

MICROSTRUCTURAL AND CHEMICAL DEVELOPMENT OF HEAT-CURED CONCRETES AND MORTARS

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ABSTRACT

Ordinary Portland cement mortars subjected to elevated temperatures ($>70^{\circ}\text{C}$) may occasionally exhibit expansion on exposure to moisture at room temperature. This deterioration process is widely referred to as delayed ettringite formation or DEF because ettringite, which normally forms at early ages of hydration, is formed on a delayed basis at much later ages.

It has been claimed that the expansion is a result of the delayed formation of ettringite. However delayed ettringite is observed in heat-cured mortars that are not expansive. Thus the presence of ettringite in a damaged mortar is not a sufficient condition to show that ettringite has caused the damage since ettringite formed at late ages is generally present, whether or not expansion occurs.

This paper presents the changes occurring in the chemistry and microstructure of expanding and non-expanding heat-cured mortars made in laboratory. A mechanism of expansion is proposed and the necessary conditions for expansion to occur in heat-cured mortars or concretes are discussed.