

Standard Method of Test for
**Determination of Washed Aggregate Gradation of
Hot Mix Asphalt Extracted Aggregates**

SCDOT Designation: SC-T-76 (9/08)

1. SCOPE

- 1.1. This method covers the determination of combined silt and clay material passing the 75- μm (No. 200) sieve and the mechanical analysis of hot-mix asphalt extracted aggregate.

2. REFERENCED DOCUMENT

- 2.1. AASHTO M 231.

3. SIGNIFICANCE AND USE

- 3.1. The purpose of this procedure is to accurately determine the amount of aggregate that passes the 75- μm (No. 200) sieve to ensure that the gradation of the mixture meets job mix specifications.

4. APPARATUS

- 4.1. *Sieves* — standard sieves with square openings. For the washing: a 600- μm (No. 30) sieve nested on a 75- μm (No. 200).
- 4.2. *Balance* — of sufficient capacity and accuracy meeting the requirements of AASHTO M 231.
- 4.3. *Wetting/Disbursing Agent* — (e.g., Calgon).
- 4.4. *Container* — bowl of sufficient capacity to hold the entire sample.
- 4.5. *Oven* — capable of maintaining $125^{\circ}\text{C} \pm 5^{\circ}\text{C}$ ($257^{\circ}\text{F} \pm 9^{\circ}\text{F}$).
- 4.6. *Shaker* — mechanical shaker (e.g., Rotap).
- 4.7. *Water* — potable water.
- 4.8. *Miscellaneous Items* — brush, trowel or spoon.

5. TEST SPECIMEN

- 5.1. The sample size used for conducting this test will be based on the amount of material remaining after a solvent extraction or ignition oven test has been performed. Unless otherwise indicated, this test will use the entire sample remaining after performing one of the aforementioned tests.

6. PROCEDURE

- 6.1. Place the entire sample at room temperature into a container. Use a brush to be sure that all of the fine material is transferred into the container. Material which has been allowed to sit for several hours, or has been obtained through solvent extraction, shall be heated in an oven at $125^{\circ}\text{C} \pm 5^{\circ}\text{C}$ ($257^{\circ}\text{F} \pm 9^{\circ}\text{F}$) until it is dried to constant weight. The sample and pan shall be weighed and the weight recorded to the nearest 0.1 gram as W_{T} . The weight of the empty container shall be recorded as W_{C} .
- 6.2. Cover the sample completely with water. Add a sufficient amount of wetting agent to assure a thorough separation of fine material from the coarser particles. Immediately stir the contents of the container vigorously with a trowel or spoon for approximately 10 to 15 seconds. Allow the material to sit and soak for a total of 5 minutes. Stir the sample once more in the middle of this time period and again at the end of the time period for a total of 3 stirrings.
- 6.3. At the end of the time period, after the material has been stirred for the final time, immediately pour the wash water through a nest of sieves consisting of a 600- μm (No. 30) sieve nested on a 75- μm (No. 200) sieve. Care should be taken to avoid spilling any of the larger particles onto the sieve nest.
- 6.4. An additional amount of water should be added to the container to again cover the sample completely. The sample should be immediately stirred and then decanted through the same nest of sieves. The sample should not be allowed to sit and soak. Repeat this rinsing and decanting until the wash water becomes clear.
- 6.5. Any material which is retained on the nest of sieves shall be carefully washed back into the container. The sample and container shall be placed in an oven at $125^{\circ}\text{C} \pm 5^{\circ}\text{C}$ ($257^{\circ}\text{F} \pm 9^{\circ}\text{F}$) and dried to constant weight. After drying, the material will be removed from the oven and immediately weighed before any moisture can be absorbed. The total weight of the sample and pan is designated as W_{TF} .

7. CALCULATIONS

7.1. Fine Aggregate Wash:

Figure SC-T-76A shows the calculations necessary to compute the total amount of material passing through the 75- μm (No. 200) sieve.

7.2. Mechanical Analysis of Extracted Aggregate:

- 7.2.1. The aggregate sample shall be introduced into a nested set of sieves corresponding to the required fraction sizes. Be sure to brush all fine material from the container. The sample shall be subjected to mechanical shaking for a period of 15 ± 1 minutes. If the sample size is greater than that allowed for the nest of sieves, the sample shall be split into smaller portions and subjected to shaking separately. When complete, the weight passing a given sieve size for each sample shall be added to each corresponding sieve size. The total amount of material from all sets of sieves shall be used in determining the percent passing each individual sieve.

DESCRIPTION	EQUATION	RESULT
ORIGINAL SAMPLE		
Initial Wt. Sample & Container	W_T	1645.0
Wt. of Container	W_C	500.0
Initial Sample Wt.	$W_i = W_T - W_C$	1145.0
MATERIAL DRIED		
Wt. Sample & Container After Drying	W_T	1635.0
Wt. of Container	W_C	500.0
Final Sample Wt.	$W_f = W_T - W_C$	1135.0
Total Loss thru 75- μ m (No. 200) Sieve	$W_L = W_i - W_f$	10.0

Note: All weights in grams.

AGGREGATE WASH CALCULATIONS Figure SC-T-76A

7.2.2. Invert the nest of sieves by removing the top size sieve and using it as the bottom. Remove the individual sieves and stack them on top of each until the pan is on top. Begin weighing and recording the amount of material contained in each sieve starting with the pan and proceeding cumulatively to the largest sieve containing material. Record the cumulative weight for the entire sample.

7.3. Mechanical Analysis Calculations:

7.3.1. Add the amount of material washed through the 75- μ m (No. 200) sieve (W_L) back to each individual sieve fraction as shown in Figure SC-T-76B. Calculate the percentage of material passing each individual sieve as a portion of the entire sample with the washed material added back. Figure SC-T-76B shows an example of these calculations.

SIEVE SIZE	WT. PASSING	+ W_L	= TOTAL WT. PASSING	TOTAL PASSING %
19.0 mm	1135	10	1145	100.0
12.5 mm	1079	10	1089	95.1
9.5 mm	908	10	918	80.2
4.75 mm	646	10	656	57.3
2.36 mm	443	10	453	39.6
600 μ m	261	10	271	23.7
150 μ m	136	10	146	12.8
75 μ m	85	10	95	8.30

Note: All weight in grams.

EXAMPLE MECHANICAL ANALYSIS CALCULATIONS Figure SC-T-76B

8. REPORT

- 8.1. Report the total percent passing of the required sieves. Test results are reported on SCDOT Form 400.05 – Daily Report of Asphalt Plant Inspection. Data and calculations are recorded on SCDOT Form 400.03 – Ignition Oven Worksheet.