

# REC REPAIR M-313

## Rapid hardening high alumina cement

### PRODUCT

**Rec Repair M-313** is a normal setting, rapid hardening High Alumina Cement (HAC) with high early strength. It differs substantially from the usual calcium silicate cements (Portland cements) in its manufacturing process, chemical composition and rapid strength gain. **Rec Repair M-313** is composed of calcium aluminates with the following characteristics:

- High early strength
- Refractoriness
- High abrasion resistance
- Resistance to biogenic sulphuric acid corrosion (BSAC)

**Rec Repair M-313** meets the requirements of British Standard BS 915 for High Alumina Cements and is controlled in accordance with EN 196.

**Rec Repair M-313** is produced by melting selected raw materials (bauxite and limestone) in special kilns. After cooling, the clinker is ground using ball mills.

### TECHNICAL DATA

#### Chemical composition (%)

SiO <sub>2</sub>	2-5
Al <sub>2</sub> O <sub>3</sub>	39-42
Fe <sub>2</sub> O <sub>3</sub>	14-17
CaO	37-40
MgO	< 1.2
SO <sub>3</sub>	< 0.4

#### Mineralogical composition

**Rec Repair M-313** contains mainly monocalcium aluminate (CA). This mineral phase is responsible for the high early strength. When mixed with water **Rec Repair M-313** forms calcium aluminate hydrates as its hydration products. During the hydration of the **Rec Repair M-313** no Ca(OH)<sub>2</sub> is created, as opposed to Portland cement.

#### Mineral phases of Rec Repair M-313

Main mineral phase: CA,  
Minor mineral phases: C<sub>4</sub>AF, C-F-T, C<sub>2</sub>AS, C<sub>6</sub>F<sub>4</sub>S, C<sub>12</sub>A<sub>7</sub>

#### Cement technical properties

Bulk density	Around 1.15 g/cm <sup>3</sup>
Specific gravity	3.2 - 3.3 g/cm <sup>3</sup>
Fineness (blaine)	3000 - 3500 cm <sup>2</sup> /g
Refractoriness in cement	Approx 1270 C
Residue on sieve at 90 micrometer	< 5 %

### Setting time and water demand

The testing of the setting time is performed using the mortar in order to describe the behavior of the **Rec Repair M-313** in mixtures with a workable consistency. A mixture containing three (3) parts of standard sand and one (1) part cement with a water/cement ratio of 0.43 is produced for testing the mortar on the basis of EN 196.

#### Mortar

Initial set	1- 4 hours
Final set	Maximum 120 min after the initial set

### DEVELOPMENT OF STRENGTH

After setting, strength develops very rapidly.

**Rec Repair M-313** is cement with very high early strength and high compressive strength. After one (1) day, the compressive strength is higher than that of high grade Portland cements CEM I 52.5 R after 28 days.

#### Development of strength [N/mm<sup>2</sup>]

	6h	1d	3d
Compressive strength	30-70	60-100	70-120
Flexural strength	4-8	7-10	9-12

The tests are conducted with mortar prisms 4 x 4 x 16 cm produced according to EN 196 containing three (3) parts standard sand and one (1) part cement with a water/ cement ratio of 0.40.

### RESISTANCE TO CORROSION

High resistance to waste waters in combination with extraordinary abrasion resistance and high resistance to biogenic sulphuric acid corrosion (BSAC) makes **Rec Repair M-313** an ideal product for sewer systems and waste water plants. When **Rec Repair M-313** is mixed with water, the hydration products of calcium aluminates are formed. They are extremely resistant to aggressive, slightly acid waters (pH factor > 3) including water soluble sulphates.

### REFRACTORINESS

After drying out, mortars and concretes made from **Rec Repair M-313** slowly emit their hydrate water without destroying the matrix. At high temperatures (> 1000 °C), ceramic bonding occurs between the high alumina cement parts and the refractory aggregates. These ceramic bonds make **Rec Repair M-313** an excellent binder in refractory concretes and other refractory mortars or gunning mixes.



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## STORAGE

Rec Repair M-313 can be stored for 6 months, in its original packaging, in a dry ventilated area.

## SAFETY PRECAUTIONS

The product contains cement powders which, when mixed with water, release alkalis that could be harmful to the skin. It is preferable that the application be done in a ventilated area, and to wear protective gear for hands, eyes and respiratory system and to avoid breathing of the dust. Splashes on the skin should be washed away by cleaning with soap and water. In case of contact with eyes, wash thoroughly with clean water. If swallowed, do not induce vomiting, in both cases seek medical attention. The product is non-flammable.

## DISCLAIMER

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