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EUROPEAN STANDARD  
NORME EUROPÉENNE  
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**EN 1402-2**

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ICS

Supersedes ENV 1402-2:1997

English version

## Unshaped refractory products - Part 2: Sampling for testing

Produits réfractaires non-façonnés - Partie 2:  
Echantillonnage

Ungeformte feuerfeste Erzeugnisse - Teil 2: Probenahme

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.

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## Foreword

This document (EN 1402-2:2003) 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of an identical text or by endorsement, at the latest by April 2004, and conflicting national standards shall be withdrawn at the latest by April 2004.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 1402-2:1997.

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*

Annex A is informative.

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 1402-2:2003 (E)

### 1 Scope

This part of this European Standard gives guidance on the sampling of unshaped refractory materials for the purpose of inspection and testing for quality and general information on the reduction and treatment of samples prior to testing. It covers all materials formulated as unshaped refractory materials.

### 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 932-1, *Tests for general properties of aggregates - Part 1: Methods for sampling.*

ISO 8656-1, *Refractory products - Sampling of raw materials and unshaped products - Part 1: Sampling scheme.*

### 3 Terms and definitions

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

#### 3.1

##### **batch**

##### **lot**

quantity of material from which a sample is to be achieved for testing to determine the quality of the material

NOTE A batch consists of material characterised as being of the same type, composition, grading and which, as far as practical, has been manufactured under the same conditions.

#### 3.2

##### **consignment**

quantity of material supplied at one time

NOTE A consignment may consist of one or more batches or parts of batches.

#### 3.3

##### **unit package**

packaged part of a batch which can be a bag or a big bag (castables, gunning material, ramming mixes), a carton (plastics), wrapped block (tap hole mixes), a drum or a can (injection material, refractory grout...)

NOTE A pallet is not a unit package.

#### 3.4

##### **increment**

quantity of material taken at one time from a larger quantity

##### 3.4.1

##### **elementary increment**

quantity of material taken at one time from a unit package

NOTE This operation repeated a number of times will constitute a package increment after mixing.

##### 3.4.2

##### **package increment**

increment that is representative of the unit package

## 4

NOTE 1 It can be the unit package itself or the result of mixing a certain number of elementary increments.

NOTE 2 The mass and number of elementary increments which are necessary to form the package increment are defined in accordance with ISO 8656-1.

### 3.4.3 laboratory increment

package increment that has been reduced by an approved method

### 3.4.4 test-piece increment

test bars or cylinders obtained by shaping the laboratory increment necessary to carry out several physical tests (e.g. castable test bars for cold modulus of rupture testing)

### 3.5 sample

one or more increments taken from a batch which are to be used to provide information on the batch and to allow a decision concerning the quality of the batch

#### 3.5.1 batch sample

set of package increments representative of the batch

NOTE The number of package increments which are to form the batch sample, should be agreed by the principal parties involved. ISO 5022 or other sampling schemes may be used.

#### 3.5.2 laboratory sample

set of laboratory increments

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NOTE The number of laboratory increments is the same as the number of package increments.

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#### 3.5.3 test-piece sample

set of test-piece increments

NOTE The number of test increments can be higher than the number of laboratory increments and is governed by EN test standards.

## 4 Sampling scheme

### 4.1 General principles

4.1.1 It is essential that the adoption of a particular sampling scheme be agreed by the principal parties and that a detailed sampling plan be documented and made available to those responsible for the taking and testing of the increments. The basic framework of a scheme requires decisions and documentation on the following:

- a) the constitution and description of the total material to be sampled;
- b) the identification of batches and quantities which make up the total material;
- c) the type of packaging and mass content for each type of material;
- d) the parties responsible for sampling and testing who may be third parties;
- e) the location, timing and method of sampling;
- f) the level of sampling, population of increments;
- g) the properties to be measured;

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- h) the methods of test (reference to EN number);
- i) the criteria for assessing values of measured properties for deciding batch quality.

**4.1.2** In all cases during sampling, increment division, preparation and storage of the increments, care shall be taken to protect against any changes in the properties to be tested.

**4.1.3** Sampling shall be performed under the supervision of a person having adequate experience on sampling. The sampler shall be approved either by the interested parties or by the appropriate body or bodies. The sampler shall be informed of the aim of the sampling.

