



Evaluation of service life design assessment according to different chloride diffusion and carbonation models applied on Belgian concrete mixtures

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Abstract

This contribution presents the preliminary research outcomes of a pilot program for the validation of models and test methods for assessment of the durability related to Belgian concrete mixtures. The chloride diffusion and carbonation model of *fib* bulletin 34 [1] and the recent outcomes reported in *fib* bulletin 76 [2] are applied and evaluated. A sensitivity analysis is performed for both damage mechanisms. In addition there are certain parameters in the models which can be recalibrated to the Belgian concrete compositions or exposure conditions. Such a calibration will be performed for the common used types of cement in Belgium (CEM I, CEM III/A and CEM III/B). Preliminary research shows that for chloride ingress, the ageing exponent α , the diffusion- and migration coefficient $D_a(t)$ and $D_{RCM,0}(t_0)$ can be recalibrated according to the Belgian situation. In case of carbonation the relationship between the natural R_{NAC}^{-1} and accelerated R_{ACC}^{-1} inverse carbonation resistance can be determined.

Keywords: Concrete; chloride ingress; carbonation; durability; modelling; sensitivity.

1 Introduction

It is common practice to design concrete in accordance to performance based requirements such as compressive strength and workability. Durability requirements are still often treated in an inferior way compared to the traditional performance criteria and the design of concrete mixtures usually often based on experience. This

approach leads to durability requirements which are not treated in a quantitative way and does not stimulate performance based design of concrete mixtures. This makes it difficult to compare the durability of concrete mixture alternatives (with e.g. new and alternative binders) and to optimize concrete mixtures. In this contribution the chloride diffusion and carbonation model of *fib* bulletins 34 [1] and 76 [2] are applied and