

Paper 2 EXPERIMENTAL STUDY ON ENHANCED CRUMB RUBBER CONCRETE(CRC) FOR RIGID PAVEMENTS

PAPER ID:IJIM/V.4(IV)/7-11/2

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ABSTRACT:In many countries around the world, the adverse environmental impacts of stockpiling waste tyres have led to investigate alternative options for disposal of waste tyres. One option to reduce this environmental concern is for the construction industry to consume a high amount of recycled tyres accumulated in stockpiles.

There are different concerns regarding the introduction of rubber into concrete, which were addressed by previous studies. On the one hand, making a homogenous mix containing even distribution of rubber is a challenge. On the other hand, the severe reduction of concrete strength limits the rubber content. Moreover, replacing a portion of fine aggregates with low-stiffness rubber particles raises concerns regarding the generated shrinkage and cracking of rubberised concrete. This thesis investigates these concerns thoroughly and provides a comprehensive know-how of rubberised concrete characteristics, using crumb rubber.

In order to improve the strength of rubberised concrete different rubber treatment has been introduced by previous studies. A commonly applied rubber treatment method in the literature termed sodium hydroxide (NaOH) treatment has been assessed in this study. Numerous investigations examined using sodium hydroxide treatment of rubber. However, the level of improvement provided by different studies was not consistent. It was found that the sodium hydroxide treatment method is required to be optimised to achieve the most promising results. Two arrays of concrete specimens were prepared using different water cement ratios and a wide range of rubber contents. Then, the common fresh and hardened mechanical tests were conducted on the prepared samples. The results indicated that the duration of rubber treatment should be optimised based on concentration of the alkali solution and the type of recycled rubber. Consequently, the 24-hour treatment duration for crumb rubber resulted in the most suitable fresh and hardened concrete characteristics. Compared to untreated rubberised concrete, rubberised concrete produced with the optimised sodium hydroxide treated rubber, showed 25% and 5% higher compressive and flexural strength, respectively.

KEYWORDS: Rubbersied concrete, sodium Hydroxide, Compressive strength, Flexural strength.

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