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Experimental Investigation on Self Curing High Performance Concrete

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Abstract: Proper curing of concrete structures is important to ensure that theymeet their intended performance and ductility requirements. Therefore an effective in situ curing is necessary to maximize the degree of hydration and to minimize cracking problems due to drying shrinkage. Traditional external curing could not achieve a desired effect due to very low permeability and high chemical reaction in high-performance concrete. So some researches shifted their attention to self curing, a new curing method that may greatly enhance the curing effect on high performance concrete. Super Absorbent Polymers (SAP) are used as self curing agent. SAPs are a group of polymeric materials that have the ability to absorb and retain a significant amount of liquid from their surroundings and to retain the liquid within their structure without dissolving. In this study investigate experimentally and analytically the behavior of exterior beam-column joint and strength characteristics of Self Curing high performance Concrete (SCC) containing Super Absorbent Polymers (SAP) and Silica Fume. In this investigation SCHPC was made by replacement of cement by 10% of Silica fume and Super Absorbent Polymer (SAP) added at a various range of 0%, 0.2%, 0.3%, and 0.4% of cement. The experimental results were then compared with analytical results obtained from the FEM Analysis using ANSYS 14.0. Load Deflection characteristics, Stiffness, Ductility were studied and it is found that the SCHPC has shown good improvement in load caring capacity. Mechanical characteristics like Compressive strength, Split-tensile strength, Flexural strength and Modulus of Elasticity examined. A mathematical model was conducted using SPSS software for the mechanical characteristics of SCHPC.A comparative study between the results obtained from the laboratory and SPSS has been made. The predicted mathematical model for mechanical characteristics produced accurate results for the respective ages when compared with the experimental results. Also, the durability study for Self cuing concrete after 28 and 56 days curing was done by conducting the tests such as saturated water absorption, porosity, Acid resistance, Sea water resistance, Accelerated electrolytic corrosion and Modified sorptivity.

INTRODUCTION

Concrete is the most extensively used material in civil engineering construction so that considerable attention is taken for improving the properties of concrete with respect to strength and durability. Proper curing of concrete is important to ensure they meet their intended performance and durability requirements. In conventional construction, this is achieved through external curing,applied after mixing, placing and finishing. Internal curing (IC) is a very promising technique that can provide additional moisture in concrete for a more effective hydration of the cement and reduced self-desiccation. Internal curing implies the introduction of a curing agent in to concrete that will provide this additional moisture. Internal curing refers to the process by which the hydration of cement occurs because of the availability of additional internal water that is not part of the mixing water. The additional internal water is typically supplied by using relatively small amounts of saturated, light weight, fine aggregates or super absorbent polymer particles in the concrete. Conventionally, curing concrete means creating conditions such that water is not lost from the surface i.e., curing is taken to happen 'from the outside to inside'. In contrast, 'internal curing' is allowing for curing 'from the inside to outside' through the internal reservoirs Created. 'Internal curing' is often also referred as 'Self–curing.'

LITERATURE SURVEY

Gaston Espinoza-hijazin et al(2012) proven that Natural pozzolans (NP) have an effective supplementary cementitious material; however, the replacement of ordinary portland cement (OPC) with NP might increase the autogenous and drying shrinkage of concrete.

