Racing Surfaces Testing Laboratory

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LABORATORY TEST METHOD FOR PERMEABILITY OF RACING SURFACE MATERIALS (ASTM D5856)

Note:
This procedure applies to both dirt and synthetic surfaces.

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

2) Record the mass of a clean **sample pan** in either the general notes section of the datasheet or a separate piece of paper. Transfer approximately 300g-500g of material to the sample pan.

3) Add the desired forming moisture content (i.e. 4%, 10%, 12% etc.) to the sample pan using a spray bottle of **distilled water**. Mix thoroughly until the color becomes uniform throughout the mixture. Cover with plastic wrap to contain moisture as necessary.

4) Prepare the **falling head permeameter** by a) placing a dry **2.5" diameter porous stone** on top of the plastic spheres inside the permeameter (dry the porous stone with compressed air if not dry) b) place a piece of **2.5in filter paper** on top of the stone (use the 2.5in hole punch on Whatman 541 filter paper to achieve the correct size). Record the mass of the permeameter as "Permeameter Start Mass."

5) The sample will be prepared in two "lifts". For the first lift, transfer approx 75g +/-5g of material to the permeameter. Place the permeameter onto a concrete floor and secure the base between your feet. Using the **2.5kg compaction hammer**, drop the weight from 10cm (marked on the compaction hammer handle) using 10 blows, trying to expose the entire surface to the hammer while securely holding the hammer guide. Scrape trimmings down from the side walls and lightly score the surface of the sample.

6) Prepare the second lift by transferring another 75g +/-5g to the permeameter. Repeat the compaction procedure in (5) for this lift. Record the final mass of the permeameter as "Permeameter End Mass".

7) Measure the sample height to within +/-1/32". The variation in sample height must not exceed 1/16", otherwise the sample preparation must be restarted.

8) Add a 5.5cm diameter filter paper to the top of the sample, followed by a 2.5" diameter porous stone.

9) Securing the sample: The sample must be lightly loaded so that the sample and permeameter pieces do not "float" during the saturation phase. Place the plastic dowel with threaded rod into the slots. Use the weight of the compaction hammer to apply load to the plastic dowel. While pushing down on the threaded rod, tighten the wing nuts. When the compaction hammer is removed, the plastic dowel should be snug against the porous stone.

10) Place the permeameter into the **catch pan**. Secure the **supply line** to the bottom of the **burette**. Fill the burette with distilled water and open the valve at the bottom. Allow the permeameter to fill with water until water goes into the catch pan. Add more water to the burette when the level of water gets low.

11) Bleeding air from the supply line: Guide large sections of air in the supply line to the top of the supply line just below the burette. Allow the water level in the burette to fall below the 45 mL mark. Lift the permeameter and catch pan to above the surface of the water in the burette. Allow water and air to flow from the permeameter and supply line into the burette until there is no air in the supply line. Note: For samples with very low permeability, it might be easier to remove the supply line from the burette, fill the supply line with distilled water, then reattach the supply line.

12) Saturate the sample: Open the burette valve to allow water to enter the sample. The sample must become saturated before flow measurements can be used to calculate the hydraulic conductivity (permeability) of the

sample. To determine if the sample is saturated, fill the burette to above zero. Open the valve to the supply line. Start the **stopwatch** when the water level in the burette drops below zero. After some constant time period, record the burette level. When the burette level after that time period converges to a constant value, the sample is saturated.

13) Record the distance between the free surface water level in the permeameter and the 0mL mark on the burette (should be about 31 inches).

14) Taking permeability measurements: Close the burette valve and fill with distilled water to the 0ml mark. Prepare the datasheet for four or five measurements, including the first one at 0, taken at either regular time intervals (i.e. 1 min, 1 hr, etc.) or regular burette intervals (i.e. 15 ml). Start the timer and record the starting level of the burette. As the time intervals elapse, record the corresponding burette level. For highly permeable samples, it may be necessary to close the burette valve and stop the stopwatch while recording the time and burette level. Be sure to read the water level from the bottom of the meniscus. Close the burette valve.

15) Repeat step (14) for another two rounds of four or five measurements. Be sure to refill the burette to the 0ml mark for each round of measurements to allow for a quick comparison to other rounds.

16) To disassemble permeameter, tilt so that water runs out the supply line. Turn upside-down and lightly tap until the porous stone comes out. Remove the sample from the permeameter with a spoon. Throw away the filter paper. If it's in good shape, the bottom porous stone can be left in the permeameter for a future test. Rinse any remaining soil from the permeameter with a spray bottle of water.

Revision No.	Date	Revision By	Description
1.0	16-Mar-2009	R. Beaumont	Created and issued procedure
1.1	28-Mar-2009	R. Beaumont	Removed part (b) from step 5 – do not pre-fill with water
1.2	03-Aug-2009	M. Segee	removed part (b) from step 5 which said 'secure the supply line to the top of the permeameter and fill'.
1.3	07-Jan-2011	M. Segee	changed container mass to permeameter mass, adjusted for new permeameter setup, finished section about disassembly
1.4	23-Nov-2012	A. Eguren	Revised.
1.5	19-Jul-2013	M. Segee	minor changes for clarity.
1.6	8-Aug-2013	M. Segee	take readings at regular time or burette readings, may need to close valve and stop timer to record readings in samples with high permeability.
1.7	28-Apr-2014	H. Babbitt	Minor changes for clarity, updated the lab address.
1.8	26-Feb-19	H. Adams	Update address and phone number
1.9	19-Mar-2025	M. Rockefeller	Update address