

THE EFFECT OF MICROSILICA ON CARBONATION OF AIR-CURED FIBRE CEMENT.

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Keywords:

Carbonation, microsilica, shrinkage,

Abstract

Carbonation is inherent in cement-based materials, resulting in shrinkage. Uneven carbonation of fibre cement leads to tension causing failure in the product, especially when fibre cement is installed in unventilated constructions. Carbonation reaction in fibre cement products is influenced by several factors. Cembrit and Elkem decided to initiate a project to study the effect of microsilica on carbonation in air-cured sheets.

The following curing regimes were designed for this study: All the samples would be cured under the designed carbonation environment including dry-soaking stages for several months. This curing schedule is called a modified BAC schedule ("Bescheunigte Alterung mit CO₂"). As a reference, another group of samples were cured simultaneously under standard condition. 3%, 5% and 10% Microsilica were used in the recipes, and fine limestone was used as filler.

Carbonation caused different influences on different properties of the final product.

Bending strength, moisture movement, water absorption and density were improved due to carbonation; however the bending work (toughness property) was visibly decreased, products becoming more brittle.

Shrinkage only increased in the samples containing 10% microsilica with 10% limestone after exposure to the CO₂ environment. There was no other visible result to indicate the shrinkage increased by adding microsilica, either when the sample was exposed to CO₂ or curing in standard condition. However, the weight increase was reduced by adding microsilica.

There were no visible results in this test to show the properties of the fibre cement products were reduced due to using microsilica, or that negative carbonation effects were increased by adding microsilica.