

SHRINKAGE OF MORTARS WITH A SUSPENSION OF SUPERABSORBENT POLYMERS

A. Bettencourt Ribeiro ⁽¹⁾; Mafalda Vinagre ⁽²⁾; Arlindo Gonçalves ⁽¹⁾

(1) LNEC - Portuguese National Laboratory of Civil Engineering, Lisbon, Portugal

(2) UE – University of Évora, Évora, Portugal

Abstract

The use of superabsorbent polymers (SAP) is effective in controlling internal desiccation of cementitious materials with low W/C. Until now, the use of this type of products is limited to research and special applications. The spread of the use on concrete for current applications depends on economy considerations and ease of application. A sample of a suspension of SAP, which is easy to incorporate in concrete production, was supplied by a large producer, containing 3 % of polymer. Autogenous shrinkage, total shrinkage, mass loss and compressive strength tests were performed in mortars with W/C=0.325 and W/C=0.42, with and without SAP. Results indicate that, if sufficient amount of the suspension is used, the admixture is useful for controlling early age shrinkage, but no benefits are evident for total shrinkage at 28 days, and a decrease of compressive strength is observed.

1. Introduction

The autogenous strain of cementitious materials have become a more relevant subject due to the use of mixtures with very low W/C, as for instance Self-Compacting Concrete or High Performance Concrete. This strain may induce cracks that may lead to a decrease of strength and durability of concrete.

Autogenous shrinkage is related with self-desiccation on internal pore structure [1]. The decrease of internal relative humidity is due to water consumption by cement hydration [2]. The use of superabsorbent polymers (SAP) in cementitious mixtures with low W/C reduces the autogenous shrinkage due to internal supply of water [3-5]. However, until now, the use of this type of products is limited to research and special applications [6]. Today, there are not SAP commercially available in large scale, to be supplied for concrete producers. The spread of the use of SAP on concrete for structures depends on economy considerations and ease of application. This work is focused in testing a SAP, supplied by a large producer of this type of