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Fresh, Strength and Confinement Behaviour of Self-Curing Self-Compacting Concrete Using Polyethylene Glycol

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Abstract- A lot of research work has been going on in the field of concrete and constant efforts are going on to improve its performance with respect to strength and durability. One of major considerations in concrete making is gaining control on water. The water supplied during mixing in concrete is needed to hydrate the cement and to achieve the required rheology properties of various concrete materials in their mixing, transportation, placing and compacting. During hydration, there is a need to maintain a correct relative humidity and temperature for developing good concrete. Decrease in relative humidity will cause self desiccation or chemical shrinkage at micro level. To prevent the above problem, it is advised to make embedded water available for curing. There are a number of methods for providing embedded water for curing viz., using light weight aggregate, super absorbent polymers and hydrophilic materials.

Keywords: concrete; sustainable construction; experimental investigation; mechanical properties; durability

I. INTRODUCTION

A lot of research work has been going on in the field of concrete and constant efforts are going on to improve its performance with respect to strength and durability. One of major considerations in concrete making is gaining control on water. The water supplied during mixing in concrete is needed to hydrate the cement and to achieve the required rheology properties of various concrete materials in their mixing, transportation, placing and compacting. During hydration, there is a need to maintain a correct relative humidity and temperature for developing good concrete. Decrease in relative humidity will cause self desiccation or chemical shrinkage at micro level. To prevent the above problem, it is advised to make embedded water available for curing. There are a number of methods for providing embedded water for curing viz., using light weight aggregate, super absorbent polymers and hydrophilic materials.

Although, various codes of practice advocate much on the provisions for adequate curing, due to practical difficulties, even the minimum specified curing on the site is not maintained. Sufficient water is needed in a concrete mix such that complete hydration of cement particles can be achieved. An adequate degree of hydration can be achieved by maintaining w/c ratio of at least 0.38 (Taylor, 1997). However, even if this is maintained, loss of moisture will reduce the initial w/c ratio and result in incomplete hydration of cement. This may lead to detrimental concrete properties such as shrinkage cracking and friable surface. This in turn leads to high permeability influencing strongly the durability properties as carbonation, chloride ingress and sulfate attack. Water retention is best achieved by application of curing compounds that act as barrier for evaporation. It is conceivable that a system can be created by introduction of a chemical during the mixing stage, to reduce water evaporation allowing the concrete to self-cure. To this extent, different investigators carried out experimental studies on influence of self-curing compounds in concretes. A method of curing concrete, i.e., internal sealing, which does not need any externally applied curing, and is not based on adding water to the concrete is being investigated in the recent past. This concept involves adding hydrophilic chemicals to water during mixing of concrete, which will reduce water evaporation as the concrete is exposed to air-drying (Dhir et al.., 1998). The use of self curing chemicals in concrete field will help in decreasing shrinkage problems. In order to make the best use of this material, there is a need to investigate the structural behaviour of self-cured SCC materials.

The ACI-308 Code (ACI 308R-2016) states that, “internal curing is the process of supplying additional internal water, which is not part of the mixing water”. This enables hydration of cement particles due to availability of continuous internal water molecules, even when the mixing water is evaporated from the concrete surface. Conventionally, curing concrete means creating conditions such that water is not lost from the surface i.e., curing is assumed to happen ‘from outside to inside’. In contrast, internal curing is allowing water for curing ‘from inside to outside’ through the internal reservoirs like saturated lightweight aggregates, super absorbent polymers and saturated wood fibers etc. ‘Internal curing’ is often referred as ‘Self–curing’. Curing of concrete means, preserving the moisture content in concrete at early stages in order to achieve the desired properties (Liang et al., 2002 and Jau,

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2011). However, good curing is not possible all the time in many cases at construction sites. Several investigators explored the possibility of accomplishing self-curing concrete. The concept of using self-curing agents in concrete, reduces the evaporation of water from concrete and hence, increases the water retention capacity of concrete compared to conventional water cured concrete. Curing of concrete using self-curing agents play a major role in improving the concrete microstructure and pore structure and hence improves its structural and durability properties (Dieb et al, 2012). Concrete containing self-curing agents will create a new trend in concrete construction in the new millennium. The importance of water reservoirs in concrete is an important aspect (1 m3 of concrete requires 3 m3 of water for making and curing concrete). From this view, using self-curing admixtures for curing concrete is necessitated to obtain good quality of concrete.

