



## Standard Terminology Relating to Refractories<sup>1</sup>

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### 1. Scope

1.1 This terminology covers terms particularly related to refractories and encompasses raw materials, manufacture, finished products, applications, and testing procedures.

1.2 When any of the definitions in this terminology are quoted or published out of context, editorially insert the limiting phrase “in refractories” after the dash following the term to properly limit the field of application of the term and definition.

### 2. Referenced Documents

#### 2.1 ASTM Standards:

- C 24 Test Method for Pyrometric Cone Equivalent (PCE) of Fireclay and High-Alumina Refractory Materials<sup>2</sup>
- C 181 Test Method for Workability Index of Fireclay and High-Alumina Plastic Refractories<sup>2</sup>
- C 401 Classification of Alumina and Alumina-Silicate Castable Refractories<sup>2</sup>
- C 416 Classification of Silica Refractory Brick<sup>2</sup>
- C 456 Test Method for Hydration Resistance of Basic Bricks and Shapes<sup>2</sup>
- C 492 Test Method for Hydration of Granular Dead-Burned Refractory Dolomite<sup>2</sup>
- C 860 Practices for Determining and Measuring Consistency of Refractory Concretes<sup>2</sup>
- C 909 Practice for Dimensions of a Modular Series of Refractory Brick and Shapes<sup>2</sup>

### 3. Significance and Use

3.1 This terminology ensures that terms peculiar to refractories are adequately defined so that other standards in which such terms are used can be understood and interpreted properly.

3.2 This terminology is useful to those who are not conversant with the terms related to refractories. However, it is also a ready reference for those directly associated with refractories to resolve differences and ensure commonality of usage, particularly in the preparation of ASTM standards.

3.3 Although this terminology is intended to promote uni-

formity in the usage of terms related to refractories, it can never be complete because new terms are constantly arising. The existence of this terminology does not preclude the use or misuse of any term in another context.

### 4. Terminology

#### 4.1 Definitions:

**abrasion of refractories**, *n*—wearing away of refractory surfaces by the scouring action of moving solids.

**acid refractories**, *n*— see **refractories, acid**.

**alumina-chromia brick**, *n*—a refractory brick, which may be burned or unburned, manufactured predominantly of a mixture of a high-alumina raw material and chromic oxide ( $\text{Cr}_2\text{O}_3$ ), with the alumina ( $\text{Al}_2\text{O}_3$ ) content being 50 % or greater by weight and with chromic oxide ( $\text{Cr}_2\text{O}_3$ ) predominating by weight among the other constituent oxides.

**anthracite-coal-base carbon refractory**, *n*—see **carbon refractory, anthracite-coal-base**.

**basic refractories**, *n*— see **refractories, basic**.

**bat**, *v*—to reject or discard a brick or shape.

**binder**, *n*—a substance added to a granular material to give it workability and green or dry strength.

**bloating of refractories**, *v*—substantial swelling produced by a heat treatment that causes the formation of a vesicular structure.

**bond fireclay**, *n*—see **fireclay, plastic or bond**.

**burn**, *v*—the heat treatment to which refractory materials are subjected in the firing process.

**burning (firing) of refractories**, *v*—the final heat treatment in a kiln to which refractory brick and shapes are subjected in the process of manufacture for the purpose of developing bond and other necessary physical and chemical properties.

**calcine, calcines**, *n*—refractory material, often fireclay, that has been heated to eliminate volatile constituents and to produce desired physical changes.

**calcined refractory dolomite**, *n*—see **dolomite, calcined refractory**.

**calcining of refractory materials**, *v*—the heat treatment to which raw refractory materials are subjected, preparatory to further processing or use, for the purpose of eliminating volatile chemically combined constituents and producing volume changes.

**carbon-ceramic refractory**, *n*—a manufactured refractory comprised of carbon (including graphite) and one or more ceramic materials such as fireclay and silicon carbide.

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 15.01.

**carbon refractory**, *n*—a manufactured refractory comprised substantially or entirely of carbon (including graphite).

**carbon refractory, anthracite-coal base**, *n*—a manufactured refractory comprised substantially of calcined anthracite coal.

**carbon refractory, graphite-base**, *n*—a manufactured refractory comprised substantially of graphite.

**carbon refractory, metallurgical-coke-base**, *n*—a manufactured refractory comprised substantially of metallurgical coke.

**carbon refractory, petroleum-coke-base**, *n*—a manufactured refractory comprised substantially of calcined petroleum coke.

**castable**, *n*—a combination of refractory grain and a suitable amount of bonding agent that, after the addition of a proper liquid, is generally poured into place to form a refractory shape or structure which becomes rigid because of chemical action (see Classification C 401).<sup>2</sup>

*chemically bonded brick*, *n*—see **unburned brick**.

