typical corner defect

3.2**edge defect**

missing edge, defined by the three dimensions, e , f , and g as indicated in Figure 2

**Key**

e , f , and g Three dimensions defining the missing edge

iteh STANDARD PREVIEW
(standards.iteh.ai)

Figure 2 — Typical edge defect

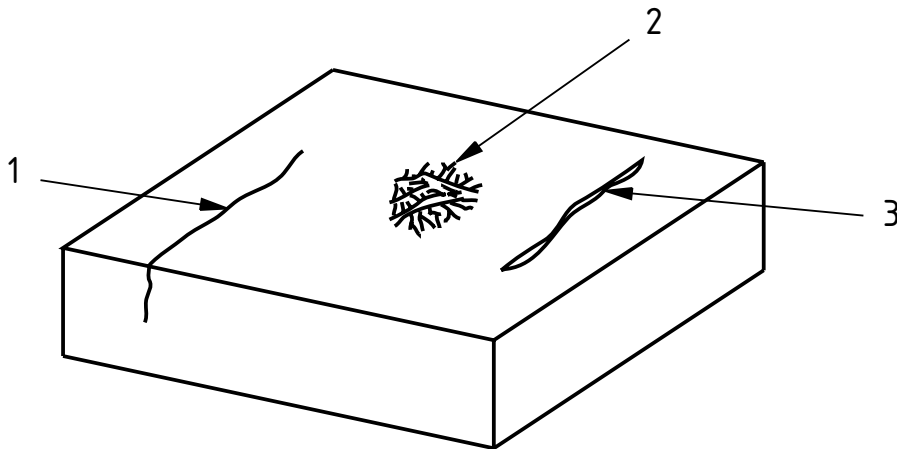
3.3**crater**

clearly defined hole in the surface of a shape whose parameters, i.e. maximum diameter, minimum diameter and depth, can be measured

NOTE Its origin can be a bubble produced during manufacture.

3.4**hairline cracks**

fine cracks visible on the surface of a shape whose length can be measured and whose width is less than or equal to 0,2 mm (see Figure 3)

**Key**

- 1 Hairline crack
- 2 Surface crazing
- 3 Open cracks

iTeh STANDARD PREVIEW
 (standards.iteh.ai)

Figure 3 — Typical cracks

3.5**surface crazing**

<https://standards.iteh.ai/catalog/standards/sist/55b4732f-af41-47a8-97d9->
 network of hairline cracks confined to the surface of the shape (see Figure 3)

3.6**open cracks**

cracks or tears on the surface whose length is more than 10 mm and whose width is more than 0,2 mm (see Figure 3)

3.7**protrusions and indentations**

imperfections that can occur during fabrication or firing, if applicable

3.8**fins**

thin layer of material on the face of a shape that projects beyond the edge

3.9**segregation**

separation of aggregate and fines during fabrication to leave a honeycomb appearance and/or a layer of excess fines

3.10**friability**

crumbly texture due to poor consolidation and/or mould leakage

3.11**warpage**

deviation of a plane surface from being flat

4 Principle

Testing of pre-formed shapes by qualitative and/or quantitative methods. These methods are of two types:

- a) **Inspection by attributes** by evaluating the integrity of a refractory shape by visual inspection of cracks or other surface defects and by conformance to dimensional tolerances;
- b) **Inspection by variables** by evaluating the quality of a refractory shape by determining physical properties using appropriate destructive or non-destructive test methods.

NOTE It is not obligatory to use all the test methods described in this European Standard when determining the quality of a pre-formed shape.

5 Apparatus

5.1 Linear measuring devices, steel tape and/or callipers in accordance with the tolerance required and conforming to an accuracy twice the intended accuracy of the measurement.

NOTE Where possible, linear tolerances less than 1 mm should be measured with callipers. Steel tape measurements are accurate to the millimetre (0,5 mm can be estimated) whereas callipers are accurate to 0,1 mm.

5.2 Steel straightedge, at least 5 mm thick and of sufficient length to span the diagonal of the largest shape to be measured.