According to Raoult's law, in case of an ideal solution, the partial vapour pressure of a component in a mixture at a particular constant temperature is proportional to its mole fraction (xA).

This means the partial vapour pressure (pA) of a mixture is equal to vapour pressure of pure component (P V) multiplied by its mole fraction (X) in the liquid. This can be represented diagrammatically as shown in Fig 1.1. Assuming component 'A' is water in a concrete mix/mortar mix and component 'B' is the water soluble chemical, it is quite evident that addition of such a chemical would lead to reduction in vapour pressure of water above concrete, reducing the loss of water from surface of concrete. This is exactly the concept involved in self-curing of concrete. Adding self-curing chemicals as PEG (water soluble chemical) in concrete, decreases the evaporation, as concrete is exposed to air drying. Not only low vapour pressure of water soluble chemical decreases the evaporation, but the existence of hydrogen bond between water molecules and water soluble chemicals help in decreasing the evaporation of moisture. The presence of hydroxyl (-OH) and ether (-O-) functional groups in water soluble chemicals as PEG, satisfy the requirements as self-curing chemicals. Hydrogen bond between their functional groups reduces the water pressure; this decreases evaporation and thus enhances water retention in concrete, increases the degree of hydration altering the C-S-H gel morphology and reduces absorptivity of concrete specimens as shown in Fig 1.2. Use of hydrophilic materials, uses water and turns it into microscopic crystals using a chemical reaction. The components of such a reaction are mobile and can be carried wherever water will take them, which effectively grows more crystals until the water pathways in concrete are completely blocked as shown in Fig 1.3 (Liang and Sun, 2002).

Benefits of Internal curing/self-curing:

Of the several curing methods, internal curing method has several benefits as follows

Internal curing (IC) is a method to provide water to hydrate all the cement, accomplishing what the mixing water alone cannot do.

II. MATERIALS AND METHODS

1. Scope And Objectives Of Investigation

- To develop Self-Curing Self-Compacting Concrete using natural aggregates.
- To study the effect of PEG 4000 and PEG 200 on the fresh and hardened properties of SCC.
- To determine the optimum dosage of self-curing agents based on workability, water retention and strength.
- To investigate the stress–strain behavior of tie-confined self-curing SCC under compression.
- To study the influence of confinement and curing conditions on strength and ductility.
- To develop suitable stress-block parameters and stress–strain models for structural analysis and design.
- Development of Self-Curing Self-Compacting Concrete (SC-SCC) using natural aggregates.
- Investigation of the effect of PEG 200 and PEG 4000 as self-curing agents on fresh and hardened properties.
- Study of the stress–strain behavior of tie-confined SC-SCC under axial compression.
- Development of stress-block parameters and stress–strain models for the structural analysis and design of SC-SCC.

2. Development Of Self Curing Self Compacting Concrete And Stress Strain Behaviour

Continuous evaporation of moisture takes place from exposed concrete surfaces due to the potential difference between the vapour and liquid phases. This will reduce the initial water cement ratio resulting in incomplete hydration of cement and thus lowering the quality of concrete. Hence, curing is considered as one of the basic necessities to achieve performance concrete. Self curing concrete is one of the special concretes which mitigates insufficient curing due to a variety of reasons including human negligence, scarcity of water, inaccessibility or bad quality of water available for curing. Although, various codes of practice advocate much on the need for adequate curing, due to practical difficulties, minimum specified curing on the site is also not maintained (Birto, 1981). Sufficient water is needed in a concrete mix such that complete hydration of cement particles can be achieved. Adequate degree of hydration can be achieved by maintaining a w/c ratio of at least 0.38 (Taylor, 1990). However, even if this is maintained, loss of moisture will reduce the initial w/c ratio resulting in incomplete hydration of cement. Curing concrete means creating a condition such that water is not lost from the surface.Despite of strict

