



SLOVENSKI STANDARD
SIST EN 12475-4:2000
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Razvrstitev gostih oblikovanih ognjevzdržnih izdelkov - 4. del.: Posebni izdelki

Classification of dense shaped refractory products - Part 4: Special products

Klassifizierung dichter geformter feuerfester Erzeugnisse - Teil 4: Sondererzeugnisse

Classification des produits réfractaires façonnés denses - Partie 4: Produits spéciaux

Ta slovenski standard je istoveten z: EN 12475-4:1998

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ICS:

81.080 Ognjevzdržni materiali Refractories

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EUROPEAN STANDARD

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Descriptors: refractory materials, shaped refractories, dense shaped refractory products, classifications, designation, chemical composition

English version

Classification of dense shaped refractory products - Part 4: Special products

Classification des produits réfractaires façonnés denses -
Partie 4: Produits spéciaux

Klassifizierung dichter geformter feuerfester Erzeugnisse -
Teil 4: Sondererzeugnisse

This European Standard was approved by CEN on 5 December 1998.

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

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Foreword

This European Standard 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of an identical text or by endorsement, at the latest by June 1999, and conflicting national standards shall be withdrawn at the latest by June 1999.

EN 12475 Classification of dense shaped refractory products consists of four parts:

Part 1 : Alumina-silica products

Part 2 : Basic products containing less than 7 % residual carbon

Part 3 : Basic products containing from 7 % to 30 % residual carbon

Part 4 : Special products

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, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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1 Scope

This part of EN 12475 establishes the classification and designation of dense shaped refractory products of special composition of the following series:

- a) oxide based products:
 - alumina-chromic oxide;
 - alumina-chromic oxide-zirconia-silica;
 - zirconia-silica;
 - alumina-zirconia-silica;
- b) oxide and non-oxide based products:
 - alumina-carbon;
 - alumina-silicon carbide-carbon;
- c) non-oxide based products:
 - silicon carbide;
 - carbon;
- d) further special products which are only designated but not classified e.g. non-oxide products such as borides, nitrides or further combinations of the series listed above.

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2 Normative references

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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 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.

- | | | |
|-----------------------------|---|---|
| EN 955-2 | : | Chemical analysis of refractory products - Part 2: Products containing silica and/or alumina (wet method) |
| prEN 955-3 | : | Chemical analysis of refractory products - Part 3: Chrome-bearing materials (wet methods) |
| ENV 955-4 | : | Chemical analysis of refractory products - Part 4: Products containing silica and/or alumina (Analysis by Flame Atomic Absorption Spectrometry (FAAS) and Inductively Coupled Plasma Atomic Emission Spectrography (ICP)) |
| prEN 955-5 | : | Chemical analysis of refractory materials - XRF fused cast bead method |
| EN 993-3 | | Methods of test for dense shaped refractory products - Part 3: Test methods for carbon-containing refractories |
| prENV 12698-1 ¹⁾ | : | Chemical analysis of silicon carbide refractories : Parts 1: General methods for analysis of oxides, oxygen and nitrogen |

¹⁾ in preparation

- prENV 12698-2 ¹⁾ Chemical analysis of silicon carbide refractories - Part 2:
Products containing less than 25% silicon carbide
- prENV 12698-3 ¹⁾ Chemical analysis of silicon carbide refractories - Part 3:
Products containing more than 25% silicon carbide

3 Classification

3.1 Basis of classification

Dense shaped special refractory products are classified according to the following six criteria:

- a) the type of product;
- b) the group determined by the content of its main chemical component(s);
- c) the principal raw material(s);
- d) the state of the raw materials;
- e) the nature of the bond;
- f) any post treatment.

3.2 Type of product

The types of dense shaped special refractory products included in this classification are:

- a) alumina-chromic oxide (ACr)
- b) chromic oxide (Cr)
- c) alumina-chromic oxide-zirconia-silica (ACrZS)
- d) zirconia (Z)
- e) zirconia-silica (ZS)
- f) alumina-zirconia-silica (AZS)
- g) alumina-carbon (AC)
- h) alumina-silicon carbide-carbon (ASC)
- i) silicon carbide (SiC)
- j) carbon (C)

These product types shall be classified in accordance with tables 1 to 8 by their chemical analysis carried out on the calcined basis for oxide products and on the as received state for non oxide products.

3.3 Classification groups

The classification groups of dense shaped special refractory products of the mentioned series shall be determined by the content of their main chemical component(s) with the designation as shown in the following tables and in accordance with the ranges given in tables 1 to 8.

¹⁾ in preparation

3.3.1 Classification of alumina-chromic oxide and chromic oxide refractories

The classification by product type and group of alumina-chromic oxide and chromic oxide special refractories is given in table 1. The two criteria for the group classification shall be the alumina and chromic oxide contents of the product types.

