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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

Reference number
ISO 10081-2:2003(E)

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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

ISO 10081-2 was prepared by Technical Committee ISO/TC 33, *Refractories*.

The various parts of this revised series of ISO 10081 will cancel and replace ISO 1109:1975. Part 1 is a partial revision of ISO 1109:1975, Part 2 cancels and replaces ISO 10081-1:1991, and Part 3 is new.

ISO 10081 consists of the following parts, under the general title *Classification of dense shaped refractory products*:

— *Part 1: Alumina-silica*

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

— *Part 3: Basic products containing from 7 % to 50 % residual carbon*

Part 4 is under preparation and is intended to cover special products as given in Clause 2 of ISO 1109:1975.

Classification of dense shaped refractory products —

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

1 Scope

This part of ISO 10081 specifies the classification and designation of dense shaped basic refractory products with or without antioxidant additives. Products containing 7 % or more 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 ISO 10081-3 covers the classification of dense shaped basic products containing from 7 % to 50 % 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, and/or mixed metal fibre.

2 Normative references

The following referenced documents are indispensable for the application 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.

ISO 10058, *Magnesites and dolomites — Chemical analysis*

ISO 12677, *Chemical analysis of refractory products by XRF — Fused cast bead method*

3 Classification

3.1 Basis of classification

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

a) the type of product;

b) the group determined principally by its magnesia content as well as the presence of antioxidant additives;

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 lime (ML),

c) magnesia doloma (MD),

d) doloma (D),

e) magnesia spinel (MSp),

f) forsterite (F),

g) magnesia chromite (MCr),

h) chromite (Cr),

i) lime (L),

j) magnesia zirconia silica (MZ, MZS)

— L: lime and/or synthetic MgO-CaO co-clinker, and

— D: sintered natural dolomite.

These product types shall be classified in accordance with Tables 1 and 2, by their chemical analysis carried out on the calcined products in accordance with ISO 10058 or ISO 12677.

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.

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

The presence of antioxidant additives shall be indicated by adding “A” to the group designation.

Table 1 — Classification of magnesia and magnesia-calcia series

Product type	Group	Contents % (mass fraction)	
		MgO	CaO
Magnesia	M 98	$MgO \geqslant 98$	
Magnesia	M 95	$95 \leqslant MgO < 98$	
Magnesia	M 90	$90 \leqslant MgO < 95$	
Magnesia	M 85	$85 \leqslant MgO < 90$	
Magnesia	M 80	$80 \leqslant MgO < 85$	
Magnesia lime	ML 80	$80 \leqslant MgO < 90$	$CaO \geqslant 10$
Magnesia lime	ML 70	$70 \leqslant MgO < 80$	$CaO \geqslant 20$
Magnesia lime	ML 60	$60 \leqslant MgO < 70$	$CaO \geqslant 30$
Magnesia lime	ML 50	$50 \leqslant MgO < 60$	$CaO \geqslant 40$
Magnesia lime	ML 40	$40 \leqslant MgO < 50$	$CaO \geqslant 50$
Magnesia doloma	MD 80	$80 \leqslant MgO < 90$	$CaO \geqslant 10$
Magnesia doloma	MD 70	$70 \leqslant MgO < 80$	$CaO \geqslant 20$
Magnesia doloma	MD 60	$60 \leqslant MgO < 70$	$CaO \geqslant 30$
Magnesia doloma	MD 50	$50 \leqslant MgO < 60$	$CaO \geqslant 40$
Magnesia doloma	MD 40	$40 \leqslant MgO < 50$	$CaO \geqslant 50$
Doloma	D 40	$MgO < 40$	$CaO \geqslant 50$
Lime	L 70	$MgO < 30$	$CaO \geqslant 70$

Table 2 — Classification of other basic products containing magnesia

Product type	Group	Contents % (mass fraction)			
		MgO	**Cr_2O_3**	**ZrO_2**	**SiO_2**
Magnesia spinel	MSp 80	$MgO \geqslant 80$			
Magnesia spinel	MSp 70	$70 \leqslant MgO < 80$			
Magnesia spinel	MSp 60	$60 \leqslant MgO < 70$			
Magnesia spinel	MSp 50	$50 \leqslant MgO < 60$			
Magnesia spinel	MSp 40	$40 \leqslant MgO < 50$			
Magnesia spinel	MSp 30	$30 \leqslant MgO < 40$			
Magnesia spinel	MSp 20	$20 \leqslant MgO < 30$			
Forsterite	F 50	$MgO \geqslant 50$			
Forsterite	F 40	$40 \leqslant MgO < 50$			
Magnesia chromite	MCr 80	$MgO \leqslant 80$			
Magnesia chromite	MCr 70	$70 \leqslant MgO < 80$			
Magnesia chromite	MCr 60	$60 \leqslant MgO < 70$			
Magnesia chromite	MCr 50	$50 \leqslant MgO < 60$			
Magnesia chromite	MCr 40	$40 \leqslant MgO < 50$			
Magnesia chromite	MCr 30	$30 \leqslant MgO < 40$			
Chromite	Cr 30	$MgO < 30$			
Magnesia zirconia	MZ 90	$MgO \geqslant 90$	$Cr_2O_3 \geqslant 30$	$ZrO_2 \geqslant 10$	
Magnesia zirconia	MZ 70	$70 \leqslant MgO < 90$		$ZrO_2 \geqslant 10$	
Magnesia zirconia silica	MZS 70	$70 \leqslant MgO < 90$		$5 \leqslant ZrO_2 < 15$	$5 \leqslant SiO_2$

3.4 State of raw materials

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

a) naturally occuring, (raw or sintered);

b) synthetic sintered;

c) co-clinker (magnesia chromite, magnesia lime);

d) fused.

3.5 Nature of the bond

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

a) ceramic bond: formed by sintering during firing;

b) organic chemical bond: formed at ambient temperature or higher temperatures;

c) inorganic chemical bond: formed by chemical reaction;

d) fusion cast: formed by total fusion of the product.

3.6 Post-treatment

Any post-treatment shall be classified by using one or both of the two designations:

a) tempering (at a temperature up to 800 °C);

b) impregnation.

NOTE There may be no post-treatment.

4 Designation

The designation of dense shaped refractory products of the basic series (< 7 % residual carbon) shall comprise the listing of the five criteria of classification given in Clause 3: type, group, state of raw materials, nature of bond, post treatment.

EXAMPLES Some examples of designations are as folows:

— magnesia chromite product of the group MCr 60, based on synthetic sintered magnesia and naturally occuring chromite, with a ceramic bond;

— doloma product of the group D 45, based on naturally occuring sintered doloma, with a ceramic bond;

— magnesia product of the group M 95, based on synthetic sintered magnesia, with an organic chemical bond, tempered and impregnated.

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