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practices followed for curing, research on concrete shows that even the most fundamental curing requirements are not met or totally ignored in practical engineering. When the water available for curing is not sufficient, due to depercolation of capillary porosity, significant autogenous deformation and cracking may result. This is most significant in the early ages. It is hence felt that addition of internal curing agents like hydrophilic chemicals in concrete enables internal curing, producing concretes that are on par with those obtained by conventional methods of curing concrete through external sources. Water retention is best achieved by application of curing compounds that act as barrier for evaporation.It is conceivable that such a system could be created by introduction of a chemical during the mixing stage that would reduce water evaporation allowing self-curing in concrete. The present study focuses on investigating the additional benefits of hydrophilic compounds (PEG 4000 and PEG 200) in self-compacting concrete (SCC), while, SCC itself is a solution for good fresh properties viz: good flow ability, passing ability and has resistance to segregation. Use of self-curing agents in concrete is expected to benefit hydration, thereby enhancing good hardened properties and durability.

SCC mix design based on Nan Su method

Table 1. Experimental data.

Material	Quantity in kg/m3	Quantity in kg/m3
Material	Mix A	Mix B
Cement	500	360
Fine Aggregate	800	860
Coarse Aggregate	775	788
Water (liters)	190	198
Fly ash	110	250
Micro Silica	40	-
Super Plasticizer (liters)	6.00	3.60

Table 2. Experimental data

Notation		Nomenclature of Specimens
AW	-	Mix A - NASCC treated with conventional water curing
AN	-	Mix A - NASCC without subjected to any curing condition i.e. no curing
AH 0.1	-	Mix A - NASCC self-cured with hydrophilic chemical PEG 4000 of 0.1%
AL 0.1	-	Mix A - NASCC self-cured with hydrophilic chemical PEG 200 of 0.1%
BW	-	Mix B - NASCC treated with conventional water curing
BN	-	Mix B - NASCC without subjected to any curing condition i.e. no curing
BH 0.1	-	Mix B - NASCC self cured with hydrophilic chemical PEG 4000 of 0.1%
BL 0.1	-	Mix B - NASCC self-cured with hydrophilic chemical PEG 200 of 0.1%

Table 3. Experimental data.

Product	Range of Average Molecular Weight (g/mol)	Range of Average Hydroxyl Number, Mg KOH/g	Liquid Density, g/cm3	Liquid Density, g/cm3	Liquid Density, g/cm3	Melting or Freezing Range, °C	Solubility in Water at 20°C, % by wt	Viscosity at 100°C (mPa.s)
Product	Range of Average Molecular Weight (g/mol)	Range of Average Hydroxyl Number, Mg KOH/g	20°C	60°C	80°C	Melting or Freezing Range, °C	Solubility in Water at 20°C, % by wt	Viscosity at 100°C (mPa.s)
PEG 200	190 to 210	535 to 590	1.124	1.092	1.076	-65	complete	4.3
PEG 4000	3600 to 4400	25 to 32	Solid	1.093	1.077	53 to 59	66	140.4

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Table 4. Experimental data

Property	**EFNARC Range**	**Designation**	**Plain**	**PEG 4000 (H)**	**PEG 4000 (H)**	**PEG 4000 (H)**	**PEG 200 (L)**	**PEG 200 (L)**	**PEG 200 (L)**
Property	EFNARC Range	Dosage	0%	0.1%	0.5%	1%	0.1%	0.5%	1%
H- Flow (mm)	650-850	Mix A	640	650	665	680	685	705	720
H- Flow (mm)	650-850	Mix B	715	725	740	750	770	780	795
T 50 (sec)	2-5	Mix A	3.89	3.80	3.72	3.40	3.29	2.80	2.48
T 50 (sec)	2-5	Mix B	3.2	2.84	2.65	2.50	2.35	2.05	2.0
J-RING (mm)	0-10	Mix A	10.0	9.50	9.00	8.00	7.50	6.50	6.00
J-RING (mm)	0-10	Mix B	8.50	8.00	7.00	6.50	6.00	5.00	4.00
L-BOX	0.8-1.0	Mix A	0.82	0.82	0.84	0.85	0.89	0.9	0.92
L-BOX	0.8-1.0	Mix B	0.86	0.87	0.88	0.9	0.92	0.95	0.96
V-FUNNEL (Sec)	6-12	Mix A	11.50	10.70	10.32	9.83	9.52	8.67	8.22
V-FUNNEL (Sec)	6-12	Mix B	8.30	7.60	7.22	6.85	6.72	6.12	6.00
V 5min (sec)	9-15	Mix A	13.50	13.00	12.54	12.24	12.04	11.50	11.36
V 5min (sec)	9-15	Mix B	9.64	8.76	8.50	7.80	7.32	6.45	6.42