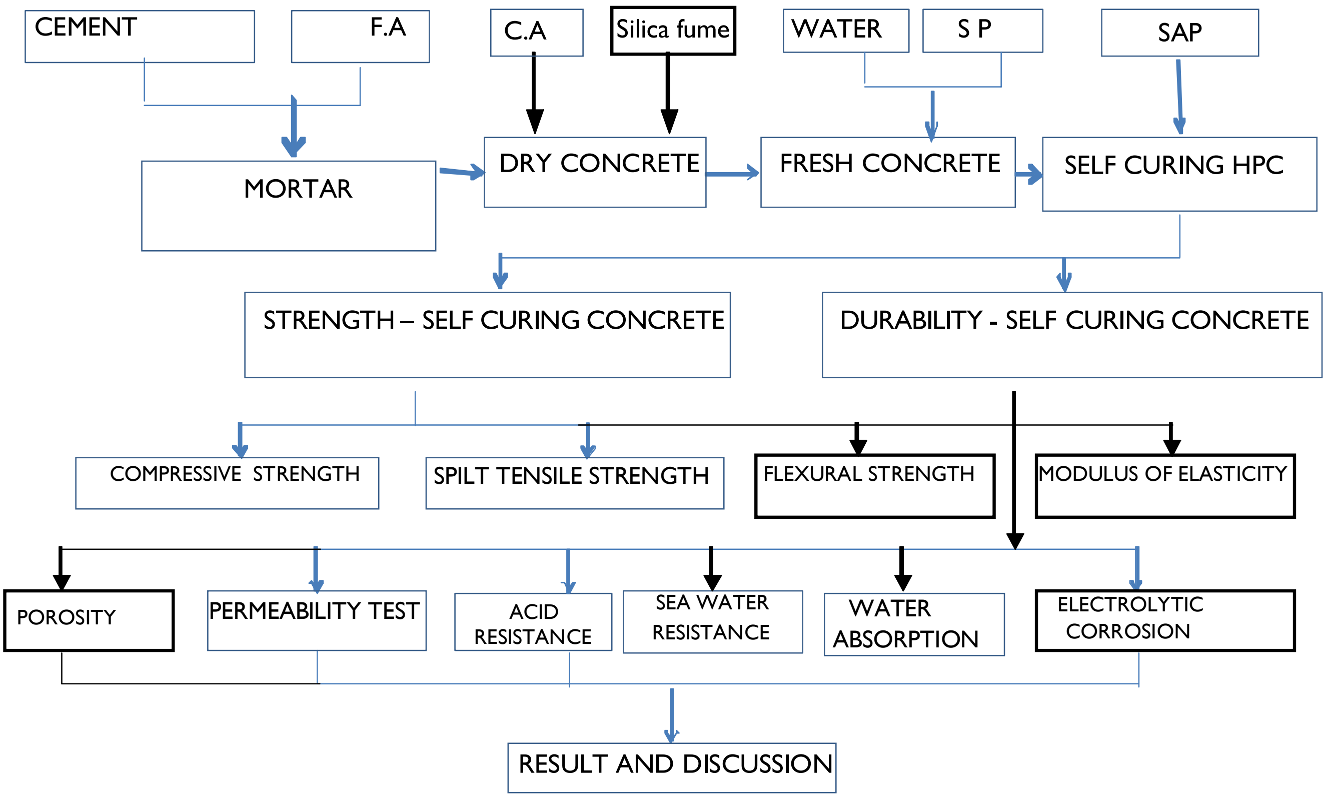
Internal curing (IC) might be of great help when using NP because it can promote the pozzolanic reactions and reduce shrinkage. The aim of this research is to assess the effect of IC in concrete containing NP. Results indicate that a 39% replacement of OPC with NP decreased compressive strength by 15%, decreased chloride ion permeability by 66%, and increased autogenous shrinkage by 40%.

Johansen et al(2008) demonstrated that the absorption capacity of internal curing materials may be determined from early age heat evolution data measured through isothermal calorimetric. In this method, cement pastes are prepared with slightly varying w/c ratios, and their early heat of hydration data are compared to data of a paste containing an internal curing agent. Accurate assessment of absorption capacity (k) of internal curing agents is necessary to properly proportion cement-based mixtures and to measure their effectiveness in mitigating autogenous shrinkage.

PietroLura et al(2006) conducted an experimental method to study internal water curing of concrete and its consequences. The special techniques needed to study internal water curing are dealt with along with the consequences of this process. This paper provided an overview of evidences of internal water curing and experimental methods to study them. In almost all cases, the experimental techniques reported or suggested are well established in concrete material science and only minor adaptations or special care are needed to extend their area of application to internal water cured concrete.

Ole Mejlhede Jensen and Pietrolura (2006) give an overview of different techniques for incorporation of internal curing water in concrete. Internal water curing can be used to mitigate self- desiccation and self- desiccation shrinkage. Some concretes may need 50 kg/m3 of internal curing water for this purpose Several techniques exist for incorporation of internal curing water in concrete. Such internal curing water can mitigate self-desiccation and self-desiccation shrinkage in high-performance concrete.

