"A Comprehensive Study of Effect of Fly-Ash Admixtures on Durability of High Performance Concrete"

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Abstract

High performance concrete is a concrete in which certain characteristics are developed for a particular application and environment, so that it will give excellent performance in the structure in which it will be placed, in the environment to which it will be exposed, and with the loads to which it will be subjected during its design life. We use various admixtures to achieve such characteristics in concrete mix. This study reviews such admixtures used to improve durability of high performing concrete.

Index Terms- Concrete, Admixture, Workability, Compressive Strength

Introduction

Durability is one of the key properties of High performing concrete. Durability depends on various factors like cement, aggregate, mix proportion and admixtures. It can be improved with proper application of admixtures during concrete mixing process. We have go through the various papers published on it and try to conclude it.

Literature Review

1. **[Hong-zhuQuan and Hideo Kasami, Jun-2014] -** They published their work as **"Experimental Study on Durability Improvement of Fly Ash Concrete with Durability Improving Admixture"**. They observed by using durability improving admixture in nonair-entraining fly ash concrete, the compressive strength of fly ash concrete can be improved by 10%–20%, and the drying shrinkage is reduced by 60%.

2. **[Veeresh Hiremath1, Prof .Venu R .Patil, Aug-2016]**– In this published paper **"Experimental Study On Partial Replacement Of Cement With Mineral Admixtures And Sand With Quarry Dust"**following results can be seen. Adding of mineral admixtures (micro silica and fly ash) to the concrete decreases slump value which leads low workability.The compressive strength of M30 mix with 5% micro silica, 5% fly ash and 5% quarry dust in place of cement and fine aggregate at 28 days is 38.07 N/mm2.

3. **[AbhijitsinhParmar and Dhaval M Patel , Dec-2013]-** Their research work published as **"Experimental Study on High Performance Concrete by Using Alccofine and Fly Ash - Hard Concrete Properties"**give following result that initial compressive strength achieved by using Fly-Ash (22%) and Alccofine (8%) is 42.33 Mpa and 66.64 Mpa at 7 and 28 days respectively,

4. **[P. Rohith , T. NarasimhaRaoand ShanagondaAkhila]-** In this paper "**Experimental Study on Admixtures"** they found not much variations in results that Cement can be replaced by stone dust in M15 grade, and there is not much variation in strength among normal concrete, Replacement of cement by10% stone dust resulted in more compressive strength.

5. [**Anitha J, Pradeepa S, LalitSoni&Rakshit K B]-** International Journal of Research in Advent Technology, Vol.4, No.11, November 2016E-ISSN: 2321-9637 ,Their Research Work is "**Influence of Admixtures on Behavior of Concrete"**The present experimental investigation analyzed different superplasticizers (PCE) in combination with different cement types. Chemical admixture (PCE) performances were evaluated on M45 concrete, the following conclusions were drawn.

5.1 Type B admixture gives good workability even after slump retention of 45min and can be used in places where very less loss of slump is required

5.2 Loss of slump is slightly higher in PPC concrete than OPC concrete due to high surface area and more fineness

Conclusion

After study of above research papers, we concluded that durability of High Performance Concrete can be improved satisfactory with use of Fly-Ash as an admixture. It can be used alone or with other mineral admixtures. Its optimum value varies 15% - 20% by weight.The concrete added with PCE based superplasticizers generally showed higher constancy in terms of performances and efficiency in terms of water reduction to attain the same initial workability in normal concrete without PCEs

Super plasticizers admixtures improve the workability without increasing water demand, for the three grades of concrete no decreasing in compressive strength was observed, Super plasticizers admixtures provide improved durability by increasing ultimate strength and reducing w/c ratio.

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