Table 5. Experimental data

DESIGNATION	Average weight loss: g	Average weight loss: g	Average weight loss: g	Average weight loss: g	Average weight loss: g	Average weight loss: g	Average weight loss: g
DESIGNATION	3D	7D	14D	21D	28D	56D	90D
AN	54	68	80	94	109	156	169
AW*	-9	-12	-14	-15	-18	-22	-28
AH- 0.1	23	30	37	43	52	68	71
AH- 0.5	47	59	65	72	79	122	128
AH-1.0	48	57	66	74	80	126	127
AL-0.1	59	73	84	92	99	129	155
AL-0.5	38	46	52	64	71	96	102
AL-1.0	60	70	78	89	100	131	157

Table 7. Experimental data.

DESIGNATION	Average weight loss: g	Average weight loss: g	Average weight loss: g	Average weight loss: g	Average weight loss: g	Average weight loss: g	Average weight loss: g
DESIGNATION	3D	7D	14D	21D	28D	56D	90D
BN	150	172	202	211	217	229	248
BW*	-18	-25	-31	-36	-42	-54	-70
BH 0.1	135	157	172	180	187	211	226
BH 0.5	113	139	152	163	183	200	215
BH 1.0	110	136	162	170	182	189	203
BL 0.1	133	158	184	194	200	211	223
BL 0.5	126	151	172	184	187	206	214
BL 1.0	150	172	202	211	217	229	248

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Table 7. Experimental data.

Average Compressive Strength: MPa	Average Compressive Strength: MPa	Average Compressive Strength: MPa	Average Compressive Strength: MPa	Average Compressive Strength: MPa
S NO	7 D	28 D	56 D	90 D
AW	53.0	68.5	73.0	76.0
AN	42.5	53.0	56.0	58.0
AH-0.1	53.5	66.5	72.5	75.0
AH-0.5	49.0	64.0	67.0	70.0
AH-1.0	50.0	64.0	66.0	68.5
AL-0.1	49.5	61.5	66.0	70.0
AL-0.5	53.5	66.0	70.0	72.0
AL-1.0	51.0	64.0	67.5	68.0

Table 8. Experimental data.

Average Compressive Strength: MPa	Average Compressive Strength: MPa	Average Compressive Strength: MPa	Average Compressive Strength: MPa	Average Compressive Strength: MPa
S :NO	7 D	28 D	56 D	90 D
BW	29.5	43.5	47.1	51.2
BN	20.3	32.5	34.8	36.2
BH-0.1	23.5	34.6	37.5	42.7
BH-0.5	24.0	34.4	39.5	44.3
BH-1.0	27.5	41.4	44.5	48.6
BL-0.1	23.2	34.2	36.4	41.5
BL-0.5	24.5	35.4	37.4	43.5
BL-1.0	26.1	39.7	42.3	46.5



Figure 1. Experimental figure.

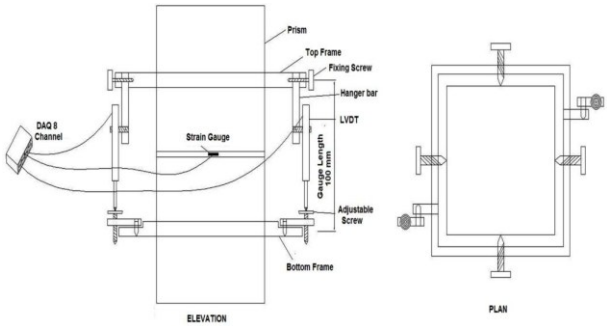


Figure 2. Experimental figure.

