



Performance of concrete by partial replacement of copper slag as fine aggregate

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Abstract: Concrete is a composition of coarse aggregate, fine aggregate, binding material and water in such proportions, that the whole sets into a monolithic mass. When concrete is used by itself it is called Mass concrete and when it is reinforced with steel it is called Reinforced concrete.

Keywords: Concrete, slag, fine aggregate, performance evaluation.

1. Introduction:

Cement is used as the binding material [1]. It bind the individual units of fine aggregate and coarse aggregate by virtue of its properties of setting or hardening in combination with water [2]. The binding material helps to fill voids and imparts density to concrete. aggregate is sand. Crushed stone sand may also be used. It should pass through a sieve having 3/16 square meshes [3]. It serves to fill voids in coarse aggregate and reduces the quantity of cement. The fine should be sharp and angular. It should be highly siliceous and free from impurities such as clay, loam, dust, coal particles and organic matter [4]. Fine aggregate should be clean, hard, strong, durable and chemically inert. Its grains. Coarse aggregate is the main filler and forms the bulk of concrete, broken stones, broken bricks and gravels are generally used as coarse aggregates [5]. Granite, basalt are also excellent coarse aggregate. Crushing strength and water tightness of concrete and its resistance to wear and tear depend upon the



aggregates [6]. The aggregates should be clean dense, hard, strong durable and Sound. Water facilitates the spreading of cement over the aggregates and regulates the consistency [7]. Water used should be clean. Seawater should not be used as it retards setting

2. Methodology:

Initial setting time should be at least 30 minutes. Final setting time should not be more than 10 hours. Pressure strength after 7 days should be at least 22N/mm Tensile strength after 7 days should be 2.5N/mm. By I.S 90 micron sieve, buildup by weight should not surpass 10%. Ratio of percentage alumina to that of iron oxide should not be under 0.65%. Weight of magnesia should not surpass 5%. Weight of insoluble buildup should not be greater than 1.50%.

Fine aggregate It should be clean and fine. It should be free from any organic or vegetable matter; usually 3-4% clay is permitted. It should be chemically inert. It should contain sharp, angular, coarse and durable grains. It should not contain salts which attracts moisture from the atmosphere. It should be well grade, for example it should contain particles of various sizes in suitable proportions. It should be strong and durable. It should be clean and free from coatings of clay and sediment. The figure 1 shows the curing interaction of prepared copper slag.

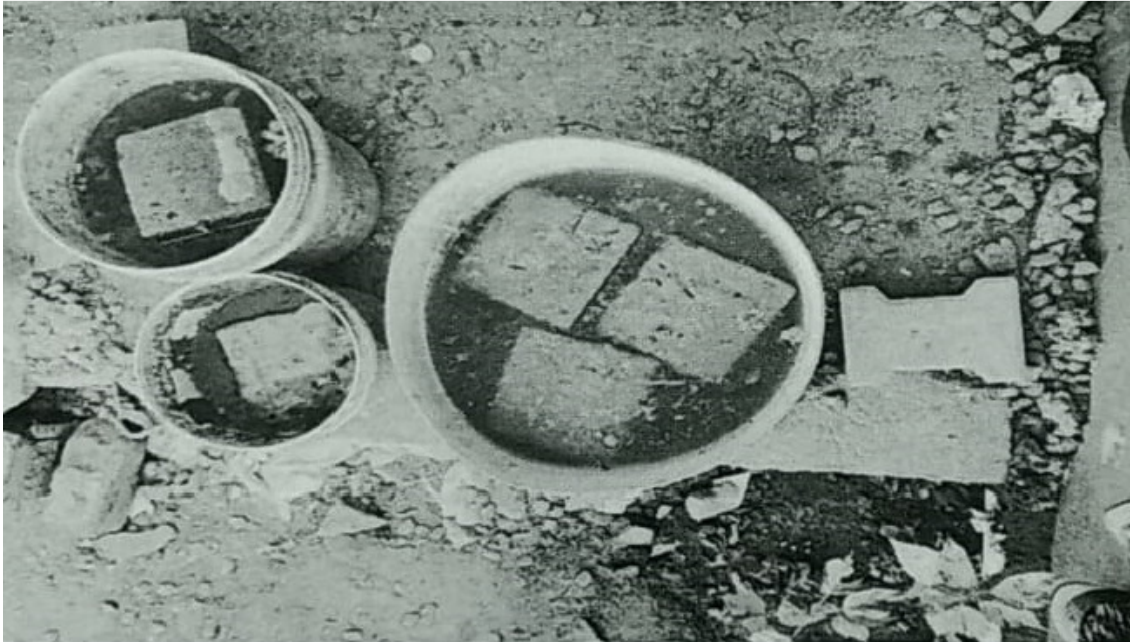


Figure 1: Curing of copper slag and fine aggregate.

Coarse Aggregate should contain sharp, angular, coarse and durable grains. It should be clean and free from coatings of clay and silt. It should be strong and durable. It should be free from any organic or vegetables matter; usually 3-4% clay is permitted. It should be clean and coarse. Cement used is Coromandel super power 53 grade (Portland Pozollana Cement) collected from nearby shop. River sand is collected from paalar (Kancheepuram district). Hard broken granite stone blue jelly is collected from the quarry near vandalur (Kelambakkam route). . Quarry dust is collected from the quarry near Vandalur (Kelambakkam route). The average fineness modulus of cement sample is 9 % Coarse Aggregate should contain sharp, angular, coarse and durable grains. It should be clean and free from coatings of clay and residue. It should be strong and durable. It should be free from any organic or vegetables matter; usually 3-4% clay is permitted. It should be clean and coarse. Cement used is Coromandel super force 53 grade (Portland Pozollana Cement) gathered from nearby shop. Stream sand



is gathered from paalar (Kancheepuram district). Hard broken granite stone blue jam is gathered from the quarry near vandalur (Kelambakkam course). . Quarry dust is gathered from the quarry near Vandalur (Kelambakkam course). The average fineness modulus of cement sample is 9 %

3. Conclusion:

Coarse Aggregate should contain sharp, angular, coarse and durable grains. It should be clean and free from coatings of clay and buildup. It should be strong and durable. It should be free from any organic or vegetables matter; usually 3-4% clay is permitted. It should be clean and coarse. Cement used is Coromandel super force 53 grade (Portland Pozollana Cement) gathered from nearby shop. Stream sand is gathered from paalar (Kancheepuram district). Hard broken granite stone blue jam is gathered from the quarry near vandalur (Kelambakkam course). . Quarry dust is gathered from the quarry near Vandalur (Kelambakkam course). The average fineness modulus of cement sample is 9 %

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