**4.1.4** When individual batches are identified, agreement should be made between the parties on whether, or to what degree, a large batch should be subdivided into smaller batches. This may be undertaken to avoid the possibility of the whole of a large batch being rejected because of a problem with a proportion of it.

**4.1.5** When a sample is required for third party certification of factory production control as the product is being made, the sample shall be achieved by the same method that the producer uses to obtain a sample for production control purposes.

**4.1.6** Where required, the consignment may be subdivided into individual test batches for example, if it is clear that the consignment consists of various batches or should be treated in separate partial quantities.

**4.1.7** The framework of sampling is presented in Figures A.1 to A.3.

**4.2 Procurement of the batch sample****4.2.1 Method**

Identify the test batch, i.e. of the consignment or part of the consignment to be sampled (nature of the product, mass, transport conditions, etc.);

Identify the unit package. The average weight of this unit package shall be known;

Obtain the number of package increments which are to form the batch sample as agreed between parties. The sampling scheme of ISO 5022 can be agreed by the parties if the unit packages, considered as equivalent to shaped pieces, weigh less than 35 kg;

Randomly, select this number of the unit packages from the batch;

Proceed to sample the selected unit packages, if their mass is more than 35 kg. This means obtain a package increment of each of these unit packages. In this case, ISO 8656-1 shall be applied to determine the mass and the number of elementary increments which are necessary to obtain the package increment:

- a) estimate the maximum grain size of the material. This estimation is important because the minimum mass of the elementary increment shall be determined, taking into account the maximum grain size of the material in order to avoid systematic errors during sampling (see Table 1).

**Table 1 — Minimum mass of elementary increment depending on the maximum grain size**

Maximum grain size mm	Minimum mass of elementary increment g
10	500 g
3	200 g
1	50 g



NOTE 1 The masses of the elementary increments relate to a bulk density greater than  $1 \text{ g/cm}^3$ . For lower bulk densities, the mass of the elementary increment can be determined by multiplying the numerical value in the table by the bulk density of the material.

NOTE 2 Special agreements should be made in the case of very lumpy products. In the case of pre-ground or pre-homogenized material, the minimum mass of the elementary increment can be determined, not from the grain size of the coarsest aggregate, but from the maximum size of the grains of the material before aggregating.

NOTE 3 The actual elementary increment masses should depend on the sampling equipment and the tests to be performed. This is the case for unshaped products if the physico-mechanical properties of test pieces taken from these products are to be determined.

- b) determine the mass of the elementary increment in accordance with ISO 8656-1, taking into account the minimum quantities required for the tests which are to be performed.
- c) classify the test batch in a quality variation class because the number of increments to be taken from a test lot shall be determined taking into account the deviations in the properties of the material.

The mean value and the standard deviation of a given property and type of unshaped product, designated respectively by  $\mu$  and  $\sigma$ , define the coefficient of variation  $v = 100 \sigma/\mu$  of this property expressed in practice as a percentage.

The values of the coefficient of variation are divided into three classes:

$0 < v < 5 \%$ , small variation, class 1;

$5 \% < v < 15 \%$ , medium variation, class 2;

$15 \% < v < 30 \%$  large variation, class 3.

The property which presents the highest value of the coefficient of variation is used to determine the number of elementary increments.

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If the coefficient of variation is unknown or if it is greater than 30, use the class 3 values (large variations).

The number of elementary increments to be taken is determined in accordance with Table 2.

**Table 2 — Minimum number  $n$  of elementary increments**

Class of deviations of the property			Mass $m$ of unit packages
%			
Class 1	Class 2	Class 3	$10^3 \text{ kg}$
$v < 5$	$5 < v < 15$	$15 < v < 30$	
4	4	8	$1 < m < 5$
4	6	12	

The value of  $n$  given in Table 2 is a minimum and generally the actual number should not be less than that specified in the table.

Package increment mass is equal to the minimum mass of elementary increment multiplied by the minimum number of increments.

If the fixed mass for the package increment is less than the mass required for the various tests, increase either the mass of the elementary increment or the number of the increments so as to obtain a sufficient amount.