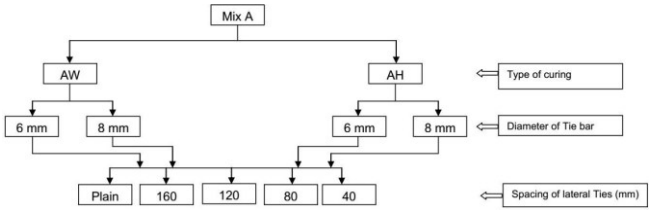


Figure 3. Experimental figure.

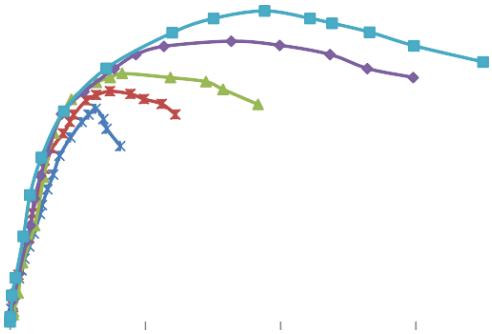


Figure 5. Experimental figure.

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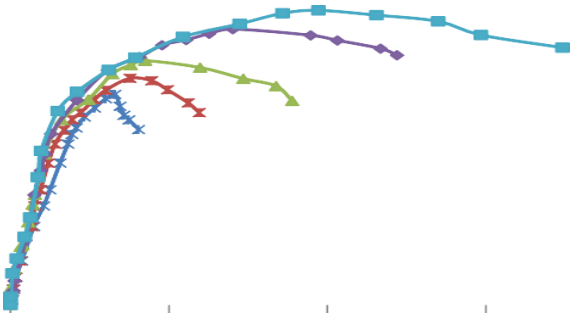


Figure 6. Experimental figure.

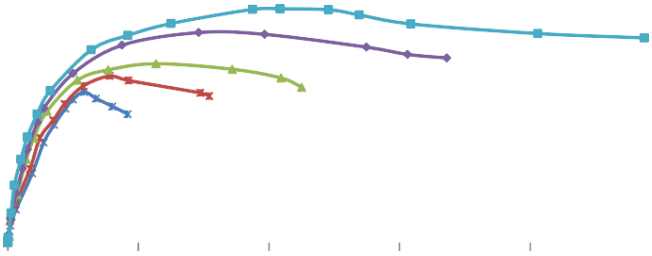


Figure 7. Experimental figure.

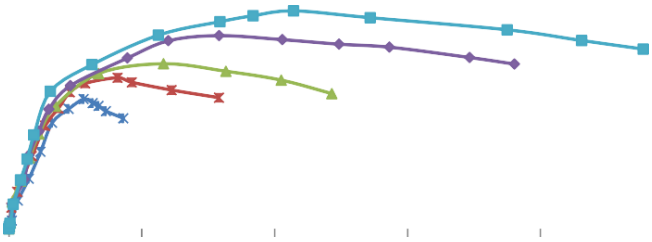


Figure 8. Experimental figure.

III. RESULTS AND DISCUSSION

The details of all the 120 prisms of SCC with and without self-curing compound are presented. The experimental stress-strain curves were drawn for each set of prisms, taking the average of the three values. The ratio of the maximum load of Tie Confined Self Compacting Concrete (TCSCC) specimens to that of the Tie Confined Self Compacting Concrete companion plain prism specimens for each set was determined for both wet curing and self-cured specimens. The relationships between the confinement index and the increase in stress and strain are established. These relationships were used later to separate the effect of confinement.

As already mentioned, all the specimens were tested under axial compression using a Tinus Olsen testing machine at a rate of 1 mm/min according to ASTM C469 (ASTM, 2002). The load increased rapidly in the initial stage up to 75 to 80 percent of the peak load and increased at a slower rate until the peak load was reached. Tests were continued until the peak load dropped to 0.75 to 0.8 times the peak load. Beyond the peak load, the strain increased at a rapid rate and was accompanied with a decrease in the load carrying capacity of the specimen.

