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SIST EN 12475-2:1998

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EUROPEAN STANDARD

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ICS

Descriptors: refractory materials, shaped refractories, dense shaped refractory products, nomenclature, classifications, designation, raw materials, magnesia refractories, dolomite: minerals, lime, chromate refractories

English version

## Classification of dense shaped refractory products - Part 2: Basic products containing less than 7% residual carbon

Classification des produits réfractaires façonnés denses -  
Partie 2: Produits basiques contenant moins de 7% de  
carbone résiduel

Klassifizierung dichter geformter feuerfester Erzeugnisse -  
Teil 2: Basische Erzeugnisse mit einem Massenanteil an  
Restkohlenstoff kleiner als 7%

This European Standard was approved by CEN on 18 January 1998.

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

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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an identical text or by endorsement, at the latest by month of August 1998, and conflicting national standards shall be withdrawn at the latest by month of August 1998.

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.

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

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## 1 Scope

This part of EN 12475 specifies the classification and designation of dense shaped basic refractory products with or without antioxidant additives. Products containing equal to or more than 7 % residual carbon after coking are excluded from this classification. The classification is applicable to dense shaped products with or without metal plates and reinforcement.

NOTE 1 : EN 12475-3 covers the classification of dense shaped basic products containing from 7% to 30 % residual carbon.

NOTE 2 : All bricks can be encased in metal plate and all unfired bricks can be reinforced by means of an internal metal plate.

## 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.

EN ISO 10058 :	Magnesites and dolomites - Chemical analysis
prEN 955-3 :	Chemical analysis of refractory products - Part 3: Chrome bearing materials
prEN 955-5 :	Chemical analysis of refractory products - Part 5: XRF analysis by the fused cast bead method

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## 3 Classification

### 3.1 Basis of classification

Dense shaped basic products containing less than 7 % carbon shall be classified according to the following five criteria:

- a) the type of product;
- b) the group determined principally by its magnesia content;
- c) the state of the raw materials;
- d) the nature of the bond;
- e) any post treatment.

### 3.2 Type of product

The types of dense shaped refractory products of the basic series included in this classification are:

- a) magnesia (M);
- b) magnesia doloma (MD);
- c) doloma (D);
- d) magnesia spinel (M<sub>Sp</sub>);
- e) forsterite (F);
- f) magnesia chromite (M<sub>Cr</sub>);
- g) chromite (Cr);
- h) lime (L);
- i) magnesia zirconia silica (MZ, MZS).

These product types shall be classified in accordance with tables 1 and 2, by their chemical analysis carried out on the calcined samples in accordance with EN ISO 10058, prEN 955-3 or prEN 955-5.

### 3.3 Classification groups

The product types shall be classified into groups according to tables 1 and 2. The primary criteria for the group classification shall be the magnesia content of the product type with each group generally covering a range of magnesia content of 5% to 10%.

For some products (MD, D, L, Cr, MZ, MZS), limits on other essential oxide constituents are imposed on the various groups.

The product types with antioxidant additives shall be classified according to the same criteria with the addition of a suffix A, indicating the presence of antioxidant additives.

**Table 1. Classification of magnesia and magnesia-calcia series**

Product type	Group	Contents (m%)	
		MgO	CaO
Magnesia	M 98	MgO>98	
Magnesia	M 95	95<MgO<98	
Magnesia	M 90	90<MgO<95	
Magnesia	M 85	85<MgO<90	
Magnesia	M 80	80<MgO<85	
Magnesia doloma	MD 80	80<MgO<90	CaO>10
Magnesia doloma	MD 70	70<MgO<80	CaO>20
Magnesia doloma	MD 60	60<MgO<70	CaO>30
Magnesia doloma	MD 50	50<MgO<60	CaO>40
Magnesia doloma	MD 40	40<MgO<50	CaO>50
Doloma	D 40	MgO< 40	CaO>50
Lime	L 70	MgO< 30	CaO>70

**Table 2 Classification of other basic products containing magnesia**

Product type	Group	Contents (m%)			
		MgO	Cr <sub>2</sub> O <sub>3</sub>	ZrO <sub>2</sub>	SiO <sub>2</sub>
Magnesia spinel	MSp 80	MgO > 80			
Magnesia spinel	MSp 70	70 < MgO < 80			
Magnesia spinel	MSp 60	60 < MgO < 70			
Magnesia spinel	MSp 50	50 < MgO < 60			
Magnesia spinel	MSp 40	40 < MgO < 50			
Magnesia spinel	MSp 30	30 < MgO < 40			
Magnesia spinel	MSp 20	20 ≤ MgO < 30			
Forsterite	F 50	MgO > 50			
Forsterite	F 40	40 < MgO < 50			
Magnesia chromite	MCr 80	MgO > 80			
Magnesia chromite	MCr 70	70 < MgO < 80			
Magnesia chromite	MCr 60	60 < MgO < 70			
Magnesia chromite	MCr 50	50 < MgO < 60			
Magnesia chromite	MCr 40	40 < MgO < 50			
Magnesia chromite	MCr 30	30 < MgO < 40			
Chromite	Cr 30	MgO < 30	Cr <sub>2</sub> O <sub>3</sub> ≥ 30		
Magnesia zirconia silica	MZ 90	MgO ≥ 90		ZrO <sub>2</sub> < 10	
Magnesia zirconia silica	MZ 70	70 ≤ MgO < 90		ZrO <sub>2</sub> ≥ 10	
Magnesia zirconia silica	MZS 70	70 ≤ MgO < 90		5 ≤ ZrO <sub>2</sub> < 15	5 ≤ SiO <sub>2</sub>

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### 3.4 State of raw materials

The raw materials shall be classified by using one or more of the four designations as follows:

- naturally occurring, (raw or sintered);
- synthetic sintered;
- co-clinker;
- fused.

### 3.5 Nature of the bond

The bonding system shall be classified by using one of the four designations as follows:

- ceramic bond: formed by sintering during firing;
- organic chemical bond: formed at ambient temperature or higher temperatures;
- inorganic chemical bond: formed by chemical reaction;
- fusion cast: formed by total fusion of the product.