

# A Research Analysis on Mix Design for High Strength Concrete

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## ABSTRACT

This Research paper depicts the result of mix design for high strength concrete. Mix design impart a big role in concrete technology. Concrete can be regarded as the most widely used construction material available nowadays because it can be prepared from locally available material and also because of its flexibility in handling and placing. Despite all its advantages, when it comes to attaining the desired strength, concrete is the most unpredictable material encountered ever. Extensive research work and experiences gained over the years have shown that quality and durability of concrete depend mostly on the properties of its constituents, and at the same time, mix design, method of preparation, placement, curing condition etc. have their influence on it. It involves the process of determining experimentally the most suitable concrete mixes in order to achieve maximum strength with at least economic expenditures. In this research work four mix were selected to achieve a compressive strength up to 160 Mpa. The variables were aggregate sizes and mix ratio. Four mix ratios by weight were selected with 0.35 water cement ratio. Plasticizer and super plasticizer was used to improve the workability of concrete mix. Locally available coarse and fine aggregates were used with ordinary Portland cement. It was concluded that the compressive strength depends on mix ratio, shape, grade, size, moisture absorption and texture of aggregates and method of compaction

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## 1. INTRODUCTION

Now a days the use of high strength concrete is increased rapidly States and other areas of world. In recent years there has been a rapid growth of interest in high strength concrete. The concrete having compressive strength more than 42Mp is called high strength concrete. High strength concrete different from nominal concrete because high strength concrete involve the use of super plasticizer, well graded cement and aggregate. A mix design is specified by the designer principally in terms of water cement ratio cement content and compressive strength. Compliance relies on strength testing. In the British practice, when there is no experience on the basis of which mix proportions could be selected and trial mixes made for high strength concrete it becomes necessary.

## 2. OBJECTIVES

The main objective of this research was to design the mix high strength concrete using locally available materials in india .

## 3. EXPERIMENTAL WORK

The experimental work has been carried out to design the mix for high strength concrete. The basic ingredients were used in this experimental work. The coarse aggregate and crushed aggregate having maximum size 22 mm is collected from Tosham in Haryana. The fine aggregate (sand) was collected from Yamuna in Delhi. OPC was used as binding material. Plasticizer and Super plasticizer was used to increase workability of concrete .Firstly the ingredient sample is air dried, then coarse and fine aggregate was graded using IS SIEVE NO. 9 .After this specific gravity of fine, coarse aggregates and cement which were 2.69, 2.72 and 3.1 respectively. The fineness modulus of fine aggregate used was 3.51. In third step batching of ingredients of aggregates and cement was done by weigh batching. The mixing is done by mixing machine having nontilting drum. The various ingredient of concrete was fed in to batches to obtain the desired mix . The slump value of mix is tested by slump test. The specimens were cast in steel mould of 150mmx300mm (6"x12") cylinders. The

mould was properly greased by using oil in order to prevent the adhesion of concrete to the steel moulds. The concrete was poured into the mould in three layers each layer being compacted by 25 blows with a standard 16mm diameter steel rod, rounded at the end. After compaction third layer the upper surface of the concrete was leveled. Precautions were taken to avoid over compaction which leads to segregation. After 24 hours in the moulds the specimens were removed and placed in water tank for 7 days 14 days and 28 days. After this the compressive strength of concrete is examined.

#### 4. RESULTS & DISCUSSION

In this research work four mix proportions were cast and the mix proportion 1:0.75:1.5 with w/c 0.35 showed high compressive strength. the methods of mix design are going to be developed after collection of a large experimental data. Trial mixes are made and optimum aggregate size is determined. The properties of coarse aggregates and fine aggregate have most important role in the development of high strength concrete. The w/c ratio for all mixes was fixed i.e. 0.35 & it is found that for the mix ratio 1:0.75:1.5 minimum dosage of admixture.

**Table for compressive strength**

Mix Ratio	Water Cement Ratio	Slump	Cement Content KG/Mtr <sup>3</sup>	7 Days Compressive Strength Mpa	14 Days Compressive Strength Mpa	28 Days Compressive Strength Mpa
1.1.5:3	0.3	22	427	25	53	146
1:1.25:2.5	0.3	26	485	31	57	149
1:01:02	0.3	Collapse	552	33	58	141
1:0.75:1.5	0.3	Collapse	651	46	62	165

#### CONCLUSION

In this research the properties of fresh & hardened concrete were examined. The conclusions are following:

1. The fineness modulus of fine aggregate also play very important role in the development of high strength concrete with the increase in the fineness modulus strength of concrete increase.
2. In the mix design method for high strength concrete the smaller size aggregate plays very important role in the achievement of high compressive strength.
3. With the increase of cement contents the strength of concrete increases.
4. The mix ratio 1:0.75:1.5 gives strength up to 165 Mpa.

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