Stress-Strain behaviour of Tie Confined Self Compacting Concrete (TCSCC) under different curing conditions

In case of wet cured plain concrete prisms, the load increased rapidly up to about 70-80 percent of the peak load and later, the rate of increase became slow. The failure was sudden in nature, which occurred as soon as the visible cracks appeared on the surface. Similar behaviour was observed in self-cured prisms but there was a slight decrease in stress compared wet cured self-compacting concrete specimens. The strains were more in case of self-cured self-compacting concrete as compared to wet cured SCC for identical stresses. Fig 4.17 shows the stress-strain relationship of 60 MPa (Mix A) and 40 MPa (Mix B) grade concrete specimens with 6 mm lateral ties for different lateral tie spacing and cured under different conditions. Similarly, Fig

3.1 Shows The Identical Relationships For 8mm Lateral Ties

Plain specimens correspond to Fig 4.17 (a).From Figs 4.17 and 4.18, it can be clearly observed that the behaviour of TCSCC self-cured specimens is almost similar to the wet cured specimens in all the cases, except that the stresses were slightly lower while the strains seemed to be slightly more.

Table 9. Experimental results

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Notation		Nomenclature of specimens
AW-P	-	Mix A–NASCC treated with conventional water curing plain prism
AW6-160	-	Mix A-NASCC treated with conventional water curing (i.e. wet curing) with 6mm diameter ties of 160 mm spacing
AH6-80	-	Mix A- NASCC self-cured with PEG 4000 of 0.1%(i.e. self-curing) with 6 mm diameter ties of spacing 80 mm
BH-P		Mix B–NASCC self-cured with 1% dosage of PEG 4000 (i.e. self-curing) plain prism

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Notation		Nomenclature of specimens
BW8-120		Mix B-NASCC treated with conventional water curing (i.e. wet curing) with 8 mm diameter ties of 120 mm spacing
BH8-40		Mix B- NASCC self-cured with PEG 4000 of 1.0%(i.e. self-curing) with 8 mm diameter ties of spacing 40 mm

Table 10. Experimental results

S.NO	Designation	Confinement index (Ci)	Peak strength (fcu)	fcu /fC'	ƐcuX 10-6	Ɛcu / Ɛ'	Ɛ0.85asc X 10-6	Ɛ0.85des X 10-6	Ductility factor
1	AW-P	0.000	49.56	1.00	2534	1.00	1648	3131	1.89
2	AW6-160	0.0017	51.23	1.03	2686	1.06	1657	4025	2.42
3	AW6-120	0.012	53.52	1.08	3091	1.22	1883	6100	3.23
4	AW6-80	0.042	56.48	1.13	5017	1.98	1913	8804	4.34
5	AW6-40	0.174	63.92	1.28	7021	2.77	2378	11799	4.96
6	AW-P	0.000	49.56	1.00	2534	1.00	1648	3231	1.96
7	AW8-160	0.0050	53.35	1.07	2888	1.14	1765	4765	2.69
8	AW8-120	0.0389	57.47	1.15	3344	1.32	1960	7109	3.62
9	AW8-80	0.1883	64.91	1.30	5473	2.16	2356	10245	4.63
10	AW8-40	0.5249	69.35	1.46	7970	3.02	2478	12931	5.21
11	BW-P	0.000	33.23	1.00	2330	1.00	1767	3473	1.96
12	BW6-160	0.0025	35.78	1.07	2798	1.20	1935	4782	2.47
13	BW6-120	0.0193	37.88	1.14	3098	1.33	2018	6707	3.32
14	BW6-80	0.0637	43.53	1.31	5193	2.22	2300	10809	4.69
15	BW6-40	0.2604	49.18	1.48	6850	2.94	2958	15458	5.22
16	BW-P	0.000	33.23	1.00	2330	1.00	1767	3673	2.07
17	BW8-160	0.0075	36.78	1.10	3122	1.34	1950	6175	3.16
18	BW8-120	0.057	39.21	1.18	4543	1.95	2332	9003	3.86
19	BW8-80	0.191	46.85	1.41	6148	2.63	2600	13448	5.17
20	BW8-40	0.782	51.17	1.56	8841	3.79	3554	19498	5.48

Table 11. Experimental results.

