



## **WSDOT Test Method T 313**

### ***Method of Test for Cement-Latex Compatibility***

#### **1. Scope**

This method tests the compatibility of cement and latex additives when combined.

#### **2. Equipment**

- a. Two brass cylindrical unit weight cups having an inside diameter of 3 in (76 mm) and a depth of approximately  $3\frac{1}{2}$  in (88 mm).
- b. Mixer, bowl, and paddle conforming to AASHTO 162.
- c. Straightedge – A steel straight edge, not less than 4 in (102 mm) long, and not less than  $\frac{1}{16}$  in (1.6 mm) nor more than  $\frac{1}{8}$  in (3.2 mm) in thickness.
- d. Glass Graduated Cylinder – Shall have 250 ml capacity, graduations at 2 ml intervals, made to deliver indicated volume at 20°C.
- e. Glass Beaker – Shall have at least a 300 ml capacity.
- f. Balance – Must conform to ASTM C 1005.
- g. Tapping Stick – Made of hardwood, a diameter of  $\frac{1}{8}$  in (3.2 mm), and a length of 6 in (152 mm).
- h. Tamper – Made of hardwood, a diameter of  $\frac{7}{16}$  in (11 mm), and a length of 6 in (152 mm).
- i. Scoop – Approximately 8 in (203 mm) long, and 3 in (76 mm) wide.
- j. Scraper – Shall consist of a semirigid rubber blade attached to a handle about 6 in (152 mm) long. Blade is about  $3\frac{1}{2}$  in (90 mm) long and 2 in (50 mm) wide. (Kitchen tool called a plate and bowl scraper meets these requirements.)

#### **3. Procedure**

- a. Weigh out a batch of washed and dried Steilacoom aggregate (B-1), using the following table:

U.S. No. Screen Size		Batch Weights (grams)	
		Individual Wt.	Accumulative Wt.
$\frac{3}{8}$ in - #4	(9.5 mm - 4.75 mm)	14	14
#4 - #8	(4.75 mm - 2.36 mm)	205	219
#8 - #16	(2.36 mm - 1.18 mm)	186	405
#16 - #30	(1.18 mm - 600 $\mu$ m)	230	635
#30 - #50	(600 $\mu$ m - 300 $\mu$ m)	561	1196
#50 - minus	(600 $\mu$ m - minus)	278	1474

- b. Weigh out 1 lb (454 g) of the cement candidate. Measure 4.80 oz (142 ml) of the latex candidate into a beaker. 2.976 oz. (Measure 88 ml) of water into the graduated cylinder.
- c. Put the aggregate and cement into the mixer bowl. (Adjust the blade to bowl clearance for the largest aggregate size first.) Mix the dry ingredients for 45 seconds at speed 1. Stop the mixer.
- d. Pour the latex sample into the mixer bowl. Rinse the latex beaker with the measured mixing water, then pour the solution into the mixing bowl.
- e. Mix for one minute at speed 1.
- f. Stop mixer for three minutes. Scrape down the sides and check the bottom of the bowl for sand pockets using the bowl scraper.
- g. Mix for ten seconds at speed 1.
- h. Tare the first unit weight (mass) cup.
- i. Use the scoop to fill the unit weight (mass) cup in three lifts. For each lift, tamp with the small wood dowel 25 times, just penetrating the layer below it, and strike the side of the unit weight (mass) cup sharply five times with the large wood dowel, at equal intervals around its circumference.
- j. Cut off the mortar to a plane surface, flush with the top of the unit weight (mass) cup, by drawing the straight edge, held at 90 degrees, with a sawing motion across the top, making two passes over the entire surface, the second pass being made at right angles to the first. Wipe off all mortar and water from the sides of the unit weight (mass) cup. Record the weight (mass). Tare the second unit weight (mass) cup and fill with the remaining mortar from the bowl, and repeat the procedure. Record the second weight (mass).

#### 4. Calculations

- a. Calculate the average weight (mass) of the two samples.

#### 5. Significance

If a latex additive and concrete mix are incompatible, they will react chemically, changing the specific gravity and density, which will adversely affect the final strength of the concrete/latex. In this test method, an adverse reaction is determined by examining the weight (mass) of the two wet products when combined. A very lightweight means there is probably a problem, and a different latex or cement should be submitted for testing.