Racing Surfaces Testing Laboratory

2 Summer Street
Orono, ME 04473
207.866.1046

LABORATORY TEST METHOD FOR WATER HOLDING CAPACITY DETERMINATION (ASTM D 2980-04, D 7367-07)

Water Holding Capacity Determination Pre-Test Equipment Review

1) Replace dirty water or add distilled water to the bottom half of **vacuum desiccator** (the clear spherical container half-filled with distilled water) on the **flow bench** (shown above) until approximately ½ full.
2) Lube the vacuum desiccator with Dow Corning High Vacuum Grease seal if needed (if the lid does not stick to the base).

3) Make sure **O-ring** is correctly in place on bottom half of vacuum desiccator.

4) Empty the collection containers which hold the water drained from sample(s) tested. Turn the knob of check valve and turn on pump until collection containers are drained.

5) If the plastic container which collects the drainage is full, empty the glass container by removing the rubber lid and pouring out the water.

6) Cut **Whatman #541** filter papers to fit the Water Holding Capacity Determination Molds (from now on referred to as the Water Holding Molds) by tracing the plastic mold labeled “Water Holding Stencil”. Or use the **3in hole-punch** in the office. Change the filter paper in mold each time a test is done.

7) Clean the compaction hammer(s) which will be used for test with a paper towel. (Water can be used to clean compaction hammer but it must be thoroughly dried in order to prevent rust.)

8) Make sure the **10 cm mark** in permanent marker is clearly depicted on compaction hammer. If not, measure 10 cm from the bottom of the hammer handle and make a new mark.

Water Holding Protocol

1) Remove sample from synthetic oven (sample must be in oven 72 hours prior to testing). Sample must by be completely dry.

2) If this is the first time the sample is being used remove any large pieces of rubber or knots of fiber by sieving the sample with a **#4 synthetic sieve** and picking out the pieces that will not go through. Bag the pieces of rubber and fiber removed and label them as "Large Rubber and Fiber Pieces." Document date bagged, sample ID, description of material removed, weight, and who bagged sample. Enter on SL-WO (if applicable).

3) Once the sample is sieved, you must have at least 300g of material.

4) Weigh empty, dry pan. Record this weight on the data sheet.

5) Place sample in pan.

6) Weigh the pan with the sample in it. Record this weight on the data sheet.

a. The data sheet calculates the amount of distilled water to add to the sample to achieve **4% moisture** in the sample. Add the calculated amount of distilled water to the sample using one of the spray bottles marked "distilled water."

7) Securely cover pan (with sample and water inside) with plastic wrap so the moisture does not escape.

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8) Get a clean, dry Water Holding Mold from the **flow bench**. Place a **Whatman #541** filter paper on the bottom inside the mold.

9) Record the Water Holding Mold identification number (labeled in black marker) on the data sheet.

10) Place the empty Water Holding Mold with the **Whatman #541** filter paper on the scale. Record this weight on the data sheet. Do not remove from scale.

11) Tare the scale with the Water Holding Mold and filter paper on it. Do not remove from scale.

12) Remove the plastic wrap from the pan and add 150g of the sample at 4% moisture content. (WHM + Sample Weight #1)

13) Replace the plastic wrap and securely cover pan of sample so moisture does not escape.

14) **COMPACTION #1**

a. Remove the Water Holding Mold from the scale and place on the stone in front of the fireplace. Wipe any dirt off of the **compaction hammer**. Compact the sample in the Water Holding Mold with 10 blows using the compaction hammer from a height of 10 cm.

b. Make sure to place the **compaction hammer** in a new place before each blow so the sample is compacted evenly.

c. Score the surface of the sample evenly to no greater than a depth of ¼ inch with the edge of any spoon. Put the spoon to the side.

d. Place the top half of the Water Holding Mold with filter and compacted sample on the scale. Remove the plastic wrap from the pan and add another 150g of the sample at 4% moisture content so the scale reads 300g.

e. Securely cover pan with plastic wrap so the moisture does not escape.

15) **COMPACTION #2**

a. Repeat steps A – C of **Compaction # 1**.

16) Place the Water Holding Mold on the scale. Record this weight on the data sheet. (WHM + Sample Weight #2)

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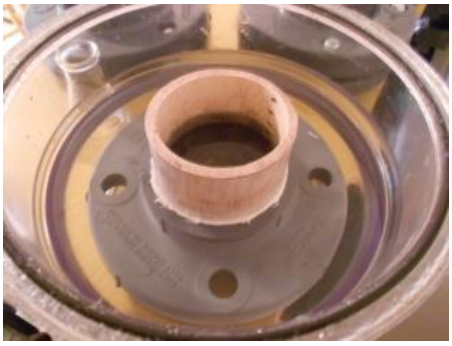
17) Identify height of sample in Water Holding Mold by counting down the centimeter marks on the inside of the Water Holding Mold starting at the top. The first line is 9 cm. If the surface of the sample is compacted between the lines then estimate. Record the sample height on the data sheet.

18) Place the Water Holding Mold into the bottom half of **vacuum desiccator.** The vacuum desiccator should be about half full of distilled water. Make sure the level of the distilled water in the desiccator is above the level of the sample in the Water Holding Mold. If the level of the distilled water in the vacuum desiccator is lower than the level of the sample in the Water Holding Mold, add distilled water by pouring it in with a beaker.



19) Pour distilled water into the top of the Water Holding Mold until there is 2cm of water on top of the sample by pouring from a beaker.

20) Check the O-ring to be sure it is securely in place.

21) Place the lid of vacuum desiccator on the bottom half of the desiccator checking to see that it seals.

22) Attach the hose from the vacuum pump to the vacuum desiccator lid.

23) Turn on the vacuum pump by pushing the white switch on the wall behind the table.

24) Start the stop watch. Allow the sample to saturate for **12 minutes**.

25) Stop the stopwatch after allotted saturation time. Turn off the vacuum and detach the hose from the vacuum desiccator lid.

26) Remove the Water Holding Mold from the vacuum desiccator. Do not spill any water that may be on top of the sample. Wipe off any water on the outside of the mold.

27) Start the stop watch as soon as the sample is removed from the water and place the stopwatch next to

the corresponding base on the **flow bench.** Place the Water Holding Mold in the corresponding base on the flow bench with the stopwatch.

28) Cover the Water Holding Mold with plastic wrap, secure with a rubber band and poke a hole in the top. Make sure to not break the surface of the sample.

29) After the stopwatch reads between 2 hours and 2 hours & 10 minutes, remove the rubber band and plastic wrap.

30) Wipe off any excess water on the outside of the Water Holding Mold and remove it from the base on the **flow bench**. Weigh the Water Holding mold with the sample. Record this weight as "Sample Mass" (weight of WHCDM & Sample after Draining).

31) Remove the sample from the Water Holding Mold by scooping it out with a spoon and place it in the oven for reuse.

32) Discard the filter paper. If any disintegration of filter paper occurs, write a note on the data sheet (date, sample ID, what was noticed, and initials of tester in the notes section).

33) Wash and dry the Water Holding Mold, pans, spoons and sieve (if used).

Revision No.	Date	Revision By	Description
1.0	Summer 2013	Molly Segee	Created and issued procedure
1.1	Fall 2013	Hannah Rubin	Updated Procedure
1.2	Feb/Jan 2014	Roberta Leavitt	Edited everything
1.3	24-2-14	Michaelle Lachance	Edited everything again
1.4	04-11-14	Hannah Rubin	Added Pictures
1.5	05-02-14	Hannah Rubin	Added pictures
1.6	05-14-14	H. Babbitt	Edited, re-arranged, added photos