METHODOLOGY



To produce high performance concrete, the utilization of high strength cements is necessary. Different types of cement have different water requirements to produce pastes of standard consistence. Different types of cement also will produce concrete have a different rates of strength development. The choice of brand and type of cement is the most important to produce a good quality of concrete. The type of cement affects the rate of hydration, so that the strengths at early ages can be considerably influenced by the particular cement used. It is also important to ensure compatibility of the chemical and mineral admixtures with cement. The properties of cement are shown in Table 3.1.

Table 3.1 Properties of Cement

S. No.	Property of Cement	Values
1	Fineness of Cement	7.5%
2	Grade of Cement	43
3	Specific Gravity	3.12
4	Initial Setting time	28 min
5	Final Setting Time	600 min

Table 3.2 Properties of Fine Aggregate

S. No.	Properties	Values
1	Specific Gravity	2.89
2	Fineness Modulus	2.25

FINE AGGREGATE

Clean and dry river sand available locally will be used. Sand passing through IS 4.75mm Sieve will be used for casting all the specimens. The properties of fine aggregate are shown in Table 3.2

EXPERIMENTAL INVESTIGATION DETAILS OF MATERIAL USED

1) Cement: Ordinary Portland cement, 43 Grade conforming to IS: 12269 – 1987.
- Fine Aggregate: Locally available river sand conforming to Grading zone II of IS: 383 –1970.
- Coarse Aggregate: Locally available crushed blue granite stones conforming to graded aggregate of nominal size 12.5 mm as per IS: 383 – 1970.

2) Super Plasticizer
- A commercially available sulphonated napthalene formaldehyde based super plasticizer (CONPLAST SP430) was used as chemical admixture to enhance the workability of the concrete. Obtained from BASF-The Chemical Company, PeelameduPudur, Coimbatore.

3) Super-absorbent Polymer
- A super absorbent polymer (Supasorb MPS-65**)** is used as the self curing agent. Obtained from Alchemy Substances-Chemical Company, Basaveshwar Nagar, Bangalore.
- Silica fume : Obtained from ELKEM India (P) Ltd., Navi Mumbai conforming to ASTM C 1240 asmineral admixture in dry densified form.

4) Water: Potable water

CEMENT

Ordinary Portland cement (43 Grade) was used for casting all

COARSE AGGREGATE

Crushed granite aggregate with specific gravity of 2.77 and passing through 12.5 mm sieve and will be used for casting all specimens. Several investigations concluded that maximum size of coarse aggregate should be restricted in strength of the composite. In addition to cement paste – aggregate ratio, aggregate type has a great influence on concrete dimensional stability. The properties of coarse aggregate are shown in Table 3.3.

Table 3.3 Properties of Coarse Aggregate

S.No.	Properties	Values
1	Specific Gravity	2.69
2	Size Of Aggregates	Passing Through 12.5 mm Sieve
3	Fineness Modulus	5.96

SUPER PLASTICIZER

Conplast SP430 is based on Sulphonated Napthalene Polymers and is supplied as a brown liquid instantly dispersible in water. Conplast SP430 has been specially formulated to give high water reductionsup to 25% without loss of workability or to produce high quality concrete of reduced permeability.

Table 3.4 Properties of Super Plasticizer

S.No.	Properties	Values
1	Specific gravity	1.265 - 1.280 at270C
2	Chloride content	Less than 0.05%
3	Air entrainment	Less than 1% over control

SUPASORB MPS-65

Super Absorbent Polymers are prepared from acrylic acid and a crosslinker by solution or suspension polymerization. The type and quantity of crosslinker control both the swelling capacity and gel modulus. It is one kind of functionality macromolecule polymer

PHYSICAL PROPERTIES OF SILICA FUME

The particle size, color, oversize, specific gravity, etc. are explainedbriefly:-

a) Particle Size: - SF particles are smooth, spherical size is1/100 the diameter of the Portland cement particle and average particle diameter lies between 0.1 to 0.2 micronrange.
b) Fineness:- The specific surface area of SF as measured by nitrogen absorption method usually lies between 13sq.m/g to 28sq.m/g. Generally the SF has the fineness value of about 22 sq.m/g which is non-toxic, non-irritating and non-corrosive. It cannot conflagrate and blast. Supasorb can be used to solidify slurries into a more manageable consistency for disposal. Supasorb can be used as a Lost Circulation Material where very heavy losses are expected. Once the slurry has been solidified, disposal can be carried out without the risk of slurry spill/escape into the watercourse.

