State of Nevada
Department of Transportation
Materials Division

# METHOD OF TEST FOR SLUMP FLOW AND STABILITY OF HYDRAULIC-CEMENT SELF-CONSOLIDATING CONCRETE

## SCOPE

This test method covers the determination of the flowability and stability of fresh hydraulic-cement self-consolidating concrete. The average diameter of the slump flow is a measure of the filling ability (flowability) of self-consolidating concrete (SCC). The Visual Stability Index (VSI) is a measure of the dynamic segregation resistance (stability) of SCC.

## APPARATUS

1. Slump cone mold and tamping rod, shall conform to Test Method Nev. T438.
2. Base plate, smooth, rigid, nonabsorbent sealed or laminated plywood, rigid plastic or steel, and be at least 914 mm (36 in.) in diameter.
3. Trowel and hand scoop.
4. Measuring tape, having a minimum gradation of 10 mm (0.5 in.).
5. Stopwatch, accurate to the nearest .01 second.

## SAMPLING

Sampling shall be performed in accordance with Test Method Nev. T416.

## PROCEDURE

1. Dampen the slump cone mold and base plate. Wipe away any excess water with a moist cloth or damp sponge.
2. Place the base plate on level, stable ground. Center the slump cone mold on the base plate. The slump cone mold shall be placed with the smaller diameter opening facing down (See Figure 1).
3. Using a hand scoop, fill the slump cone mold in one lift without vibrating, rodding or tamping.

4. Strike off the surface of the concrete level with the top of the slump cone mold using a trowel or by means of a screeding or rolling motion using a tamping rod. Remove excess concrete from around the base of the slump cone mold and base plate.

5. Raise the slump cone mold vertically to a distance of 225 ± 75 mm (9 ± 3 in.) in 3 ± 1 second without any lateral or torsional motion. Complete the test procedure from filling the slump cone mold to removal of the slump cone mold, without any interruption, and within 2.5 minutes.

6. *If specified in the contract documents:* From the time the slump cone mold is lifted, measure the time in seconds it takes for the concrete to reach a diameter of 500 mm (20 in.). This is the $T_{50}$ time.

7. When the concrete has stopped flowing, measure the maximum diameter of the resulting slump flow and then measure the diameter perpendicular to the maximum diameter. If the difference between the two slump flow diameters is more than 50 mm (2 in.), verify the base plate is level, then start the test over.

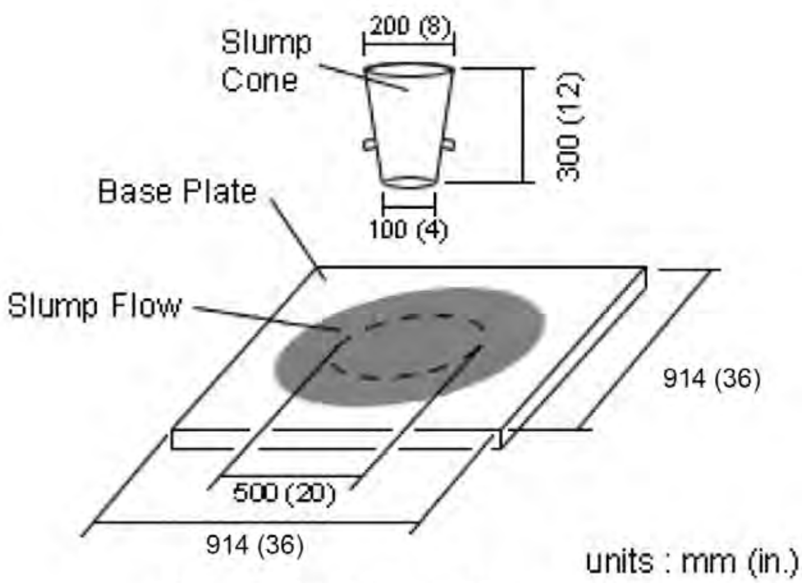


**Figure 1. Slump Flow Test**

## CALCULATIONS

Calculate the average of the two measured diameters. This is the slump flow.

