METHOD OF TEST FOR EVALUATION OF FRESHLY MIXED SELF-CONSOLIDATING CONCRETE WITH THE V-FUNNEL

1. SCOPE

This test method covers the procedures for determining V-funnel flow time and V-funnel flow time at 5 min. The procedure is suitable for use in the laboratory or in the field, and is used as a measure of flowability and dynamic stability of SCC.

Note 1: This method is based on the test method outlined in the Precast/Prestressed Concrete Institute and EFNARC (European Federation of Producers and Contractors of Specialist Products for Structures) guidelines.

Note 2: The V-funnel is filled with SCC and the time for it to flow through the V-funnel opening is measured. The test can also detect any tendency for aggregate blockage.

2. RELEVANT DOCUMENTS

2.1 Interim Guidelines for the Use of Self-Consolidating Concrete in Precast/Prestressed Concrete Institute Member Plants, Precast/Prestressed Concrete Institute, TR-6-03, April 2003

2.2 Specification and Guidelines for Self-Compacting Concrete, EFNARC, February 2002

3. DEFINITIONS

3.1 Dynamic Stability: A measure of the SCC's ability to remain homogeneous while flowing.

3.2 Flowability: A measure of the SCC's ability to completely fill formwork without entrapped air pockets.

3.3 Self-Consolidating Concrete (SCC): Highly flowable yet stable concrete that can spread readily into place, fill the formwork, and encapsulate the reinforcement without any mechanical consolidation and without undergoing segregation or excessive bleeding.

4. APPARATUS

4.1 V-Funnel: Made of a stiff non-absorbing material, with dimensions as shown in Figure 1.

4.2 TROWEL OR STRIKE-OFF BAR

4.3 SCOOP OR A SMALL BUCKET

4.4 STOPWATCH: Capable of measuring to the nearest second.

4.5 LEVEL

5. PROCEDURE

5.1 Set the V-funnel apparatus on firm ground and ensure it is level.

5.2 Ensure that the gate opens and closes freely.

5.3 Immediately following completion of mixing, obtain a sample of at least 12 L of SCC.

5.4 Moisten the inside surfaces of the V-funnel apparatus with water and remove any surplus water.

5.5 Ensure that the gate is closed.

5.6 Use the scoop or a small bucket to fill the V-funnel with the SCC sample. Ensure that concrete is deposited into the V-funnel from a height of 150 mm or less above the top of the V-funnel. Do not tap or rod the SCC. Use the trowel or strike-off bar to make the top of the SCC level with the top edge of the funnel.

5.7 Immediately following Step 5.6, open the gate to allow the SCC to flow out the bottom of the funnel, and simultaneously start the stopwatch.

5.8 Record the time when the light can first be seen through the opening at the bottom of the funnel when looking through the funnel from the top. This time is V-funnel flow time.

Note: Concrete may still be flowing when light can first be seen.

5.9 Observe and record the nature of the flow and record any abnormal flow characteristics such as segregation of aggregate and paste, blocking of coarse aggregate at the restricted opening, bleed water appearing, etc., if occurring.

5.10 Repeat the test with the following exceptions. Do not wash or moisten the V-funnel before filling it with SCC. Fill the V-funnel and then let the concrete stand in the apparatus for 5 min before opening the gate and recording V-funnel flow time at 5 min.

6. REPORT

6.1 V-funnel flow time in seconds ($t_{0\ minute}$).

6.2 V-funnel flow time tested after allowing the concrete to stand in the V-funnel for 5 min; reported in seconds ($t_{5\ minute}$).

6.3 Difference in time between the V-funnel and V-funnel test at 5 min.

6.4 Any observation regarding the nature of the flow; e.g. segregation of aggregate and paste, blocking of coarse aggregate at the restricted opening, bleed water appearing, etc.

Figure 1