Dosage

- For tunneling applications pre-mix 1-2kg per 1000litres ofslurry, allow time for the water to absorb into the polymer and agitate where necessary.
- For HDD applications add between 2-7kg per 1000litres
- For LCM, add between 150-350g per 1000 liters of fluid.

SILICA FUME

The silica fume is the another type of pozzolana and its merit being the 'Silica Fume Concrete' produced using this to attain compressive strength of 96 MPa which is 2 to 3 times the strength of Portland Cement Concrete (PCC). This result in reduction in weight and size of structure, lower its permeability and makes it as a very durable material. SF used as an admixtures, improves the properties of fresh and hardened concrete. Due to high surface area of SF, SFC requires more water for obtaining the given slump. The fresh SFC mix is cohesive and there is no risk of segregation during handling of concrete and desired finish can be achieved. SF increases the electrical resistivity of concrete because it reduces the rate of carbonation of concrete. For instance PCC has electrical resistivity of 4200 ohms-cm and SFC produced with 20% SF in cements has 110,000 ohms cm.

CHEMICAL PROPERTIES OF SILICA FUME

Table 3.5 Chemical Properties of Silica Fume

Chemical parameter	Silica fume(%)
SiO2	97.1
Al2O3Fe2O3	0.4
CaO	0.3
Mg	0.3
O	0.0
SO3	0.2
Total alkalies (Na2O)	0.0
LOI	1.7

c) Colour: - The colour of SF depends on carbon content; lowerthe carbon content of SF, the lighter is shade of grey. Usually, ferrosilicon furnaces manufacturing low silicon content alloys shoe darker silica fume.
d) Specific Gravity:- The specific gravity of SF produced fromhigh quality silicon and high grade ferrosilicon alloys typically ranges between 2.2 and 2.3

WATER

Casting and curing of specimens were done with the potable water that is available in the college premises. Water is used for both mixingand curing shall be clean and the amounts of deleterious materials andsuch as Viz oils, acids, alkalis, salts, sugar, organic materials or other substances that may be deleterious to concrete or steel. Potable watersare generally satisfactory for mixing and curing concrete. In cause of doubt, the suitability of water for making concrete shall be ascertainedby the compressive strength and initial setting time test specified in I.S. 456 – 2000.

MIX DESIGN

Mix Design is the process of selecting suitable ingredients of the concrete and determining their relative proportion with object of producing concrete possessing certain minimum desirable properties like workability in fresh state minimum desirable strength and durability in hardened state. To obtain the required strength properties of concrete in SCC, a higher proportion of ultra fine materials and the incorporation of chemical admixtures are necessary. The control mix was proportioned by IS 10262: 2009 to obtain compressive strength of40 MPa

Table 3.6 Final Mix Proportion

Water(kg)	Cement(kg)	Fine Aggregate (kg)	Coarse Aggregate (kg)	Super plasticizer (kg)
140	315	945	1119	7

Mix ratio for the M40 Grade concrete is taken as 0.4: 1:2.7: 3.19:0.02

Mix proportions

The control mix was proportioned by IS 10262: 2009 to obtain compressive strength of 40 MPa. The identification, mix proportion and quantity of material taken for one meter cube of selfcuring concrete mixes are given in Table 3.7.The mixes 1, 2, 3 and 4 were obtained by adding SAP content 0%, 0.2%, 0.3%, and 0.4% of weight of cement. Additional water added to the mix depends upon the amount of SAP added (for 1 kg SAP adds 45 liter water). Super plasticizer CONPLAST SP430 is added 2% to the weight of binder.

