Effect of Glass Fibers on Self Compacting Concrete

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Abstract. Self Compacting Concrete (SCC) is a specially developed concrete for concreting under extreme condition of inaccessibility from heights. It is capable to flow under influence of its own weight. It could be used when encountered with dense reinforcement and complex structural design. Problem of segregation as well as bleeding is eliminated and vibration is not required for compaction. As concrete is strong in compression and weak in tension. Hence to make it strong in tension, discontinuous Anti-Crack high dispersion glass fibers are added. SCC mix prepared with addition of discontinuous glass fibers is called as Glass Fiber reinforced Self Compacting Concrete (GFRSCC). In this paper an experimental study has been carried out to check the effect of Anti-Crack high dispersion glass fibers on the compressive strength, split tensile strength and flexural strength of SCC. The result show that, as compared to the Normal SCC, the compressive strength of GFRSCC increases by 2.80% and 12.42%, the split tensile strength of GFRSCC increases by 4.47% and 25.12% and the flexural strength of SCC increases by 6.57% and 14.34% when the Cem-FIL Anti-Crack HD glass fibers were added as 0.25% and 0.50% respectively by the weight of total cementitious material contents. The addition of 0.25% Cem-FIL Anti-Crack HD glass fibers to SCC has not much affect on the workability of Normal SCC. Whereas, addition of 0.50% Cem-FIL Anti-Crack HD glass fibers reduces the workability of SCC.

1Introduction

Today Self Compacting concrete (SCC) has proven to be a big milestone in the construction industry because of its advantages. It can pass easily through congested reinforcement and the gap between formwork and steel reinforcement, also capable to fill the formwork without any voids. It is common experience that, dense reinforcement causes problems during pouring and compaction of concrete. Therefore, concrete must be capable enough to pass through the dense reinforcement arrangement without blocking or segregating. Also poor placement and the lack of compaction can lead to the inclusion of voids and loss of long term durability of concrete structures. To avoid this concrete capable enough to flow by itself and filling the spaces should be used. And this need has been solved by introduction of SCC. It is superior over normal vibrated concrete as it eliminates requirement of vibration for compaction of concrete, thus the reduction in noise at construction site is achieved. It also gives better surface finish. Due to high workability, it is easier to place SCC, thereby reducing the number of workers on site. It increases construction speed leading to economy. Since SCC requires more amount of binder and to achieve economy, cement is replaced in percentage by cement replacement materials like fly ash, GGBS, silica fume, etc [1, 2, 3].

In 1980's, Japan encountered shortage of construction workers. To overcome this problem, Okamura from Japan proposed necessity of SSC as an effective solution for labour intensive concreting work. SSC was superior to normal cement concrete in terms of properties in fresh state as filling ability, ease in passing and segregation resistance. To prepare SSC mix, cement paste content has to be increase, coarse aggregate content and water-powder ratio must be reduced. To compensate these changes suitable admixture, preferably Superplasticizer is added [2]. Prepared SSC mixture is checked as per EFNARC guidelines for fresh concrete properties. Tests like Slump flow test, T_{50} slump flow, L-box test, V-funnel test and V- Funnel at $T_{5minutes}$ are

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