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A REVIEW PAPER ON BEHAVIOR OF HIGH PERFORMANCE CONCRETE USING ALCCOFINE AND FLYASH

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Abstract: In the present paper, the effect of alccofine and fly ash on properties of concrete has been studied. The aim of this study is to evaluate the high performance of concrete containing supplementary cementations material such as alccofine & fly ash. In the paper literature of various researchers were studied on durability of high performance concrete with alccofine & fly ash. The necessity of HPC is increasing because of demands in the construction industry. Efforts for improving the performance of concrete over the past few years suggest that cement replacement materials along with mineral & chemical admixtures can improve the strength and durability characteristics of concrete. Alccofine is a new generation micro fine concrete material for high strength concrete which is important in respect of workability as well as strength. For high strength concrete the cost of the concrete mix prepared with alccofine is lesser than the concrete without alccofine.

I. INTRODUCTION

In construction industry Concrete is an important structural material. The concrete is regarded as one of the best construction material in the present scenario. The progress of concrete industry also gives to many other nature problems like pollution, dumping of waste materials, emission of greenhouse gases (CO2), depletion of vegetation and natural resources. These days, Ordinary Portland Cement (OPC), binding materials and other materials are available that increase the performance of concrete. The production of each ton of cement, about 1 ton of CO2 is generated. Then, cement production plays an important role in generation of greenhouse gases that share about 5 percent of total CO2 emissions. In USA and UK are aware of these situations and have also introduced taxes on climate changes to reduce carbon emissions. Therefore, the concept of sustainable development is introduced with the aim of using industrial waste products for enhancement of concrete properties. These industrial wastes or by-product plays very important role in development of concrete industry, giving the most suitable, economical and technical solutions for waste disposal resulting in less harm to the nature. These by-products and wastes can be used as partial replacement for cement making these as important constituents of concrete.

II. LITERATURE REVIEW

A.Narender Reddy, T.Meena (2017) – Investigated the compressive strength of concrete incorporating alccofine and GGBS will achieve the better workability. The highest compression strength is achieved by the combination of cement, GGBS and alccofine at 72%, 20% and 8%. From the results it clearly seen as the percentage of alccofine increase the compression strength decreases these is due to the compability nature of the materials used.

Shaikh mohd zubair, S.S. Jamkar (2016) – Investigated development of High strength concrete the compressive strength of concrete of concrete containing different amount of water content for same W/C ratio are within +/- 10% of average value. Obtaining desired workability for same amount of fly ash and alccofine as a replacing material for different water content for 0.2 w/c ratio needs to be use of more dosage of super plasticizer.

Rajesh K. S, A. Samanta and Singha Roy (2015) – Investigated the mechanical properties of concrete containing alccofine and concluded that alccofine will increase the strength in both compression and in flexure to a huge extent at 10% substitute level of cement. It is found that the strength development take place in concrete at all ages of curing. The strength increased rapidly at early age and after that increased gradually. If the proportion level of alccofine is extended beyond the limit it acts as a filler material and yields high workability to the concrete.

Siddharth.P and Jamnu M. A (2014) – Conducted experimental work on compressive strength on self compacting concrete by replacing cement with alccofine, Fly ash and natural sand and M-sand. They observed that by adding alccofine the strength has been increased rapidly at early stages than that of fly ash. The combination of fly ash and alccofine yielded better strength than that of concrete with fly ash and alccofine at all levels. The highest compressive strength is achieved by replacing cement at 10% alccofine and 30% fly ash. The addition of alccofine increases the self compatibility characters of concrete like filling and passing abilities, it also helps in resisting segregation.

Saurabh, Dr. Sanjay and Dr. Devinder (2013) – Have done investigation on strength of concrete containing alccofine and concluded that the use of alccofine as mineral admixture will increase the strength than traditional concrete. The concrete with alccofine shows higher workability and retain the workability for sufficient time. Alccofine can be easily mixed with cement and materials and it also helps in reducing the water/cement ratio.

III. MATERIALS

1 Cement –The Ordinary Portland cement in general can be defined as a material, which possesses very good adhesive and cohesive properties that make it possible to bond with other materials to form a compact mass. Thus cement is a material which possesses cementations properties. The cement used in concrete solidifies when mixed with water.

2 Fly Ash – The Fly ash is a pulverized fuel ash, is the

byproduct obtained by electrostatics and mechanical means from flue gases of power station furnace fixed with pulverized coal. Fly ash is complicated in its chemical and phase compositions. It consists of heterogeneous combination of glassy and crystalline phases. However, wide range exist in the amount of the three principle constituents- Sio2(25 to 60%), Al2O3(10 to 30%) and Fe2O3(5 to 25%). Fly ash can be categorized into two classes, Class F and Class C, According to ASTM C618, If the sum of these three ingradients is 70% or greater, The Fly ash is categorized as class F However as Class C. In the pozzolanic reaction of fly ash, the Ca(OH)2 produced during cement hydration reacts with the silicate and aluminate phases of fly ash to produce calcium silicate and aluminate hydrates its pozzolanic activity attributed to the presence of Sio2 and Ai2O3 is amorphous form, Due to its pozzolanic reaction, Fly ash can beneficially affect various properties of concrete.

3. Alccofine - Is a specially processed product based on high glass content with high reactivity obtained through the process of controlled granulation. Alccofine 1203 provides reduces water demand for a given workability, even up to 70% replacement level as per requirement of concrete performance. Alccofine 1203 can also be used as a high range water reducer to improve compressive strength or as a super workability aid to improve flow.

4. Fine Aggregate – The Fine aggregate should consist of smooth rounded particles, to reduce the water demand. It is recommended that the grading should lie on the coarser side of the limits, a fineness modulus of 3 or greater is recommended, both to decrease the water requirements and to improve the workability of these paste rich mixes, of course, the sand to must be free of silt or clay particles.

5. Coarse Aggregate – For high performance of concrete, the coarse aggregate particles themselves must be strong, from both strength and rheological considerations, the coarse aggregate particles should be roughly equi-dimensional, either crushed rock or natural gravels, particularly if they are of glacial origin, are suitable. In addition, it is important to ensure that the aggregate is clean, since a layer of silt or clay will reduce the cement-aggregate bond strength, in addition to increase the water demand.

6. Water – Water is the main ingredients of preparation for concrete. The potable water was used for mixing concrete and curing the specimens.

7. Admixture – CAC HYPERFLUID (H5) is used where a high degree of workability and its retention are required as also necessitate in places where delays in transportation or placing are likely or else when high ambient temperature causes rapid slump loss. It facilitates further in the production of high quality concrete.

IV. TESTING

Compressive strength – The compressive strength is the capacity of a material or structure to with stand loads. It can be measured by plotting applied force against deformation in a compression testing machine. Some materials fracture at their compressive strength limit, other deform inversely, so a given amount of deformation may be considered as the limit for compressive load. Compressive strength is a key value for design of structures. All the test specimens cost for compressive strength were tested using a compression testing machine.

Split tensile strength – The concrete is very weak in tension due to its brittle nature and is not expected to resist the direct tension. The concrete develops cracks when subjected to tensile forces. Thus, it is necessary to determine the tensile strength of concrete to determine the load at which the concrete members may crack.

Flexural strength – The flexural strength represents the highest stress experienced within the material at its moment of rupture. It is measured in terms of stress. The flexural strength was tested using a two point loading frame.

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