

# Supplementary Materials:

**Table S1.** Concrete Strength (MPa) under different Curing Condition and Curing Age using Vesicular Basalt aggregates.

Curing method	Cube Compressive Strength (Surface /Volume Ratio = 40, w/c=0.5)			Cylindrical Compressive Strength (Surface /Volume Ratio = 26.4, w/c=0.5)		
	3 days	7 days	28 days	3 days	7 days	28 days
Water Curing (Control)	19.3	22.5	30.9	15.2	17.9	23.3
Air Curing	15.8	18.5	23.3	12.4	14.5	16.9
Membrane Curing	18.5	21.6	27.6	14.9	17.5	20.5
Internal Curing (Air Curing)	16.5	19.5	26.1	13.1	15.6	19.9
Internal Curing (1 <sup>st</sup> 3 day water curing)	17.9	20.5	27.3	13.9	16.3	19.3
Internal Curing (28 day water)	20.9	24.6	33.9	16.9	19.8	26.2

**Table S2.** Concrete Strength (MPa) under different Curing Condition and Curing Age using Vesicular Basalt and Pumice aggregates.

Curing method	Cube Compressive Strength (w/c=0.35, Silica fume admixture and Vesicular Basalt Agg. Internal curing)			Cube Compressive Strength (w/c=0.5, Pumice Internal curing)		
	3 days	7 days	28 days	3 days	7 days	28 days
Water Curing (Control)	30.9	38.1	44.1	19.3	22.5	30.9
Internal Curing (Air Curing)	26.5	31.9	36.7	17.9	20.4	27.5
Internal Curing (1 <sup>st</sup> 3 day water curing)	28.4	33.2	39.3	18.5	21.1	28.7
Internal Curing (28 day water)	32.7	40.9	48.5	19.5	22.9	31.5

**Table S3:** Relative Cube Strength with respect to control concrete and rate of development of concrete strength under different curing conditions (Surface /Volume Ratio = 40, w/c=0.5)

Curing Conditions	Age of Conc			% increase in Strength (3 to 7 days)	% increase in Strength (7 to 28 days)
	3 days (%)	7 days (%)	28 days (%)		
Control Concrete	--	--	--	16.6	37.3
Air Curing	-18.1	-17.8	-24.6	17.1	25.9
Membrane Curing	-4.1	-4.0	-10.7	16.8	27.8
Internal Curing (Air Curing)	-14.5	-13.3	-15.5	18.2	33.8
Internal Curing (1 <sup>st</sup> 3 day water curing)	-7.3	-8.9	-11.7	14.5	33.2
Internal Curing (28 day water)	8.3	9.3	9.7	17.7	37.8

**Table S4:** Relative Cylindrical Strength with respect to control concrete and rate of development of concrete strength under different curing conditions (Surface /Volume Ratio = 26.4, w/c=0.5)

Curing Conditions	Age of Concrete			% increase in Strength (3 to 7 days)	% increase in Strength (7 to 28 days)
	3 days (%)	7 days (%)	28 days (%)		
Control Concrete	--	--	--	17.8	30.2
Air Curing	-18.4	-19.0	-27.5	16.9	16.6
Membrane Curing	-2.0	-2.2	-12.0	17.4	17.1
Internal Curing (Air Curing)	-13.8	-12.8	-14.6	19.1	27.6
Internal Curing (1 <sup>st</sup> 3 day water curing)	-8.6	-8.9	-17.2	17.3	18.4
Internal Curing (28 day water)	11.2	10.6	12.4	17.2	32.3

**Table 5.** Relative Cubical Strength of internal curing concrete having low water-cement ratio with respect to control concrete and rate of development of concrete strength (Surface /Volume Ratio = 40, w/c=0.35).

Curing Conditions	Age of Concrete			% increase in Strength (3 to 7 days)	% increase in Strength (7 to 28 days)
	3 days (%)	7 days (%)	28 days (%)		
Control Concrete	--	--	--	23.3	15.7
Internal Curing (Air Curing)	-14.2	-16.3	-16.8	20.4	15.0
Internal Curing (1 <sup>st</sup> 3 day water curing)	-8.1	-12.9	-9.1	16.9	20.8
Internal Curing (28 day water)	5.8	7.3	10.0	25.1	18.6

**Table S6:** Relative Cubical Strength of Pumice aggregate blended internal curing concrete with respect to control concrete and rate of development of concrete strength (Surface /Volume Ratio = 40, w/c=0.5)

Curing Conditions	Age of Concrete			% increase in Strength (3 to 7 days)	% increase in Strength (7 to 28 days)
	3 days (%)	7 days (%)	28 days (%)		
Control Concrete	--	--	--	16.6	37.3
Internal Curing (Air Curing)	-7.3	-9.3	-11.0	14.0	34.8
Internal Curing (1 <sup>st</sup> 3 day water curing)	-4.1	-6.2	-7.1	14.1	36.0
Internal Curing (28 day water)	1.0	1.8	1.9	17.4	37.6