EXPERIMENTAL STUDY ON COMPARION OF NORMAL SOLID BLOCK AND PERMA HYPER PLAST SOLID BLOCK

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Abstract - This paper focus on an experimental investigation carried out by the study of the feasibility of producing solid blocks with low cost and extra strength. Normally, the solid blocks required at least 14 days of curing period. But, by adding the Perma Hyper Plast as an admixture in a usual concrete mix, the curing period were decreased wildly and the compressive strength of that specimen increases amazingly. Thus, the curing period is decreased and the block taken to compressive strength test as per IS 3495 code procedure. The test result obtained in the present investigation indicates the possibility to manufacture good quality solid blocks using Perma Hyper Plast. The percentage combination of fine aggregate cement and compressive strength are compared with conventional solid blocks.

1.**Introduction**

The production of Solid blocks used in both structural and cladding masonry is characterized by the use of "dry concrete". This special type of concrete has significantly greater consistency than conventional plastic concrete due to its lower water content, which is required to push the blocks out of the moulds immediately after forming (MARCHAND, 1996). This characteristic makes the use of compression machines necessary; these are special compaction devices that simultaneously apply compression and vibration to eliminate air voids when moulding the blocks. The properties of this particular type of concrete do not depend exclusively on the water: cement ratio and are rather influenced by the size and type of compression machine employed. Hence, the existing mix design methods for this type of concrete require excessively arduous, expensive, and time consuming tests in concrete plants. The most used methods are those disseminated by the largest machine manufacturers.

2**. Materials**

2.1. Cement

Cement is a binding material which possess very good and cohesive properties which make it possible to bond with other materials to form a compact mass. Ordinary Portland cement is the most commonly used cement for general engineering works. The specific gravity of all grades namely 33, 43 and 53 grades. In this project Ordinary Portland Cement of 53 grades is used for experimental work. Initial and final setting time of the cement was 30 minutes and 600 minutes.

2.2. Fine aggregate

The fine aggregate used was locally available river sand without any organic impurities and conforming to IS: 383 – 1970. The fine aggregate was tested for its physical requirements such as gradation, fineness modulus, specific gravity and bulk density. A concrete can be made from sand consisting of rounded grains as good as form that in which the grains or granular.

2.3 Coarse Aggregate

Coarse aggregate for structures consists of material within the range of 5mm to 150mm size. Rocks having water absorption value greater than 3% or specific gravity of less than 2.5 are not considered suitable for mass concrete. However, in practice mixes of same workability for round shaped aggregates required less water than angular shaped aggregates.

2.4 Water

Water is an important ingredient of concrete as it activity participates in the chemical reaction with cement and potable water available in laboratory with pH value of not less than 6.5 and not more than8.5 ,conforming to the requirement of IS 456 2000 were used for mixing concrete and curing the specimen. The water which is fit for drinking should be used for making concrete.

2.5 Perma Hyper Plast

The Perma Hyper Plast is based on hyper plasticising sulphonated synthetic polymers. It may be dispensed at dosages varying between 0.3 to 2 percent by weight of cement depending upon type of concrete required.

Figure 1. Perma Hyper Plast

2.5.1 Characteristics of Perma Hyper Plast

- It is based on refined ligno sulfonates.
- It is high workability.

2.5.2 Properties of Perma Hyper Plast

- Density (kg/m3) – 1300
- Moisture content (%) - 7
- Tensile strength (M Pa) – 80
- Elongation at Break (%) - 60
- Young's modulus (G Pa) – 9

3**. Experimental Work**

3.1 Measurement of Workability

The workability of a fresh concrete is a composite property which includes the diverse requirements of stability, mobility, placing of ability and finishing ability. There are different methods for measuring the workability. Each of them measures only particular aspects of it and there is no unique test which measures workability of concrete in its totality. The test measures the relative effort required to change a mass of concrete from definite shape to another by means of vibration.

3.2 Compression Test on Concrete

Compression test is the most common test conducted on harden concrete, partly because it is an easy test to perform, and partly because most of the desirable characteristics properties of concrete are qualitatively related to its compressive strength.

All these blocks have been tested 28 days after the production date, which is the test age specified in the standard by which time the blocks must have reached a minimum compressive strength of 3.5 MPa. But the load bearing capability of a block depends not only on strength but also on design factors such as the load bearing area and whether the block is hollow or solid.

The current minimum strength requirement could reflect a wish of having a minimum material strength. Because the local habit is to use a solid 6 inch block the minimum requirement for the material becomes excessive. With a 6 inch block of 3.5 MPa strength the block can carry a load of approximately 20 tonnes. this part of the beam could be used to find out the compressive strength.

Figure 2. Compressive test on concrete

Table 1. Compression Test Results

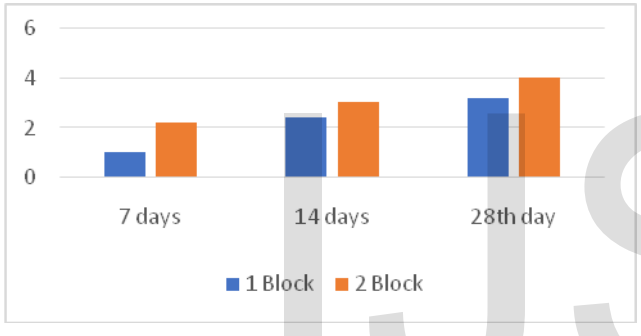
Sl.No	Specimen	Compressive strength in N /mm²		
		7 days	14 days	28 days
1	Normal Block	30	60	120
2	Perma Hyper Plast Block	50	80	140

4. Result and Discussion

Various tests were conducted to know the characteristics of the concrete. The test was conducted to investigate the optimum percentage of different materials under which the concrete attains its maximum strength.

4.1 Compression Test on Concrete

The compressive strength of different types of mixes at 7 days, 14 day, 28 day are shown in graph1



Graph 1. Compression Test Results

5. Conclusion

The earlier indicated improvement potential in block making performance indicator Strength times number of blocks per bag (MPa*Blocks). This indicates a factor four difference in performance between similar types of block producers. There is no commonly accepted target for the load bearing strength of the blocks which makes optimisation difficult.

A proposed preliminary target of 2.2 MPa for a 6 inch block corresponding with a load bearing strength of 15 tonnes per block has been established. The benchmark in MPa*Blocks has been assessed to 180 MPa*Blocks. At the target of 2.2 MPa this translates to about 80 blocks per 50 kg bag of cement as a theoretical best performance. Compared to the current assessed average of 29 Bl/bag there seems to be a huge improvement potential for using the cement more effectively in both economic and environmental terms.

In realistic terms about half of the theoretical potential should be possible to realise with dedicated efforts over a period of some years. Apart from the economic benefits the carbon footprint of the blocks could be halved resulting in yearly reduced emissions of some 100 000 tonnes of CO2. Changing the main product from solid blocks to hollow blocks would also reduce the consumption of sand used for blocks with about 3 million tonnes per year at the current level of production of 300 million blocks.

6. References

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