

Influence of Chrysotile Fibers on Drying Shrinkage of Cement Paste

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Different types of fibers are used in building construction to enhance strength and to reduce cracks in structural and non-structural concrete components. Among the fiber cement (FC) composites, FC thin sheets are extensively used as a building material, mainly in ceilings, siding, and flooring. FC thin sheets are lightweight and demonstrate a high strength-to-weight ratio. However, dimensional changes in the sheets and consequent warping are significant issues in these thin FC components. It is noted that drying shrinkage is a notable concern in cement-based materials, particularly in thin components with high surface-to-volume ratios. Hence, it is crucial to investigate the influence of fibers on the drying shrinkage of cement components. This study was conducted to identify the effect of chrysotile fibers on the drying shrinkage of cement paste. The testing mixes comprised chrysotile fibers and ordinary Portland cement (OPC). The chrysotile fibers and OPC were combined in a 1:7 ratio, and water was added to achieve a water/cement of 0.42, mirroring the production of commercial fiber cement thin sheets. Similarly, a control mixture was prepared using the same process without adding chrysotile fibers. Samples were subjected to drying at 25°C and relative humidity of 50% and the drying shrinkage of both samples, with and without fiber addition, was observed to be 0.203% and 0.198%, respectively, at the age of 28 days. It was determined that the incorporation of chrysotile fibers did not result in any significant increase or decrease in drying shrinkage. Hence, the influence of chrysotile fibers on drying shrinkage was found to be insignificant. Further investigations could explore alternative approaches to mitigate shrinkage in fiber cement products, such as the incorporation of shrinkage-reducing admixtures.

Keywords: Fiber cement, Cement paste, Chrysotile fiber, Drying shrinkage

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