S.NO	Designation	Confinement index (Ci)	Peak strength (fcu)	fcu /fC'	Ɛcu X 10-6	Ɛcu /Ɛ'	Ɛ0.85asc X 10-6	Ɛ0.85des X 10-6	Ductility factor
1	AH-P	0.000	46.95	1.00	2492	1.00	1687	3140	1.86
2	AH6-160	0.0017	48.82	1.04	2691	1.08	1698	3997	2.35
3	AH6-120	0.013	50.23	1.07	2791	1.12	1997	6208	3.10
4	AH6-80	0.044	54.34	1.15	4560	1.83	2038	8513	4.17
5	AH6-40	0.180	61.91	1.31	6130	2.46	2476	11706	4.72
6	AH-P	0.000	46.95	1.00	2492	1.00	1687	3260	1.93
7	AH8-160	0.0052	50.13	1.06	2890	1.16	1832	4891	2.66
8	AH8-120	0.040	54.93	1.17	3264	1.31	2013	7337	3.64
9	AH8-80	0.132	60.56	1.29	5432	2.18	2648	11972	4.52
10	AH8-40	0.542	67.13	1.43	7426	2.98	2727	13990	5.13
11	BH-P	0.000	31.02	1.00	2310	1.00	1713	3140	1.86

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S.NO	Designation	Confinement index (Ci)	Peak strength (fcu)	fcu /fC'	Ɛcu X 10-6	Ɛcu /Ɛ'	Ɛ0.85asc X 10-6	Ɛ0.85des X 10-6	Ductility factor
12	BH6-160	0.0026	33.34	1.08	2795	1.21	2104	5093	2.42
13	BH6-120	0.020	35.37	1.15	3210	1.39	2176	6996	3.21
14	BH6-80	0.068	40.43	1.29	5105	2.21	2625	11840	4.51
15	BH6-40	0.278	45.23	1.47	7161	3.10	3143	16504	5.25
16	BH-P	0.000	31.02	1.00	2310	1.00	1713	3345	1.95
17	BH8-160	0.0080	34.61	1.15	3123	1.35	1987	5644	2.84
18	BH8-120	0.062	36.56	1.26	4666	2.02	2585	9723	3.76
19	BH8-80	0.205	40.62	1.40	6329	2.74	3056	15221	4.98
20	BH8-40	0.838	47.69	1.51	8685	3.76	3569	19096	5.35

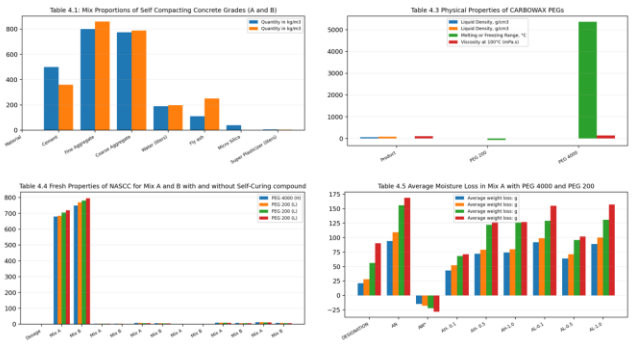


Figure 1. Bar-graph comparison of experimental results.

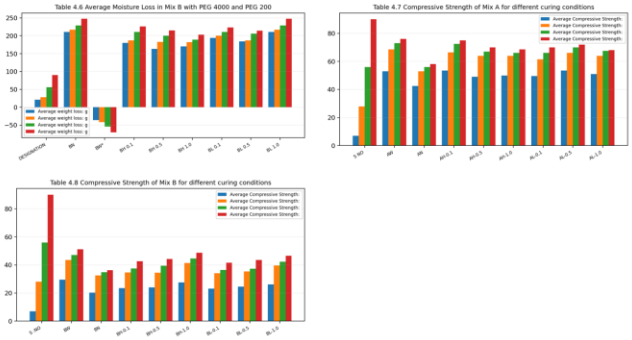


Figure 2. Bar-graph comparison of experimental results.

IV. CONCLUSIONS

The details of all the 120 prisms of SCC with and without self-curing compound are presented. The experimental stress-strain curves were drawn for each set of prisms, taking the average of the three values. The ratio of the maximum load of Tie Confined Self Compacting Concrete (TCSCC) specimens to that of the Tie Confined Self Compacting Concrete companion plain prism specimens for each set was determined for both wet curing and self-cured specimens. The relationships between the confinement index and the increase in stress and strain are established. These relationships were used later to separate the effect of confinement.