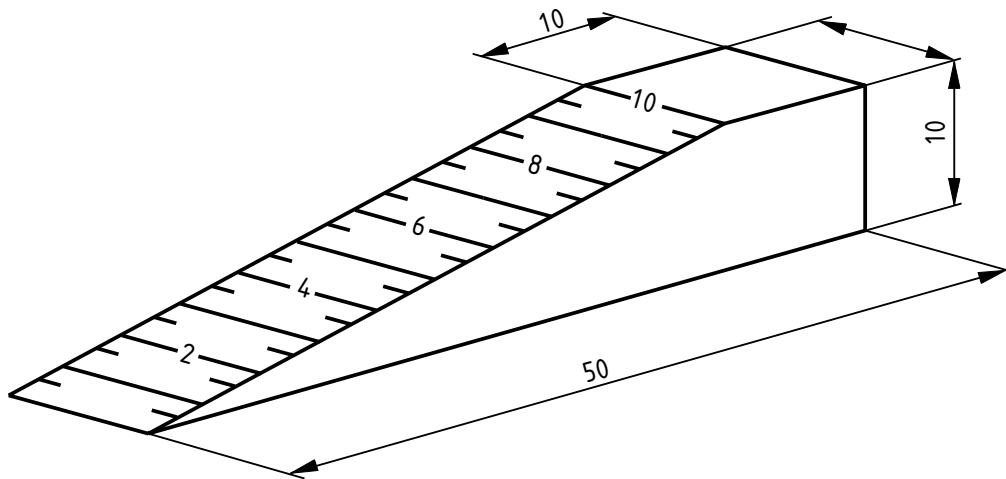
5.3 Two steel measuring wedges, which shall be either:

- a) type 1, at least 50 mm in length and 10 mm in thickness at one end, of uniform cross section for a length of at least 10 mm from that end and then tapering to zero thickness at the other end (see for example Figure 4a), or
- b) type 2, up to 160 mm in length with an even taper from 4 mm to zero (see for example Figure 4b).

Each wedge shall be graduated and numbered along the slope to show the thickness of the wedge between the base and the slope in increments of either 0,5 mm (type 1) or 0,1 mm (type 2).

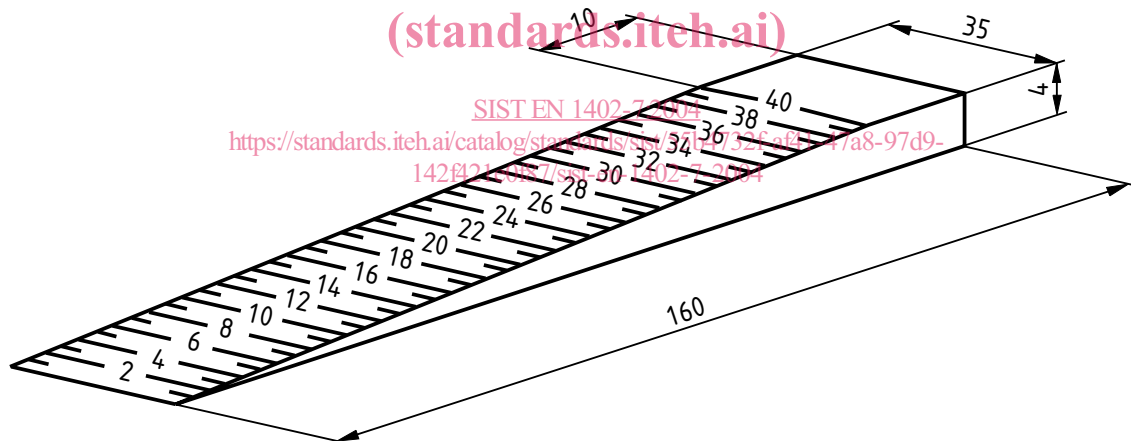
iTeh STANDARD PREVIEW
(standards.iteh.ai)
SIST EN 1402-7:2004
http://standards.iteh.ai/en/standards/SIST/EN/1402-7-2004/142421e0f87/sist-en-1402-7-2004

