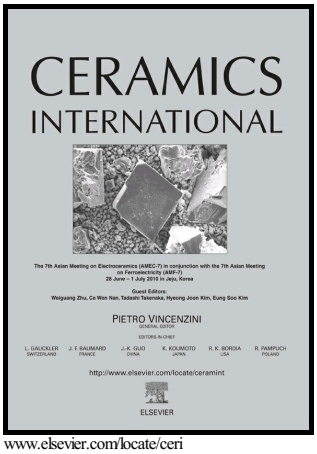


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**Fused dolomite-magnesia co-clinker for fired dolomite refractories**

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Abstract

In this work a new method of obtaining doloma-magnesia co-clinker, which involves fusing a mixture of dolomite decarbonate and caustic magnesia, has been presented. Fused dolomite clinker and fused doloma-magnesia co-clinker have been prepared from high purity raw materials. The properties of a fired material obtained from such co-clinker were compared with a product obtained from fused dolomite clinker without any addition of MgO and with a product enriched with magnesium oxide in the traditional way – by substituting the finest grain fractions with magnesia clinker. It has been proved that it is possible to obtain a fired doloma-magnesia material based on fused doloma-magnesia co-clinker characterized by high chemical purity as well as high resistance to corrosion, hydration and thermal shocks.

**Keywords:** fired dolomite bricks, dolomite clinker, fused clinker, corrosion resistance, thermal shock resistance, doloma-magnesia co-clinker



## 1. Introduction

Dolomite fired bricks are subjected to thermal treatment at a temperature of minimum 1500$^{o}$C. Clinker for the production of such materials must contain limited amounts of $SiO_2$, $Al_2O_3$ and $Fe_2O_3$ admixtures, the total amount of which cannot exceed 2-2.5%. This requirement results from the fact that the above mentioned materials are used to obtain high quality steel. An increased content of fluxes would have a negative influence on the purity of obtained steel and would make it difficult to maintain the dimensions in the process of brick firing. Moreover, the presence of iron, aluminium and silicon compounds in the product reduces its refractoriness and corrosion resistance. The reaction of calcium oxide with aluminium and iron oxides leads to the formation of dicalcium ferrite $2CaO{\cdot}Fe_2O_3$, calcium aluminoferrite $4CaO{\cdot}Al_2O_3{\cdot}Fe_2O_3$ and tricalcium aluminate $3CaO{\cdot}Al_2O_3$. The reaction of calcium oxide with silicon oxide leads to the formation of calcium silicates $2CaO{\cdot}SiO_2$ and $3CaO{\cdot}SiO_2$. Dicalcium silicate in the presence of calcium aluminate forms a liqud phase at ca. 1400 °C. The thermomechanical properties are influenced by the amount of this phase which depends on the amount of impurities. Furthermore, $2CaO{\cdot}SiO_2$ undergoes a polymorphic transition $\beta\rightarrow\gamma$ at 675$^{o}$C, which is accompanied by a 10% volume change, leading to the loosening of clinker's structure [1, 2]. However obtaining a well-sintered dolomite clinker with a low content of admixtures is not an easy task [3]. Liquid phase formed in the reaction of calcium oxide with admixtures facilitate sintering and obtaining of a high density and low porosity clinker [4-6]. To obtain a good quality dolomite clinker