

EXPERIMENTAL STUDY ON SELF COMPACTING CONCRETE

USING PUMICE POWDER AND SILICA SAND.

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Abstract - In this project, cement is partially replaced by pumice powder in different percentages such as 0%, 10%, 20%, 30% and fine aggregate is partially replaced with silica sand in percentages such as 50%. Enfiq superplasticizer-400 and Polycarboxylic-ether type super plasticizers are used to achieve the desired workability. The design mix used for this project is M40 grade concrete. In this compressive strength, split tensile strength, flexural strength are determined.

Key Words: Pumice powder, Silica sand, Super plasticizers

1. INTRODUCTION -Self-compacting concrete (SCC) is an innovative concrete that does not require vibration for placing and compaction. It is able to flow under its own weight, completely filling formwork and achieving full compaction, even in the presence of congested reinforcement. The hardened concrete is dense, homogeneous and has the same engineering properties and durability as traditional vibrated concrete.

1.1 FEATURES OF THE PROJECT

- Better surface finish
- Easier placing
- Improved durability
- Greater freedom in design
- Thinner concrete sections
- Reduced noise levels, absence of vibration
- Safer working environment

2. OBJECTIVE OF STUDY

- Self Compacting Concrete (SSC) by using cement is partially replaced by pumice powder in different percentages such as 0%, 10%, 20%.
- Fine aggregate is partial replaced with silica sand in percentages such as 0%, 5%, 10%, 15% and 20%.

3. MIX DESIGN CONCRETE AND PROPOTIONS

3.1 MIX DESIGN FOR M40 GRADE OF CONCRETE

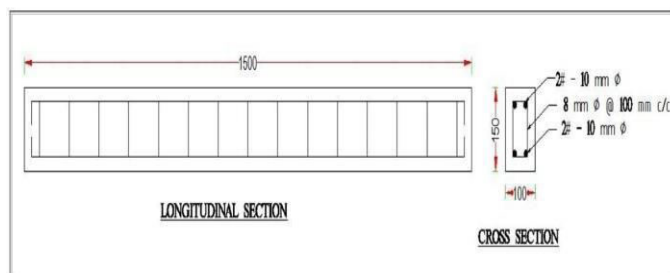
Recommendations for concrete mix design are IS: 10262-1982 IS: 10262-2009 IS: 456-2000.

Cement kg/m ³	Fine Aggregate kg/m ³	Coarse Aggregate kg/m ³
451	600	1263

Water Cement -Ratio	Chemical Admixture kg/m ³
0.35	18.04

Mix Proportion 1:1.33:2.8

4. DESIGN OF BEAM - DESIGN OF SIMPLY SUPPORTED BEAM AS PER IS 456:2000



Longitudinal Section of Beam

4.1 FLEXURAL STRENGTH OF CONCRETE

Flexural strength is one measure of the tensile strength of concrete. It is a measure of reinforced concrete beam to

resist failure in bending. It is measured by loading RC beams with span length of at least 3 times the depth.

Flexural tests are extremely sensitive to specimen preparation, handling and curing procedure. Beams are very heavy and can be damaged when handled and transported from jobsite to lab.

TESTING OF BEAM



5. TABLES AND GRAPHS

Compressive strength of concrete after 28 days curing

% of Pumice powder & Silicasand	Average compressive strength in N/mm ²
20%P.P + 50% S.S	49.66
30%P.P + 50% S.S	46.70

5.1 Split tensile strength of concrete after 28 days curing

% of Pumice powder & Silicasand	Average split tensile strength in N/mm ²
20%P.P + 50% S.S	3.51
30%P.P + 50% S.S	2.74

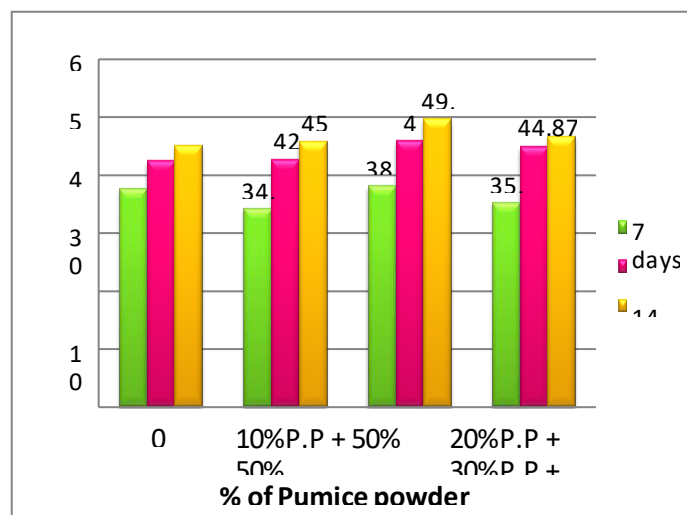
5.2 FLEXURAL STRENGTH TEST FOR M40 GRADE CONCRETE

Tests were conducted on beam specimens to calculate the flexural strength of M40 grade concrete after 28 days of curing. The results of flexural strength of concrete are given below:

Flexural strength test after 28 days curing

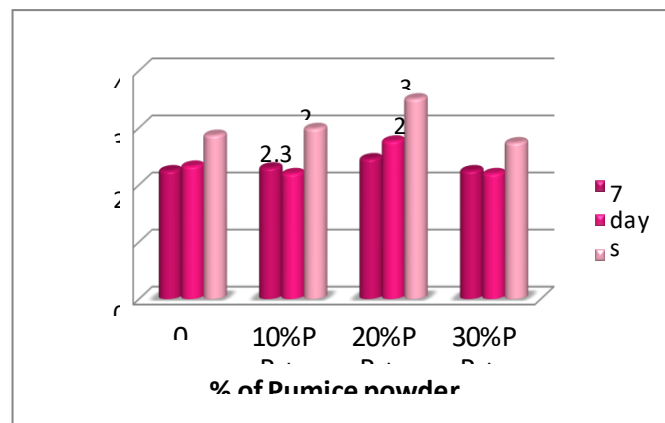
CONCRETE MIX	FLEXURAL STRENGTH N/mm ²
Beam without reinforcement	84.3
(20% P.P + 50% S.S)	84.3
Beam with reinforcement	82.5
(20% P.P + 50% S.S)	82.5

5.3 .Comparison of compressive strength test for M40 grade concrete



Bar chart representation of compressive strength test data after curing periods of 7, 14 and 28 days

5.4 .Comparison of split strength test for M40 grade concrete



Bar chart representation of Split Tensile strength test data after curing periods of 7, 14 and 28 days.

6. CONCLUSION

The strength parameters of self-compacting concrete were compared with conventional cured concrete at 7 days, 14 days and 28 days. Concrete compacted internally using 4% of Enfiq Superplasticier-400 along with partial replacement of cement with 20% of pumice powder and fine aggregate with 50% of silica sand attained more compressive strength and split tensile strength than conventional cured concrete. Strength of self-compacting concrete is on par with conventional concrete. self-compacting concrete has confirmed itself as a revolutionary step forward in concrete technology. Its properties include high flow ability, workability and passing ability. Pumice powder gives more strength in the member. Pumice powder is naturally safe for the environment. It is mostly siliceous and rich in dissolved volatile constituents. Fine aggregate with silica sand by making concrete more dense and it minimizes the environmental impact of concrete. The use of good quality superplasticier is essential to get SCC mix of adequate workability. Effect on mineral admixture like pumice powder, on fresh & hardened properties and durability of SCC were studied.

7. REFERENCE

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