

CALCIUM – ALUMINATE

Manufacture

The cement is made by fusing together a mixture of a calcium-bearing material (normally calcium oxide from Limestone and an aluminum-bearing material (normally BAUXITE for general purposes, or refined alumina for white and refractory cements).

The liquified mixture cools to a vesicular, basalt-like clinker which is ground alone to produce the finished product. Because complete melting usually takes place, raw materials in lump-form can be used. A typical kiln arrangement comprises a reverberatory furnace provided with a shaft preheater in which the hot exhaust gases pass upward as the lump raw material mix passes downward. The preheater recuperates most of the heat in the combustion gases, dehydrates and de-hydroxylates the bauxite and de-carbonates the limestone. The calcined material drops into the "cool end" of the melt bath. The melt overflows the hot end of the furnace into molds in which it cools and solidifies. The system is fired with pulverized coal or oil. The cooled clinker ingots are crushed and ground in a ball mill. In the case of high-alumina Refractory cements, where the mix only sinters, a rotary kiln can be used.

Applications

Because of their relatively high cost, calcium aluminate cements are used in a number of restricted applications where performance achieved justifies costs, in construction concretes, where rapid strength development is required, even at low temperatures.

as a protective liner against microbial such as in sewer infrastructure.

In refractory concretes, where strength is required at high temperatures.

as a component in blended cement formulations, for various properties such as ultra-rapid strength development and controlled expansion are required.

in sewer networks for their high resistance to biogenic sulfide corrosion.

Sewer networks applications

The biogenic corrosion resistance of calcium aluminate cements is used today in three main applications:

Ductile iron pipe for waste water have an internal lining made of calcium aluminate cement mortar,

Concrete pipes for sewerage can be made either with full mass calcium aluminate cement concrete or with an internal liner of calcium aluminate cement mortar,

Rehabilitation of man-accessible sewer infrastructures with 100% calcium aluminate mortar using one of the following installation methods: low pressure wet spray, spinning head wet spray or high pressure dry spray (guniting).