SAP- in % of cement	TYPE	Compressive Strength	Split Tensile Strength	Flexural Strength	Modulus Of Elasticity
		150mm Cubes	Cylinder of 150mm Diameter And 300mm Height.	Beam of Size 100mmX100mm X500mm	Cylinder of 150mm Dia 300mm Height.
0	Mix-1	9	9	3	3
0.2	Mix-2	9	9	3	3
0.3	Mix-3	9	9	3	3
0.4	Mix-4	9	9	3	3
Total No		36 Cubes	36Cylinder	12Beams	12Cylinder

Table 3.7 Mix Proportions Per m^3

No AP	-% of Cement	Cement(kg)	AP (kg)	licaFume (kg)	ne Aggregateg)	Coarse Aggregateg)	atert)
ix-1		5			0	19	0
ix-2	2	5	7		0	19	1.5
ix-3	3	5	05		0	19	7.3
ix-4	4	5	4		0	19	3

COST ANALYSIS

The cost analysis is worked out considering the materials totally required for 1 m^3 concrete in the mix design of M40 grade for various mixes. Rates which are at present in the market for the locally available materials are considered. For each mechanical property and analyzed. Table 3.9 shows specimendetails and scheme of work.

Table 3.9 Details of Specimens Casting

SAP- in %of Cement	TYPE	Water Absorption	Poros ity	Acid Resistance	Sea Water resistance	Electrolytic corrosion	sorptivity
		100mm Cubes	100mm Cubes	150mm Cubes	150mm Cubes	Cylinder 100 mm diaand 200mm height	100m m Cubes
0	M1	6	6	6	6	3	6
0.2	M2	6	6	6	6	3	6
0.3	M3	6	6	6	6	3	6
0.4	M4	6	6	6	6	3	6
Total No		24 Cubes	24Cubes	24 Cubes	24 Cubes	12 Cylinders	24 Cubes

Here the mechanical properties were studied for various Mix having SAP content 0%, 0.2%, 0.3% and 0.4% of cement. The compressive and split tensile strength tests were conducted on specimens for 3 days,7 days and 28 days. Flexural Strength and Modulus of Elasticity tests conducted on specimens for 28 days.

DURABILITY CHARACTERISTICS

For each mixture, Saturated Water Absorption, Porosity, Acid Resistance, Sea water resistance, Accelerated electrolytic corrosion and sorptivity tests were carried out after 28, and 56 days of curing.. The objective of this durability study was to investigate the drying and shrinkage studies, deterioration and water absorption studies for SAP based self-curing concrete as per codel provisions. The Saturated water absorption (SWA) tests were carried out on 100 mm cube specimen at the age of 28, and 56 days curing as per ASTM C 642. The saturated water absorption of concrete is a measure of the pore volume or porosity in hardened concrete which is occupied by water in saturated condition. It denotes the quantity of water which can be removed on drying a saturated specimen. The porosity obtained from absorption tests is designated as effective porosity. The acid resistanceand sea water resistance tests were carried out on 150 mm size cube specimen at the age of 28 and 56 days curing. Accelerated electrolytic corrosion helps to assess the material quality against rust expansion pressure by chloride accumulation at the anode (rebar). The specimenscomprising of cylinder with 100 mm diameter and 200 mm height. Sorptivity measures the rate of penetration of water into the pores in concrete by capillary action. In this present study, the test for sorptivity was conducted on 100mmx100mmx100mm cube specimens.

Table 3.10 Specimens for Durability Characteristics

Mix	Cementilica	Fume	F.A	C.A	SAP	Water	S.P	TotalRs/m^3
M1	2115	700	535	345	_	26	285	4006
M2	2115	700	535	345	175	31.5	285	186.5
M3	2115	700	535	345	62.5	34.5	285	4277
M4	2115	700	535	345	350	37	285	4367

SCHEME OF EXPERIMENTAL INVESTIGATIONSSTRENGTH CHARACTERISTICS

The experimental investigation has to be carried out in different specimens for different strength characteristics such as compressive strength, split tensile strength, flexural strength and modulus of elasticity. The size of the specimens has to be decided.

BEAM-COLUMN JOINT

Strength and ductility of structures depend mainly on properdetailing of the reinforcement in beam column joints. The flow of forces within a beam-column joint may be interrupted if the shear strength of the joint is not adequately provided. Beam column joint is an important part of reinforced concrete (RC) moment resisting frames in the earthquake prone areas. The cross sections of beams and columns close to the joints in RC structures are ordinary tap water. After 28 days of curing, the cubes are then allowed to become dry for some hours .For each proportions triplicate specimen were cast .The cubes are tested in compressive –testing machine. The load was applied at the rate of 140 kN/min. The ultimate loads at which the cube fails were taken. critical, and under the effect of strong earthquake motion they aresubjected to large bending moments and shear forces. Beam column joint in moment resisting frames are crucial zones that control the effective transmission of forces in the structure. The beam column joint is the crucial zone in a reinforced concrete moment resisting frame.

