

Racing Surfaces Testing Laboratory

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LABORATORY TEST METHOD FOR SIEVE SEPARATION OF SOILS FOR RACING SURFACE MATERIALS (ASTM D422)

Note:

This procedure applies to dirt only. All material must be completely free from wax and other synthetic materials.

1) Place approx 1200g sample in oven to remove moisture. Refer to the Moisture Removal & Determination Procedure for details.

2) Using a **scale accurate to $\pm 0.1\text{g}$** weigh an empty **1000-ml beaker**. Record the mass on the wet sieve data sheet under “weight of empty beaker.”

3) Place 1000g of oven dried material in the 1000 ml beaker. Record the total mass under “initial weight of beaker + material.” Care should be used when pouring the material to prevent the loss of very fine particles to the air.

4) Pour **distilled water** into the beaker until the sample is covered. Stir the material thoroughly.

5) Rinse any material stuck to the spoon back into the beaker with distilled water, and allow the mixture to soak for 24 hours.

6) Record the combined mass of 2 **#270 sieves** under “weight of the #270 sieves.” Place the sieves in the **plastic sink** or over a bucket.

7) Stir the material and water mixture in the 1000 ml beaker then divide evenly into the two #270 sieves. Use a spray bottle of **tap water** to wash any sample stuck to the sides of the beaker into the sieve.

8) Stir the material and water mixture gently with a stainless steel spoon, taking care not to damage the mesh of the sieve. Avoid splashing the water and do not let it spill from the top.



9) When most of the water has run out of the sieve, add more tap water.

10) Repeat steps 8 and 9 until the water looks clear, flows easily out of the bottom of the sieve, and appears to be free of clay particles. Typically about 1 to 3 gallons of water will be used.



11) Let the sieves sit for about 30 minutes to allow excess water to run out of the sample. If time is an issue, reduce this to about 10 minutes.

12) Spoon the material from the #270 sieves into a pan. Rinse the sieves with a spray bottle of distilled water. Place the sieve in the **oven** on top of a piece of **aluminum foil**. Place the pan in the oven as well. Allow the sample and the sieve to dry for 24 hours at 110°C.



13) If time is an issue and the sample does not contain fiber, rubber, or large amounts of organic material, then the sample can be dried in a **microwave oven**. Spoon the material from the sieve into a glass beaker or other microwaveable vessel so that there are large pockets of air where moisture can escape. Cover the beaker with a damp **paper towel** during the first 10 minutes of drying. This is important to prevent trapped steam from forcing material out of the beaker. Also place a **250 mL beaker** of tap water in the microwave with the sample. While the sample is drying in the microwave (~30 minutes), place the mostly-empty sieve on a piece of aluminum foil in the oven to dry the remaining material. When the sample is dry it should not change mass after one minute of drying. Once the sample is dry, return it to the sieve, taking care to remove ALL of the material from the beaker.

14) Record the mass of the dried sample and the #270 sieve under "Final weight of the dried material and #270 sieve." Avoid shaking the sieve after the mass is measured.

15) Record the mass of each of the empty **sieves** using a scale accurate to $\pm 0.1g$. Sort sieves from coarsest mesh on top to finest mesh on bottom (10, 14, 18, 35, 40, 60, 100, 140, 200, 270, Pan). The higher the sieve number, the finer the mesh.

16) Pour the dried material into the top sieve (No. 10). Care should be used when pouring to prevent the loss of very fine particles to the air. Place the **sieve cap** onto the top sieve.

17) Place the stack of sieves into the **sieve shaker**, and set the hammer on top of the sieve cap. Check the shaker for loose bolts. Close the clasp and start the shaker by pressing the red button. The machine will run for 5 minutes. Wear hearing protection while the machine is running or leave the room.

18) Remove the sieve stack from the shaker. Separate the No. 10 sieve from the sieve stack and record the weight of the sieve + material. Continue to record the weight of each sieve all the way down to the pan. Save a small amount of material from the sieve with the highest percentage retained for microscopy for sand shape, if necessary. Handle the finer particle sizes (#140 and finer) with care as these particles tend to become free-floating dust easily.

19) After recording the masses of all of the sieves, pour the contents of each sieve into the pan or another container. Put this material in a plastic bag labeled with the sample identifier, the sample description, "after #270 wet sieve", the date, and the initials of the person bagging the sample.

Revision No.	Date	Revision By	Description
1.0	17-Mar-2009	R. Beaumont	Created and issued procedure
1.1	28-Mar-2009	C. Mahaffey	Modified step (5) to measure each sieve separately.
1.2	03-Aug-2009	M. Segee	Added a step to remove large rubber pieces with 14 sieve.
1.3	25-Sep-2009	M. Segee	Added steps to wash on 200 sieve, modified step 17 to include saving material for microscopy
1.4	01-Nov-2010	L. Flanders	Added details for microwaving the material to quickly dry it. Removed crossed-out steps.
1.5	21-Jan-2011	W. Luo	Step 2, 3 and 16 are modified
1.6	15-Mar-2011	M. Segee	In wet sieve, changed distilled water to tap water (soaking still distilled)
1.7	26-Dec-2011	M. Segee	changed wet sieve to #270
1.8	14-Apr-2012	M. Segee	Wet sieve with 2 sieves, clarified other steps
1.9	06-Jun-2013	M. Segee	Added cell labels from data sheet
2.0	28-Jun-2013	M. Segee	Added pictures, clarified steps
2.1	11-Jul-2013	M. Segee	Clarified steps
2.2	25-Mar-2014	H. Babbitt	Clarified Steps, Updated Lab Address