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Cement-Flyash-Superplastisiser Optimization using Marsh Cone

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Abstract : Rapid infrastructural development necessitated the need of concrete of desired and specific quality, then, normal concrete. High strength concrete or high performance concrete is the today's need. They adopt very low water-cement ratio, and demands admixtures in specific water reducers to maintain workability. Varieties of water reducers or superplastisisers are available. The effect of each of these superplastisisers is different with different brands of cement. As such a compatibility study is necessary to select the right admixture for the right cement. Here an attempt is made to study the compatibility between the admixture and the different brands of cement, using Marsh cone. After deciding the brand of cement to be used with admixture, optimum dosage of superplastisiser for the cement paste and cement-flyash paste is determined for the particular water-cement ratio, which is maintained constant throughout studies.

I. KEY WORDS : MARSH CONE, OPTIMISATION, SUPERPLASTISISERS, COMPATIBILITY

II. INTRODUCTION

These are the days, wherein, concrete of desired and specific quality is expected, then, normal or conventional concrete. High performance or high strength concrete is common now a day. This high performance concrete is defined in many ways by many organizations. But in general high performance or high strength concrete needs an admixture inevitably, because HPC or HSC adopts very low water-cement ratio, where workability becomes a big problem. Here admixtures used are called 'water reducers' or 'high range water reducers', generally they are referred as 'plasticizers' or 'super plasticizers'. use of these admixtures are not much popular till 1985 in India, may be due to, most of the concreting works are in the hands of common builders or government departments, who generally do not accept something new, and lack of awareness of benefits of admixtures. The most important point here is, in India usually low strength concrete of grade M15 to M20 are used, which do not really need the use of these admixtures[1]. Use of Ready mix concrete has really promoted the use of admixture in India, in recent times.

Admixtures are available in variety and their capabilities to produce fluidizing effects are also different, with different cements. The effectiveness of super plasticizer depends on many factors like type, brand and amount of cementing materials, its water content, aggregate shape, gradation, proportions, mixing time and temperature of concrete[2].

Plasticizers and superplastisiser are basically polymers. The commonly used polymers as base for the superplastisiser are Sulphonated Melanic-formaldehyde condensates (SMF) Sulphonated Naphthalene-formaldehyde condensates (SNF)Modified Lignosulphates (MLS)

New generation superplastisiser are based on Carboxylic acrylic ester (CAE) and Multi carboxyl ate ester (MCE).In the present study commercially available polymer based superplastisiser 'SB 430',a product of FOSROC is used.

To check the compatibility, trial mixes are required to be done and observe the requirements. The present study envisages about the compatibility of particular superplastisiser with different brands of ordinary Portland cement 43 grade, and optimization of superplastiser for cement paste and cement-flyash paste, using Marsh cone. The Marsh cone test was used by many authors to evaluate the characteristics of different pastes, in order to select the better combination of water + cementicious material + chemical admixture and the optimum dosage of admixture[3].

III. MECHANISM OF ACTION OF PLASTICIZERS AND SUPERPLASTISISER

Right workability is the essence of good concrete. Different situations of concreting, demands different degree of workability. The conventional method of obtaining high degree of workability is by improving the gradation, using