The functional requirement of a joint, which is the zone of intersection of beams and columns, is to enable the adjoining members to develop and sustain their ultimate capacity. The demand on this finite size element is always severe especially under seismic loading. The joints should have adequate strength and stiffness to resist the internal forces induced by the framing members

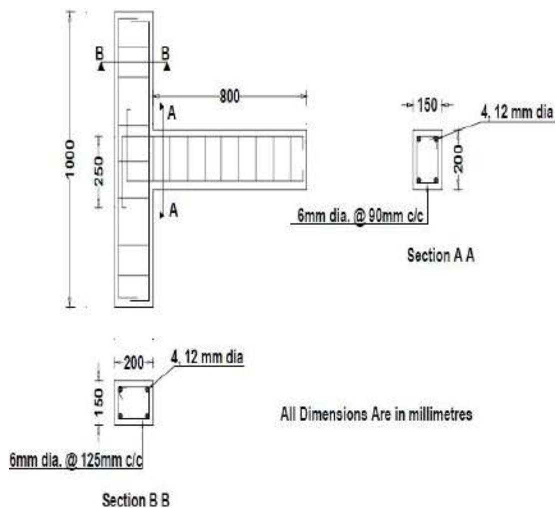
DETAILS OF SPECIMENS

In the present investigation, eigth exterior beam-column joints were cast and tested under monotonic loading. The beams were 150mm deep by 200 mm wide and columns were 150 mm deep by 200 mm wide. The length of the beam is 800mm measured from column face and column height of 1000 mm. The column was reinforced with four 12 mm diameter high yield strength deformed (HYSD) bars, and the beam was provided with two 12 mm diameter HYSD bars at the top and bottom. HYSD bars of 6 mm diameter were used for transverse ties in the columns and stirrups in the beams. Figure 3.4 shows the cross section and reinforcement configurations for the specimens. Ordinary Portland cement (43 grade), sand passing through 4.75 mm IS sieve and crushed granite stone of maximum size not exceeding 12 mm were used for the concrete mix. The cover for the longitudinal bars was maintained at 25mm for all the units. Adequate development lengths as per the code requirement were given for the beam longitudinal bars and cross bracing bars to take care of the pull out force. The specimens were cast in horizontal position inside a wood mould. All the specimens were tested under constant axial load and montonic loading at the end of the beam. The compressive strength for various mixes at 3,7 and 28 days are shown in the Table 4.1. Also the variations of the strength of mixes are shown in the Fig 4.2.

Table 4.1 Compressive Strength Test Results

Mix	SAP- in % of Cement	Compressive strength MPa		
		3 days	7 days	28 days
M1	0	14.00	28.62	42.20
M2	0.2	16.55	34.65	43.60
M3	0.3	17.27	36.45	44.21
M4	0.4	14.26	33.82	43.00

The cube-compressive test was conducted in compression testing machine as shown in Fig.4.1. The load was applied as per IS 516-1964. Concrete specimen of 100 x 100 x 100 mm cubes were cast with different proportion of concrete. After 24 hours the specimen are demoulded and subjected to curing for 28 days. From the table 4.1 it was noted that the compressive strength increased by 18%, 23% and 1.85% at 3days and 21%,27% and18% at 7 days and 3.3%,5.7% and 1.9% at 28 days respectively for the M2,M3 and M4 when compared to control mix. It shows that by adding SAP content at 0.3% of cement maximum compressive strength is obtained.



