STATIC SEGREGATION OF SELF-CONSOLIDATING CONCRETE (SCC) USING THE COLUMN METHOD
WAQTC TM 19

Scope

This procedure provides instruction for assessing the static segregation of self-consolidating concrete (SCC) in accordance with ASTM C1610-19.

Column segregation is a static test that measures aggregate segregation of SCC mixtures at rest. In this method, a column mold is filled with SCC and allowed to stabilize undisturbed for 15 ± 1 min., then the amount of coarse aggregate in the top quarter of the mold is compared to the amount of coarse aggregate in the bottom quarter of the mold. If there is significantly more coarse aggregate in the bottom quarter of the mold, static segregation has occurred.

Warning—Fresh hydraulic cementitious mixtures are caustic and may cause chemical burns to skin and tissue upon prolonged exposure.

Apparatus

- Balance or scale: accurate to within 45 g (0.1 lb) or 0.3 percent of the test load, whichever is greater, at any point within the range of use.
- Column Mold: a 200 mm (8 in.) diameter PVC column separated into three sections, top, middle and bottom, fastened together to form a mortar-tight joint and secured to a base plate, meeting the requirements of ASTM C1610.
- Collector plate: non-absorbent, rigid, plate at least 510 mm (20 in.) square with a 220 mm (8.7 in.) cutout in the center and 50 mm 2 in. lip around three sides of the perimeter, meeting the requirements of ASTM C1610.
- Sieve: 4.75 mm (No. 4) rectangular sieve at least 330 mm (13 in.) by 630 mm (25 in.).
- Strike-off bar: a straight steel bar or other suitable metal.
- Pouring vessel or scoop: a water-tight container large enough so each amount of concrete obtained from the sampling receptacle is representative and small enough, so it is not spilled during placement in the mold.
- Plastic container: a bucket or other suitable container.

Procedure

1. Obtain the sample according to the FOP for WAQTC TM 2.
2. Dampen the inside of the mold and empty excess water.
3. Use the pouring vessel or scoop vessel to slightly overfill the mold within 2 min. Do not rod or tamp the SCC. Do not tap or vibrate the mold.
4. Use the strike-off bar to strike off the SCC level with the top of the mold.
5. Allow SCC to stabilize for 15 ±1 min.
6. Hold the top section of the mold and remove fastening system.
7. Place the collector plate around the mold below the top joint.
8. Pull the SCC in the top section of the mold on to the collector plate with a rotating screeding motion.
9. Place SCC into a plastic container.
10. Hold the middle section of the mold and remove fastening system.
11. Place the collector plate around the mold below the middle joint.
12. Pull the SCC in the middle section of the mold on to the collector plate with a rotating screeding motion and discard.
13. Wash the SCC from the top portion of the mold through the 4.75 mm (No. 4) sieve so that only the coarse aggregate remains.
14. Place the coarse aggregate from the top portion of the mold in a clean plastic container.
15. Wash the SCC from the bottom portion of the mold through the 4.75 mm (No. 4) sieve so that only the coarse aggregate remains.
16. Dry the aggregate from top portion of the mold to a surface-dry surface dry condition by rolling in a large absorbent cloth until all visible films of water are removed.
17. Determine the mass of the surface-dry aggregate to the nearest 50 g. Designate as C_t.
18. Repeat Step 15 through 17 with the aggregate from the bottom portion of the mold. Designate as C_b.
19. Calculate the static segregation, S, to the nearest 0.1 percent.
20. If the mass of aggregate in the top portion of the mold exceeds the mass of aggregate in the bottom portion of the mold, S = 0.

Calculation

Calculate the percent of static segregation.

$$S = \frac{C_b - C_t}{C_b + C_t} \times 100$$

Where:

S = static segregation, percent

C_b = mass of coarse aggregate in the bottom portion of the mold, g

C_t = mass of coarse aggregate in the top portion of the mold, g

If $C_b < Ct$, S = 0.

Example:

$$S = \frac{5800\ g - 5650\ g}{5800\ g + 5650 g} \times 100 = 1.3\%$$

Given:

C_b = 5800 g

C_t = 5650 g

Report

- On forms approved by the agency
- Sample ID
- Static segregation (S) to the nearest 0.1 percent