Dimensions in millimetres



a) Type 1

iTeh STANDARD PREVIEW
(standards.iteh.ai)



b) Type 2

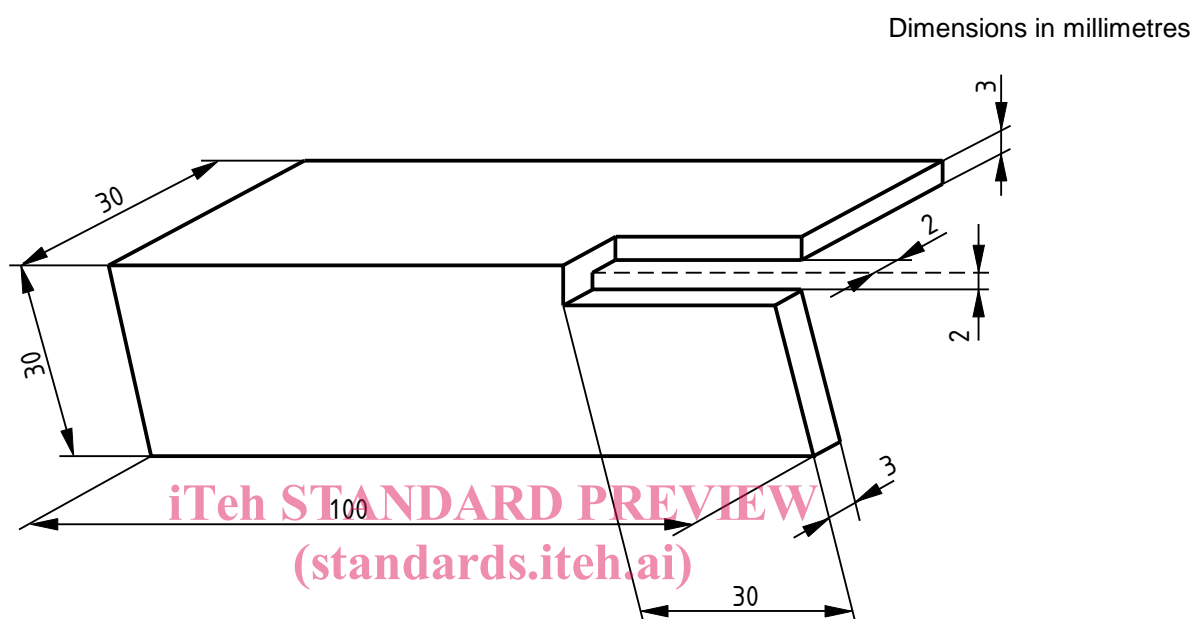
Figure 4 — Two types of measuring wedge

- 5.4 Graticule**, with 0,1 mm graduations and/or feeler gauges of an appropriate size and accuracy to be used for the measurement of crack width. If necessary, the gauges can be replaced by measuring wedges of appropriate accuracy.
- 5.5 Sliding bevel**, for the measurement of angles.
- 5.6 Depth gauge** calibrated in millimetres of depth, having a probe of 3 mm diameter.

5.7 Breakage defect sizer, with a slot uncovering 2 mm on both surfaces, for determination of minimum defect sizes for corner and edge defects, according to Figure 5.

NOTE 1 One breakage defect sizer can be used together with a steel straightedge for the measurement of corner defects (see 6.5). Two breakage defect sizers can be used together with a linear measuring device for the measurement of edge defects (see 6.6).

NOTE 2 A breakage defect sizer permits an objective definition of the point of departure for the measurement of the size of a broken edge.



SIST EN 1402-7:2004

<https://standards.iteh.ai/catalog/standards/sist/55b4732f-af41-47a8-97d9->

Figure 5 — Breakage defect sizer

5.8 Balance, capable of measuring to an accuracy of 1 %.

5.9 Ultrasonic pulse velocity measuring equipment.

5.10 Equipment for determining the resonant frequency by mechanical shock.

5.11 Rebound hammer.

5.12 Drying oven, capable of being controlled at $110\text{ °C} \pm 5\text{ °C}$.

5.13 Furnace, capable of operating at $1\ 050\text{ °C} \pm 5\text{ °C}$.

6 Inspection by attributes

6.1 Preparation of the test piece

The definition of edges may be improved, after any protrusions or indentations have been measured, by removing any projections such as fins or protrusions. This can normally be achieved by light abrasion.

6.2 Measurement of dimensions

Linear dimensions shall be measured by means of a linear measuring device (see 5.1), and unless otherwise agreed, shall be measured to the nearest 0,5 mm.