Virginia Test Method – 51

Filtering Efficiency and Flow Rate of a Filter Fabric

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1. Scope

This method covers the procedure to be used in determining the filtering efficiency and flow rate of a commercial filter fabric.

2. Apparatus

a. A flume 48 inches long and 32 inches wide by 12 inches high with a gutter attached to one side. (See Figure 1).

b. Two 20 gallon containers.

c. A stirrer on a l/4 inch portable drill.

d. Stopwatch.

e. A DH-48 integrated water sampler with 500 ml bottles.

3. Procedure

a. Stretch a sample of the fabric 39 inches long by 12 inches wide across the flume opening 32 inches wide and fasten securely in place to assure that all the sediment-laden water passes through the sample. Note: The flume opening is the standard length of a straw bale.

b. Elevate the flume to an 8 percent slope.

c. Take a depth integrated suspended solids sample from an untreated, fairly sediment free water supply. Continuously agitate the supply for uniformity during the sampling process.

d. Pre-wet the fabric by passing 50 liters of untreated, fairly sediment free water through it.

e. Mix 150 grams of minus 10 material of a silty soil (See Gradation Curve, Figure 2) in 50 liters of the untreated water placed in one of the 20 gallon containers. Thoroughly agitate the solution with the stirrer on the l/4 inch portable drill to obtain a uniform mix.

f. After uniformly mixing the solution, quickly dump the solution behind the fabric sample in the flume. Start the timer at dumping.

g. Rinse the mixing container with 1 or 2 liters of the filtrate and dump into the flume.

h. Time the flow of water through the fabric until the water level drops to a point 10.5 inches behind the fabric. At this point the flow rate has essentially ceased.

i. Collect all filtrate in a second mixing container.

j. At the completion of the test, agitate the collected filtrate until the mixture is uniformly mixed. Obtain a depth integrated suspended solids sample from the mixture during agitation.

k. Process the two suspended solids samples by the "nonfilterable residue" procedure described in the 14th edition of Standard Methods for the Examination of Water and Wastewater (APHA, AWWA, WPCH).

l. Calculate the flow rate of the fabric as follows:

Flow rate (gal./sq. ft./min.) = 14.85/time (min.)

m. Calculate the filtering efficiency (F.E.) of the fabric as follows:

$$F.E. = \frac{(S.S.bg + 3000) - S.S.After}{(S.S.bg + 3000)} * 100$$

Where S.S.after and S.S.bg are the suspended solids value after filtration and the background level, respectively.

n. Repeat steps e through m for the same piece of fabric twice more.

o. Obtain two more fabric samples and repeat the entire procedure for each one.

p. Average the results of the nine tests.