

State of Nevada  
Department of Transportation  
Materials Division

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

**SCOPE**

This test method covers the determination of the flow-ability and stability of fresh hydraulic-cement self-consolidating concrete using the slump cone. The average diameter of the unobstructed slump flow is a measure of the filling ability (flow-ability) 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 graduation of 10 mm (0.5 in.).
5. Stopwatch, accurate to the nearest .01 second.

**SAMPLING**

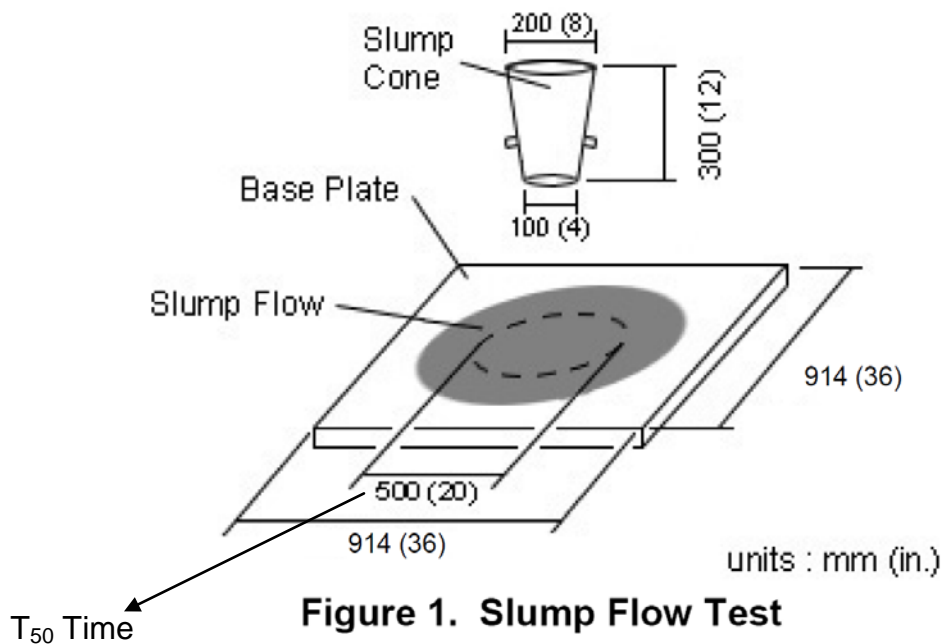
Sampling shall be performed in accordance with Test Method Nev. T416.

**PROCEDURE**

1. Place the base plate on level, stable ground. Dampen the slump cone mold and base plate. Wipe away any excess water with a moist cloth or damp sponge.
2. 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 in a vertical direction, making sure the mold clears the top of the SCC in  $3 \pm 1$  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 unobstructed slump flow and then measure the diameter perpendicular to the maximum diameter. If the difference between the two unobstructed slump flow diameters is more than 50 mm (2 in.), the test is invalid. Check to make sure the base plate is level and flat, and run the test again ensuring that the slump cone is raised in a vertical direction within  $3 \pm 1$  seconds.

Example: 560 mm (22 in.) unobstructed slump flow – 510 mm (20 in.) unobstructed slump flow = 50 mm (2 in.), test is acceptable.



## CALCULATIONS

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

Example: 560 mm (22 in.) unobstructed slump flow + 510 mm (20 in.) unobstructed slump flow =  
1070 mm (42 in.) / 2 = 535 mm (21 in.) = 530 mm (21 in.) unobstructed slump flow.

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

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

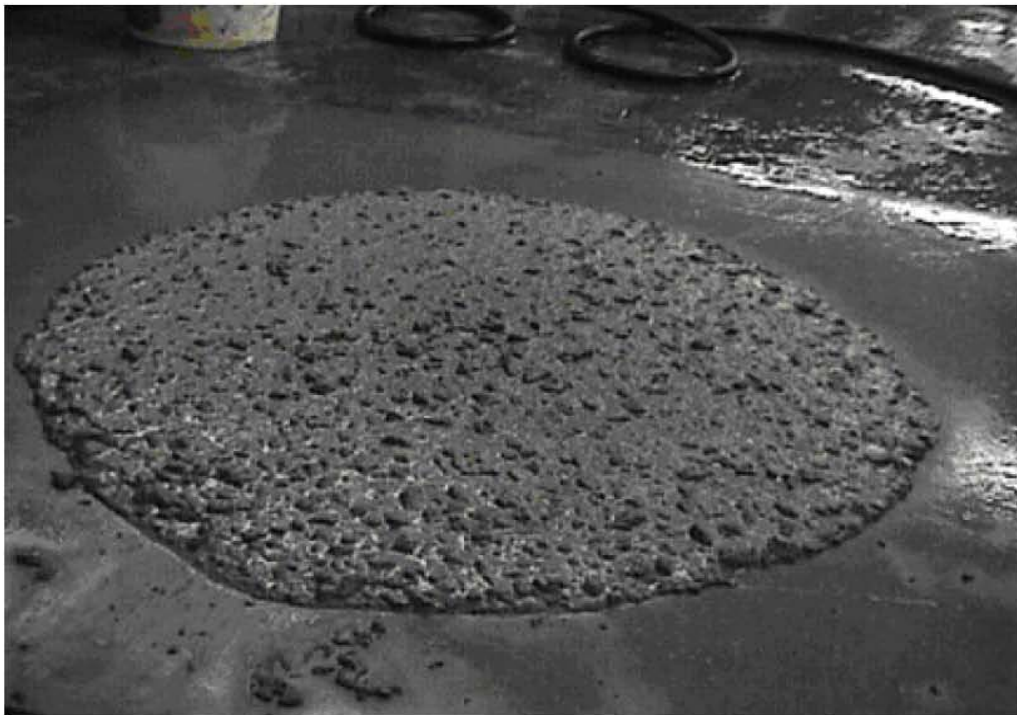
<b>Rating</b>	<b>Criteria</b>
0 Stable	No evidence of segregation or bleeding in slump flow area, mixer drum chute, or sampling receptacle (e.g. wheelbarrow, bucket, etc.)
1 Stable	No mortar halo or coarse aggregate heaping within the slump flow area, but slight bleeding and/or air popping is evident on the surface of the slump flow area on the concrete surface in the mixer drum chute or sampling receptacle.
2 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 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 unobstructed slump flow to the nearest 10 mm (0.5 in.).
2. Report the VSI rating.
3. *If specified in the contract documents:* Report the T<sub>50</sub> 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**