

## Flow Properties of Self Consolidating Concrete with Time

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### Abstract

In this study, flow characteristics of a SCC mix made with locally available materials was studied. The maximum aggregate size was 3/8 inch. The flow properties were characterized using slump flow test, V-Funnel test and J-Ring test. All these tests were also used to characterize SCC with time and the change in properties of SCC with time was studied.

### Introduction

Conventional concrete tends to present a problem with regard to adequate consolidation in areas of congested reinforcement; resulting large number of air voids affecting the performance and durability of the concrete. Self-consolidating concrete (SCC) can be used to minimize the problem since it is designed to consolidate under its own weight. If properly designed self consolidating concrete can be a highly flowable, yet stable concrete (no separation or segregation) that can spread readily into place (low viscosity) and fill the formwork without any consolidation and without undergoing significant separation. Some of the applications of SCC are slabs, precast elements, tanks, bridge decks, architectural columns and also anchorages for large bridges. Studies recommend that for a good SCC the slump flow should be in the range of 24-30inch, V-funnel time 3-8sec and J-ring value should be 10-15mm. Slump flow test, V-funnel tests and J-ring test are as shown in Fig1 through Fig 3

### Objective

The overall objective of this study was to compare the flow properties using various test methods and to determine the changes in flow properties with time for a SCC mix.



Fig 1 Slump flow test

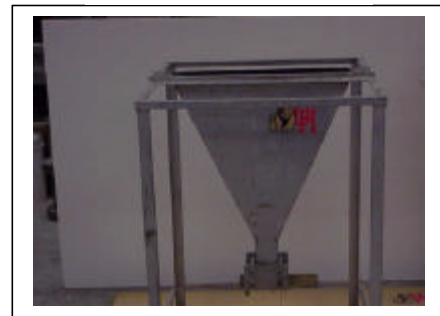


Fig-2 V-Funnel Test



**Table.1** SCC mix

zAMIX No.	CEMENT lbs/cu.yd	GRAVEL lbs/cu.yd	SAND lbs/cu.yd	WATER lbs/cu.yd	HRWR oz/cwt	W/C	CA/FA	FA/TA
1	700	1500	1620	250	18	0.35	0.93	0.51

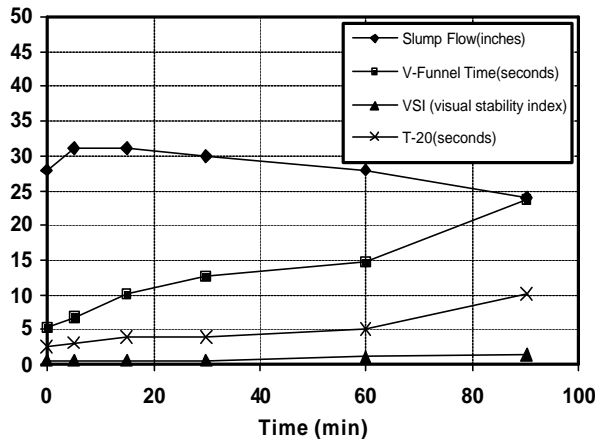
**Table.2** Fresh properties of SCC

Mix No.	Slump Flow (in.)	T-20 (Sec)	VSI	V-Funnel (sec)	V-Funnel (sec) T-5	J-Ring Value (mm)	J-Ring Slump flow	J-Ring T20 (sec)	Remarks
1	28	2.53	0.5	5.35	6.87	5.5	27	2.75	Good passing ability

**Analysis of results**

1. Time required for the mix to flow 20 inches in the slump flow test was about 2.53 seconds which showed that the mix had a very good flowability (Table-2).
2. The slump flow drops beyond the acceptable range after 90min (Fig-4).
3. The VSI (stability) and the T20 values for the mix go beyond the acceptable range after one hour of mixing while the V-funnel values go beyond the acceptable range after about 15 min of mixing (Fig 4).

**Fig.4** SCC properties with time (No mixing)



**Conclusions**

1. The SCC mix studied satisfied the slump flow test, V-funnel test and J-ring test and the values were within acceptable range (Table 2).
2. The study also showed that HRWRA used, agitates the mix after 2-3 minutes of mixing which improves the flow properties.

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