By visual examination, rate the Visual Stability Index (VSI) of the SCC using the criteria in Table 1 and photo illustration shown in Figures 2-9.

**Table 1 - Visual Stability Index (VSI) Rating Criteria**

| Rating | Criteria |
|---|---|
| 0<br>Stable | No evidence of segregation or bleeding in slump flow area, mixer drum chute, or sampling receptacle (e.g. wheelbarrow, bucket, etc.) |
| 1<br>Stable | No mortar halo or coarse aggregate heaping within the slump flow area, but slight bleeding and/or air popping is evident on the surface of the slump flow area on the concrete surface in the mixer drum chute or sampling receptacle. |
| 2<br>Unstable | Slight mortar halo, # 10 mm (0.5 in.) wide within slump flow area, and/or coarse aggregate heaping in the slump flow area, and highly noticeable bleeding in the mixer drum chute or sampling receptacle. |
| 3<br>Unstable | Clearly segregated by evidence of a large mortar halo, > 10 mm (0.5 in.) wide, and/or large coarse aggregate pile with the slump flow area. A thick layer of paste on the concrete surface in the mixer drum chute or sampling receptacle. |

## REPORT

1. Report the slump flow to the nearest 10 mm (0.5 in.).
2. Report the VSI rating.
3. *If specified in the contract documents: R*eport the $T_{50}$ time to the nearest 0.2 seconds.

Figure 2. VSI = 0, stable

Figure 3. VSI = 0, stable

Figure 4. VSI = 1, stable

Figure 5. VSI = 1, stable

Figure 6. VSI = 2, unstable

Figure 7. VSI = 2, unstable

Figure 8. VSI = 3, unstable

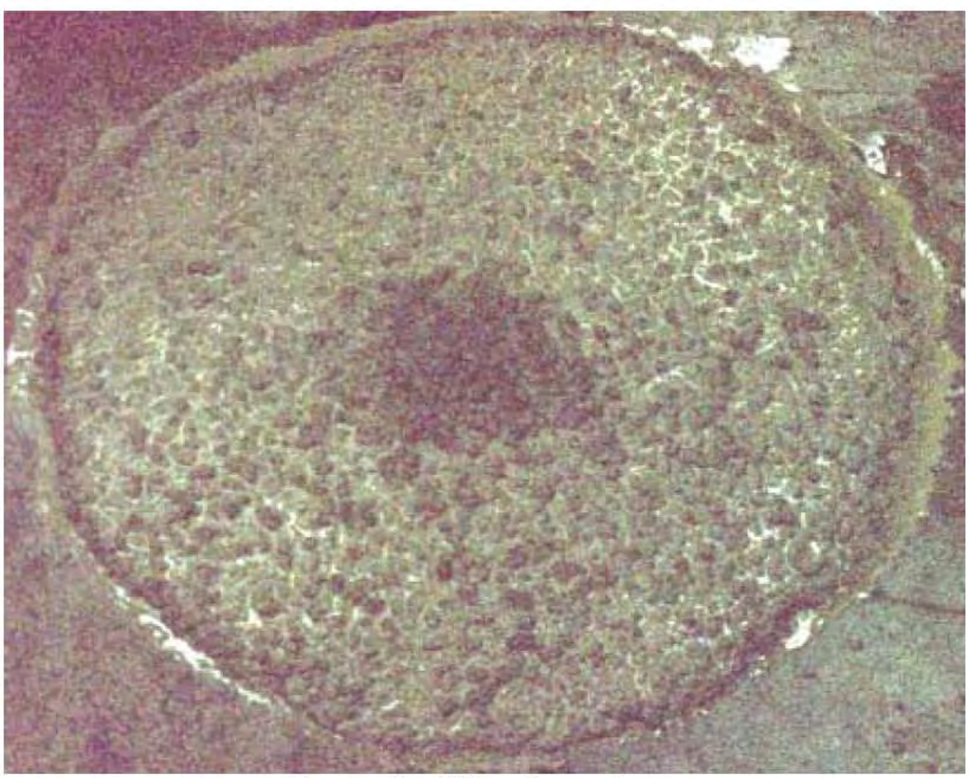

Figure 9. VSI = 3, unstable