**chrome brick**, *n*—a refractory brick, which may be burned or unburned, manufactured predominantly or entirely of refractory-grade chrome ore, and having a Cr<sub>2</sub>O<sub>3</sub> content of 30 % or greater (see also chromic oxide brick).

**chrome-magnesia brick**, *n*—a refractory brick, which may be burned or unburned, manufactured predominantly of a mixture of refractory-grade chrome ore and refractory-grade magnesia in which the refractory-grade chrome ore predominates by weight; the refractory-grade magnesia may be either seawater magnesia, dead-burned magnesite, fused magnesia, or a combination of these materials.

**chrome ore, refractory-grade**, *n*—a refractory ore consisting essentially of chrome-bearing spinel with only minor amounts of accessory minerals and having physical and chemical properties suitable for making refractory products.

**chromia-alumina brick**, *n*—a refractory brick, which may be burned or unburned, manufactured predominantly of a mixture of chromic oxide (Cr<sub>2</sub>O<sub>3</sub>) and a high-alumina raw material, with the chromic oxide content being 50 % or greater by weight and with alumina (Al<sub>2</sub>O<sub>3</sub>) predominating by weight among the other constituent oxides.

**chromic oxide brick**—a refractory brick, which may be burned or unburned, manufactured predominantly of chromic oxide (Cr<sub>2</sub>O<sub>3</sub>) and having a Cr<sub>2</sub>O<sub>3</sub> content of 90 % or greater (may also be called chromia brick).

**concrete, refractory**, *n*—a hardened castable.

**consistency**, *n*—the degree of mobility of a refractory castable as determined by Practices C 860.

**corrosion of refractories**, *n*—destruction of refractory surfaces by the chemical action of external agencies.

**dead-burned**, *adj*—the state of a basic refractory material resulting from a heat treatment that yields a product resistant to atmospheric hydration or recombination with carbon dioxide.

*dead-burned magnesite*, *n*—see **magnesite, dead-burned**.

*dead-burned refractory dolomite*, *n*—see **dolomite, dead-burned refractory**.

**diaspore clay**, *n*—a rock consisting essentially of diaspore bonded by fireclay.

**direct bonded basic brick**, *n*—a fired refractory in which the grains are joined predominantly by a solid state diffusion mechanism.

DISCUSSION—The term “direct bond” was initially applied to fired magnesia-chrome refractories.

**doloma-carbon refractory**, *n*—a refractory brick manufactured predominantly from a mixture of refractory-grade doloma and 2 to 20 weight percent carbonaceous materials, with resin, tar, pitch or a combination of these materials as the bonding agent; the refractory-grade doloma may be either dead-burned dolomite, synthetic doloma, fused doloma or combinations of these materials, and the carbonaceous material may be either graphite, carbon black, or a combination of these materials.

**doloma, fused**, *n*—refractory-grade material consisting predominantly of lime and magnesia which has solidified from a fused or molten state.

**doloma-magnesia refractory**, *n*—a refractory, which may be burned or unburned, manufactured predominantly of a mixture of refractory-grade doloma and refractory-grade magnesia in which the refractory-grade doloma predominates by weight.

**doloma refractory**, *n*—a refractory manufactured predominantly of dead-burned dolomite, synthetic doloma, fused doloma or combinations of these materials.

**doloma, refractory-grade**, *n*—a dead-burned or fused refractory material consisting predominately of lime and magnesia; the three principal types are dolomite, dead-burned; doloma, synthetic; and doloma, fused.

**doloma, synthetic**, *n*—a refractory-grade doloma which has been derived from blending magnesia and lime or dolomite and dead-burning to form a dense, hydration-resistant material; and having a MgO content of 30 % to 80 % and maximum CaO content of 70 %.

**dolomite**, *n*—a carbonate rock consisting predominantly of magnesium carbonate (MgCO<sub>3</sub>) and calcium carbonate (CaCO<sub>3</sub>) in approximately an equal molecular ratio.

**dolomite, dead-burned**, *n*—a refractory grade doloma which is obtained by burning dolomite above 1450°C long enough to form a dense hydration-resistant material composed primarily of lime and magnesia.

**erosion of refractories**, *n*—wearing away of refractory surfaces by the washing action of moving liquids.

**firebrick**, *n*—any type of refractory brick specifically fireclay brick.

**firebrick, insulating**, *n*—a refractory brick characterized by low thermal conductivity and low heat capacity.

**fireclay**, *n*—an earthy or stony mineral aggregate that has as the essential constituent hydrous silicates of aluminum with or without free silica, plastic when sufficiently pulverized and wetted, rigid when subsequently dried, and of suitable refractoriness for use in commercial refractory products.

**fireclay, nodular**, *n*—a rock containing aluminous or ferruginous nodules, or both, bonded by fireclay.

DISCUSSION—In some districts such clays are called “burley” or “burley flint” clay.