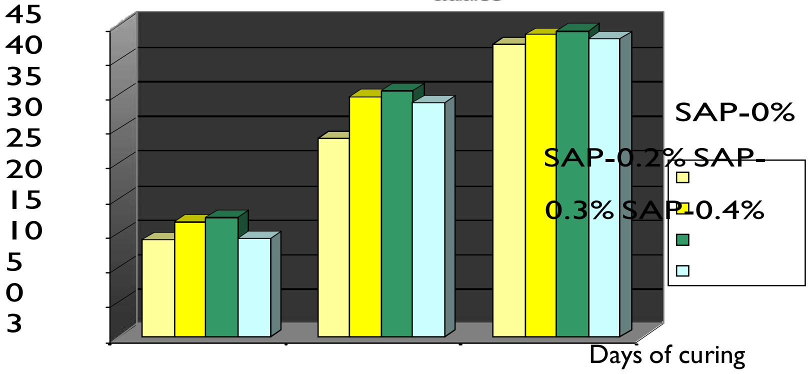


Figure 3.4 Exterior Beam- Column Joint Reinforcement DetailTest procedure

SPLIT TENSILE STRENGTH TEST

It is a method of determining the tensile strength of concrete using a cylinder which splits across the vertical diameter. It is expressed as the minimum tensile stress (force per unit area) neededto split the material apart. A cylindrical specimen of size 150x300 mmis used. The specimen if loaded until failure occurs and failure load is noted. The main advantage of this method is that the same type of specimen and the same testing machine as are used for the compression test can be employed for the test. The splitting test is simple to perform and gives more uniform results than other tension tests. Strength determined in the splitting test is believed tobe closer to the true tensile strength of concrete, than the modulus of rupture. Splitting strength gives about 5 -12% higher value than the direct tensile strength.

Test procedure

The split tension test is a method of determining the tensile strength of concrete. The test is carried out according to IS: 5816- 1970.The experiment consists of casting and testing of cylinder, 100mm diameter and 300mm height. Specimens were cured for 28 days under water prior to testing. Compression testing machine having 2000kN is used for loading. Load at a constant stoke rate, isapplied through two hardwood strips of 25mm wide, 3mm thick and 300mm long. The load was applied until the cylinder splits across the diametric plane connecting the loading strips. The failure of Cylinder Specimen is shown in Figure 4.3. From the Table 4.2 it was noted that the split tensile strength increased by 15%,31.2% and 1.5% at 3days and 4.3%,14% and 2.4% at 7 days and 9.7%,17.7% and 3.1% at 28 days respectively for the M2,M3 and M4 when compared to control mix. It shows thatby adding SAP content at 0.3% of cement get maximum split tensile strength.

FLEXURAL STRENGTH TEST

A beam specimen is casted to test the flexural strength of the concrete. The standard specimen size is 100x100x500 mm. A UTM machine is used for the testing of these specimens. The testing machine shall be set to any reliable type of sufficient capacity for the test. Permissible errors should not be greater than ±0.5%. The bed of the machine should be provided with two steel rollers, of 38 mm diameter, on which the specimen is supported. The test specimen should be casted and cured for 28 days and tested for maximum load.

Test procedure

The flexural strength of concrete prism was determined based on IS: 516 –1959.Beam specimens of size 100x100x500 mm were casted and placed in UTM and tested for flexural strength. The specimens are placed on two point loading setup and rollers above the specimens. Place the specimen in the machine in such a manner that the load is applied to the upper most surface as cast in the mould along two lines spaced 13.3cm a part. Apply load without shock and increase continuously at a rate of 180 kg/min and it is increased until the sample fails. Measure the distance between the line of fracture and nearest support. Testing of Prism for Flexural strength is shown in Fig.4.5.

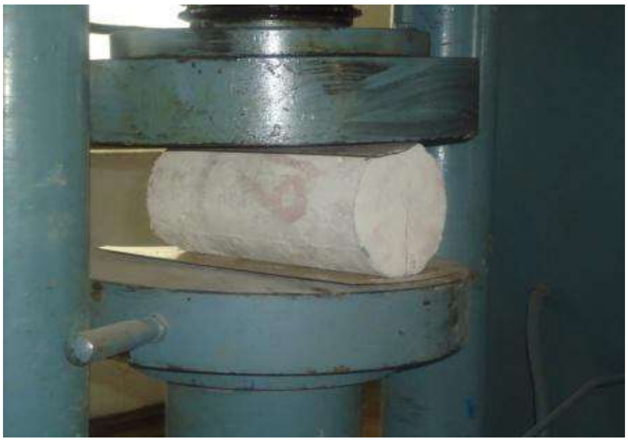


Figure 4.3 Failure Of Cylinder Specimen

The variation of the tensile strength of the various mixes are shown in the Table 4.2. It is also represented in a pictorial graph as shown in the Fig 4.4.