Table 1. Classification of alumina-chromic oxide and chromic oxide special refractories

Product type	Group	Contents (m%)	
		Al ₂ O ₃	Cr ₂ O ₃
Alumina - chromic oxide	ACr 90	Al ₂ O ₃ ≥ 90	5 ≤ Cr ₂ O ₃ < 10
	ACr 80	80 ≤ Al ₂ O ₃ < 90	10 ≤ Cr ₂ O ₃ < 15
	ACr 70	70 ≤ Al ₂ O ₃ < 80	15 ≤ Cr ₂ O ₃ < 30
	ACr 50	50 ≤ Al ₂ O ₃ < 70	30 ≤ Cr ₂ O ₃ < 50
Chromic oxide	Cr 50	10 ≤ Al ₂ O ₃ < 50	50 ≤ Cr ₂ O ₃ < 90
	Cr 90	Al ₂ O ₃ < 10	Cr ₂ O ₃ ≥ 90

NOTE : The analysis is carried out on the calcined product in accordance with EN 955-2, prEN 955-3, ENV 955-4 or prEN 955-5.

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3.3.2 Classification of alumina-chromic oxide-zirconia-silica refractories

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The classification by product type and group of alumina-chromic oxide-zirconia-silica special refractories is given in table 2. The two main criteria for the group classification shall be the chromic oxide and alumina contents of the product types ; limits on the total content in silica and zirconia are imposed on the various groups.

Table 2. Classification of alumina-chromic oxide-zirconia-silica special refractories

Product type	Group	Contents (m%)		
		Cr ₂ O ₃	Al ₂ O ₃	ZrO ₂ +SiO ₂
Alumina - chromic oxide - zirconia - silica	ACrZS 10	10 ≤ Cr ₂ O ₃ < 25	20 ≤ Al ₂ O ₃ < 55	25 ≤ ZrO ₂ +SiO ₂ < 50
	ACrZS 25	25 ≤ Cr ₂ O ₃ < 40	15 ≤ Al ₂ O ₃ < 60	10 ≤ ZrO ₂ +SiO ₂ < 50
	ACrZS 40	40 ≤ Cr ₂ O ₃ < 80	5 ≤ Al ₂ O ₃ < 30	10 ≤ ZrO ₂ +SiO ₂ < 30

NOTE 1 : The analysis is carried out on the calcined product in accordance with EN 955-2, prEN 955-3, ENV 955-4 or prEN 955-5.

NOTE 2 : The ZrO₂ content includes HfO₂.

3.3.3 Classification of zirconia and zirconia-silica refractories

The classification by product type and group of zirconia and zirconia-silica refractories is given in table 3. The primary criteria for classification shall be the zirconia content of the product type. For groups with lower content in zirconia, limits on silica and/or alumina are imposed on the various groups.

Table 3. Classification of zirconia and zirconia-silica special refractories

Product type	Group	Contents (m%)		
		ZrO ₂	Al ₂ O ₃	SiO ₂
Zirconia	Z 95	ZrO ₂ ≥ 95		
	Z 90	90 ≤ ZrO ₂ < 95		
	Z 70	70 ≤ ZrO ₂ < 90		10 ≤ SiO ₂ < 25
Zirconia-silica	ZS 60	60 ≤ ZrO ₂ < 70		25 ≤ SiO ₂ < 40
	ZS 50	50 ≤ ZrO ₂ < 60		30 ≤ SiO ₂ < 50
	ZS 35	35 ≤ ZrO ₂ < 50	Al ₂ O ₃ < 20	25 ≤ SiO ₂ < 50

NOTE 1 : The analysis is carried out on the calcined product in accordance with EN 955-2, ENV 955-4 or prEN 955-5.

NOTE 2 : The ZrO₂ content includes HfO₂.

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3.3.4 Classification of alumina-zirconia-silica refractories

The classification by product type and group of alumina-zirconia-silica special refractories is given in table 4. The two main criteria for the group classification shall be the zirconia and alumina contents ; limits on the silica content are imposed on the various groups.

Table 4. Classification of alumina-zirconia-silica refractories

Product type	Group	Contents (m%)		
		ZrO ₂	Al ₂ O ₃	SiO ₂
Alumina-zirconia-silica	AZS 5	5 ≤ ZrO ₂ < 15	60 ≤ Al ₂ O ₃ < 95	SiO ₂ < 35
	AZS 15	15 ≤ ZrO ₂ < 30	50 ≤ Al ₂ O ₃ < 80	SiO ₂ < 25
	AZS 30	30 ≤ ZrO ₂ < 40	30 ≤ Al ₂ O ₃ < 55	SiO ₂ < 20
	AZS 40	40 ≤ ZrO ₂ < 50	30 ≤ Al ₂ O ₃ < 55	25 ≤ SiO ₂ < 40

NOTE 1 : The analysis is carried out on the calcined product in accordance with EN 955-2, ENV 955-4 or prEN 955-5.

NOTE 2 : The ZrO₂ content includes HfO₂