COMPATIBILITY ASSESSMENT OF COMMERCIAL CEMENTS AND SUPERPLASTICIZERS

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ABSTRACT

In spite of the widespread use of superplasticizers, it is still not possible to anticipate the compatibility between these materials and a specific cement. Such lack of knowledge does not restrain the use of admixtures in concrete, but it makes it harder to optimise mixtures and can lead to an unexpected behaviour. Therefore, in order to contribute to the on-going discussion concerning the cement-superplasticizer interaction, a study was conducted where the effectiveness of one naphthalene sulfonate-type and four polycarboxylate-type superplasticizers was assessed against a CEM I 52,5R and a CEM I 42,5R cement supplied from two different sources in Portugal. The results show the impact of the composition of commercial cements and the nature and dosage of commercial chemical admixtures on the cement-superplasticizer compatibility. This translates the difficulties felt by the end users on a day to day basis and stresses out the urgent need of the development of a compatibility indicator that can be straightforwardly utilised by the end user.

Keywords: superplasticizer; cement; compatibility; cement pastes; rheological behaviour.

INTRODUCTION

High range water reducing/superplasticizing (HRWR/SP) admixtures are used quite extensively for the production of normal, precast, and special concretes, *e.g.* self-compacting concrete and other cementitious based mixtures such as grouts or self-levelling mortars. The improved rheological performance that they impart to cementitious mixtures is attributed to dispersion of agglomerated cement particles [1-6]. However, because HRWR/SP admixtures can interact with many other components of the liquid and solid phases of the mixture, they can take part in a variety of secondary processes that will affect the cement hydration and may lead to situations in which the HRWR/SP admixture performance is adversely affected; in such situations it is said that an "incompatibility" problem exists between the HRWR/SP admixture and the cement. Examples include, for instance, unexpected variations in flowability or segregation and a negative effect on mechanical properties and durability [2, 7].