Table 4.2 Split Tensile Strength Results

Mix	SAP- in % ofCement	Split Tensile Strength MPa		
		3 days	7 days	28 days
M1	0	1.28	3.27	4.5
M2	0.2	1.47	3.41	4.94
M3	0.3	1.68	3.73	5.30
M4	0.4	1.30	3.35	4.64

If a < 11, Discard the specimen

P = Maximum load applied to the specimen in k N.L= Supported Length in mm.

d = Depth of the specimen mm, and

a = Distance of the crack from the nearest support

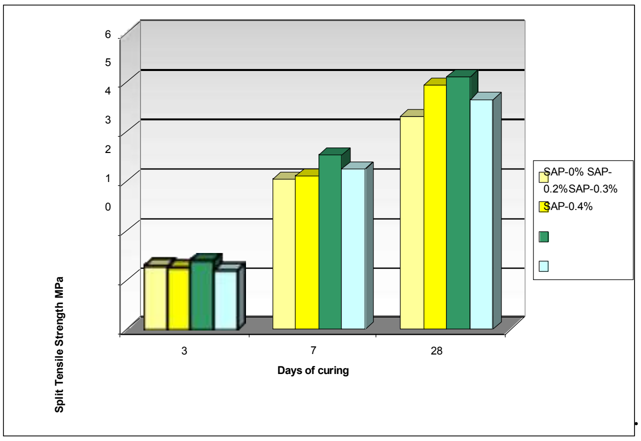


Figure 4.5 Testing Of Prism For Flexural Strength

Figure 3.4 Exterior Beam- Column Joint Reinforcement Detail Test procedure

The values of flexural strength for various mixes are as Figure 4.4 Split Tensile Strength Vs Days of Curing shown in the Table 4.3. Also the variation of the flexural strength for the various mixes are shown in the Figure 4.6. From the table 4.3 it was noted that the Flexural strength increased by 10.3%,12.8% and 8.6% at 28 days respectively for the M2,M3 and M4 when compared to control mix. It shows that by adding SAP content at 0.3% of cement get maximum flexural strength.

Flexural Strength Results

Mix	SAP- in % of Cement	Flexural StrengthMpa
		28 days
M1	0	5.94
M2	0.2	6.55
M3	0.3	6.70
M4	0.4	6.45

CONCLUSION STRENGTH PROPERTIES

- Addition of SAP leads to a significant increase of mechanical strength (Compressive , Split tensile andflexural)
- Maximum compressive stress, Split tensile and Flexural strength and modulus of elasticity develop in M-40 grade self curing concrete by adding SAP 0.3% of cement.
- Performance of the self-curing agent will be affected bythe mix proportions mainly the cement content and the w/c ratio.
- The mathematical model predicted accurate results whencompared with experimental results.
- In stepwise and forward regression models the parameters influenced the equation were same. In the case of backward regression model more number of parameters involved in all strength characteristics. Hence the backward regression is the best method which gives the accurate results.

DURABILITY PROPERTIES

- The water absorption percentage and the porosity percentage were found to be slightly higher for self curingconcrete than those for continuously moist cured conventional concrete.
- Acid resistance and Sea water resistance capacity increases in self curing concrete and maximum in SAP content of 0.3% of cement.
- Self curing concrete mix were more electrolytic corrosionresistant than conventional concrete mix due to the higher rate of hydration.
- Water sorptivity values for self curing concrete decreased with age indicating lower permeable pores percentage as a result of continuation of cement hydration.

BEAM-COLUMN JOINT

- The SCHPC joints undergo large displacements withoutdeveloping wider cracks when compared to the HPC joints. This indicates that Self curing impart high ductility tothe HPC beam column joints.
- Self curing to the beam-column joints decreased the rate ofstiffness degradation appreciably when compared to the joints without self curing.
- Maximum load carrying capacity of the joint developed inaddition of SAP 0.3% of cement.
- The results predicted by the analytical model were in goodagreement with the experimental data.

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