As already mentioned, all the specimens were tested under axial compression using a Tinus Olsen testing machine at a rate of 1 mm/min according to ASTM C469 (ASTM, 2002). The load increased rapidly in the initial stage up to 75 to 80 percent of the peak load and increased at a slower rate until the peak load was reached. Tests were continued until the peak load dropped to 0.75 to 0.8 times the peak load. Beyond the peak load, the strain increased at a rapid rate and was accompanied with a decrease in the load carrying capacity of the specimen.

Stress-Strain behaviour of Tie Confined Self Compacting Concrete (TCSCC) under different curing conditions

In case of wet cured plain concrete prisms, the load increased rapidly up to about 70-80 percent of the peak load and later, the rate of increase became slow. The failure was sudden in nature, which occurred as soon as the visible cracks appeared on the surface. Similar behaviour was observed in self-cured prisms but there was a slight decrease in stress compared wet cured self-compacting concrete specimens. The strains were more in case of self-cured self-compacting concrete as compared to wet cured SCC for identical stresses.

REFERENCES

1. Okamura, H., and Ouchi, M. (2003). "Self-compacting concrete." Journal of Advanced Concrete Technology, 1(1), 5–15.
2. Ozawa, K., Maekawa, K., Kunishima, M., and Okamura, H. (1989). "Development of high performance concrete based on the durability design of concrete structures." Proceedings of the Second East-Asia-Pacific Conference on Structural Engineering and Construction.

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3. EFNARC (2005). The European Guidelines for Self-Compacting Concrete: Specification, Production and Use. European Federation of National Associations Representing Producers and Applicators of Specialist Building Products for Structures.
4. EFNARC (2002). Specification and Guidelines for Self-Compacting Concrete. European Federation for Specialist Construction Chemicals and Concrete Systems.
5. ACI 237R-07 (2007). Self-Consolidating Concrete. American Concrete Institute, Farmington Hills, Michigan.
6. ACI 308R-01 (2008). Guide to Curing Concrete. American Concrete Institute.
7. ASTM C39/C39M. Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens. ASTM International.
8. ASTM C469/C469M. Standard Test Method for Static Modulus of Elasticity and Poisson's Ratio of Concrete in Compression. ASTM International.
9. ASTM C1611/C1611M. Standard Test Method for Slump Flow of Self-Consolidating Concrete. ASTM International.
10. ASTM C1621/C1621M. Standard Test Method for Passing Ability of Self-Consolidating Concrete by J-Ring. ASTM International.
11. Persson, B. (1997). "Self-desiccation and its importance in concrete technology." Materials and Structures, 30, 293–305.
12. Dhir, R. K., Hewlett, P. C., and Lota, J. S. (1994). "Densification of cement paste by polymeric admixtures." Cement and Concrete Research.
13. Dhir, R. K., Hewlett, P. C., and Dyer, T. D. (1998). "Mechanisms of water retention in cement pastes containing a self-curing agent." Magazine of Concrete Research.
14. Zhutovsky, S., Kovler, K., and Bentur, A. (2002). "Efficiency of lightweight aggregates for internal curing of high strength concrete." Cement and Concrete Research.
15. Zhutovsky, S., Kovler, K., and Bentur, A. (2004). "Effect of internal curing on durability-related properties of high performance concrete." Cement and Concrete Research.
16. Bentur, A., Igarashi, S., and Kovler, K. (2001). "Prevention of autogenous shrinkage in high-strength concrete by internal curing using wet lightweight aggregates." Cement and Concrete Research.
17. Lura, P., Jensen, O. M., and van Breugel, K. (2003). "Autogenous shrinkage in high-performance cement paste." Cement and Concrete Research.
18. Cusson, D., and Hoogeveen, T. (2007). "Internal curing of high-performance concrete with pre-soaked lightweight aggregate." Canadian Journal of Civil Engineering.
19. Mousa, M. I., El-Khodary, H., and Elsayed, M. (2015). "Self-curing concrete types; water retention and durability." Alexandria Engineering Journal.
20. Mousa, M. I., Mahdy, M. G., Abdel-Reheem, A. H., and Akram, A. (2015). "Self-curing concrete types; water retention and durability." Alexandria Engineering Journal.

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