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Standard Classification for Fusion-Cast Refractory Blocks and Shapes[1]

This standard is issued under the fixed designation C 1547; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This classification covers commercial fusion-cast refractory blocks and shapes. Its purpose is to set forth the various types and classes of these materials according to their mineralogical compositions. These compositions are important to determining their suitability for use in specified applications. This standard is not intended to cover commercial fused grains or beads.

1.2 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory requirements prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*

C 1118 Guide for Selecting Components for Wavelength Dispersive X-ray Fluorescence (XRF) Systems[2]

E 1479 Practice for Describing and Specifying Inductively Coupled Plasma Atomic Emission Spectrometers[2]

2.2 *Other Document:*

"A Practical Guide for the Preparation of Specimens for X-Ray Fluorescence and X-Ray Diffraction Analysis," Victor E. Buhrke, Ron Jenkins and Deane K. Smith, eds., John Wiley & Sons, Inc., New York, 1998

NOTE 1—Chemical analysis of refractory products are determined by a combination of x-ray fluorescence (XRF) and inductively coupled plasma (ICP) analyses using standard reference materials (SRM), including various types of minerals and refractory materials which are available from the National Institute of Standards and Technology and other appropriate sources.

3. Terminology

3.1 For definitions of terms used in this classification, see Terminology C 71.

4. Significance and Use

4.1 This classification categorizes the defined types of fused-cast refractory blocks and shapes into distinct classes based on mineralogical composition. Such classes have historically been useful for relating the defined types and classes with specific industrial applications and for developing product or purchasing specifications.

5. Basis of Classification

5.1 Fused alumina refractories are classified by the content of soda, Na_2O, as determined by chemical analysis and the resulting beta- (β-) alumina ($NaAl_{11}O_{17}$) or beta″- (β″-) alumina ($NaMg_2Al_{15}O_{25}$) content as determined by quantitative x-ray diffraction (XRD) or by quantitative image analysis of representative polished sections.

NOTE 2—Differential rates of solidification at the surface and the interior of fusion cast shapes, result in different grain sizes. Likewise, the segregation of one or more components may occur during solidification. Therefore the most representative specimens are small, rapidly cooled ladles or shapes (no dimension >3 in. (>75 mm)) obtained by casting into metallic or graphite molds directly from the pouring stream of the fusion furnace.

5.2 Fused alumina-zirconia-silica (AZS) and high zirconia refractory types are classified by the content of monoclinic zirconia (ZrO_2) as determined by chemical analysis or quantitative image analysis on representative polished sections.

5.3 Fused aluminosilicate refractories are classified by their alumina to silica (Al_2O_3:SiO_2) ratios as determined by chemical analysis and by the amount of monoclinic zirconia present as determined by x-ray diffraction (XRD) or quantitative image analysis.

5.4 Fused chromium-containing refractories are classified by the amount of chromia present by chemical analysis and by its mineralogical form as determined by x-ray diffraction (XRD) or by quantitative image analysis.

5.5 Magnesia-containing fused refractories are classified by the amount and type of MgO (periclase) and spinel phases ($R^{2+}R^{3+}{}_2O_4$, where R^{2+} represents the relevant divalent cations and R^{3+} represents the relevant trivalent cations) as determined by x-ray diffraction (XRD) or by quantitative image analysis.

[1] This classification is under the jurisdiction of ASTM Committee C08 on Refractories and is the direct responsibility of Subcommittee C08.92 on The Joseph E. Kopanda Subcommittee for Editorial, Terminology, and Classification.

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[2] *Annual ASTM Book of Standards*, Vol

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