

## REFCON®

### General information

Refcon® is a fused, intermediate purity calcium aluminate (CA) cement typically used in refractory applications up to 1540 °C (2800 °F) where reducing conditions may also be present. Refcon® is also chosen for certain applications where its light color or other properties give it superior performance.

Refcon® is composed of calcium aluminate phases which have the following characteristics:

- High early strength
- Refractoriness
- High abrasion resistance
- Resistance to biogenic sulfuric acid corrosion

Refcon® has a shelf life of approximately six months if stored in a dry environment with small temperature variations. Other environments may shorten or extend the shelf life.

### Production

Refcon® is produced by melting selected raw materials (bauxite and limestone) in special kilns. After cooling, the clinker is ground using ball mills. The total alumina content is adjusted by adding calcined alumina to enhance peak service temperature performance.

### Quality

Refcon® is tested according to ASTM and other accepted procedures. Quality control data is available for each production lot.

The production plant is certified according to EN ISO 9001 – certificate number CH08/1542 and the Environmental Management System EN ISO 14001 – certificate number CH08/1543.

### Technical data

The following information represents typical ranges for the chemical and physical properties of Refcon® produced at our plant.

### Chemical composition, % (ASTM C-114)

SiO <sub>2</sub>	≤ 6.0%
Al <sub>2</sub> O <sub>3</sub>	≥ 55.0%
Fe <sub>2</sub> O <sub>3</sub>	≤ 3.0%
CaO	≤ 36.0%
MgO	≤ 1.5%
SO <sub>3</sub>	≤ 0.4%

### Mineralogical composition

Refcon® contains mainly monocalcium aluminate (CA). This mineral phase is responsible for the high early strength.

When mixed with water, Refcon® forms calcium aluminate hydrates as its hydration products.

### Mineral phases of Refcon®:

Main mineral phase	CA
Minor mineral phases	C <sub>2</sub> AS, CT, C <sub>12</sub> A <sub>7</sub>

### Physical properties:

% retained on 325 mesh	< 35%
Blaine Fineness (ASTM-204)	330 - 380 m <sup>2</sup> /kg
Bulk density	approx. 1.15 g/cm <sup>3</sup>
Specific gravity	3.0-3.1 g/cm <sup>3</sup>
Approximate melting point:	1540°C / 2800°F

### Setting time and water demand

The setting time is determined by ASTM C-403 using a test mortar. The strength and water demand are determined by ASTM C-109.

Initial set (hrs:min)	3:00 – 5:30
Final set	maximum 120 min after initial set

### Development of strength

After setting, strength develops very rapidly. Refcon® is a cement with very high early strength and high compressive strength. After one day, the compressive strength is typically higher than Type I Portland cements after 28 days.

### Typical development of strength versus time

Time	6 hrs	1 day
Compressive Strength (MPa)	-	>35

#### ▶ Refractoriness

Refcon<sup>®</sup> can be used in a variety of moderate to severe refractory applications. It is especially designed for use under reducing conditions where carbon monoxide is present at high temperatures. Refcon<sup>®</sup> can be used in gunning mixes as well as castables. It can be used as a stand-alone cement, or as part of a more complex hydraulic system.

#### ▶ Mixing advice

As with Portland cement, ambient conditions and temperatures of the ingredients will influence the length of time Refcon<sup>®</sup> concretes and mortars will remain plastic and workable. Higher temperatures naturally will reduce this time while lower temperatures will extend it. Many types of mixes using Refcon<sup>®</sup> are extremely sensitive to the characteristics of each ingredient in the mix, and may require substantial lab testing to obtain optimum properties.

#### ▶ Safety instructions

Please refer to our Material Safety Data Sheets for complete information. In general, CALUCEM calcium aluminate cements are not known to contain hazardous or toxic materials.

#### ▶ Important notice

The information and statements herein are believed to be reliable, but are not to be construed as a warranty or representation for which we assume legal responsibility. No warranty, representation or condition of any kind, expressed or implied (including NO WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE) SHALL APPLY. Having no control over the use of cement, the seller will not guarantee finished work, nor shall the seller be liable for consequential damages.

#### ▶ Note of caution

Dry cement powder is non-hazardous, but will act as an irritant if airborne cement dust is breathed. When mixed with water to make concrete, mortar or grout, skin or eye contact may cause mild to severe irritation. Care should be taken to minimize contact with cement powder or paste, and to avoid breathing any airborne cement dust.

Date: 09/2014

This supersedes all earlier data sheets.