WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
MATERIALS CONTROL, SOILS AND TESTING DIVISION

MATERIALS PROCEDURE

TEST METHODS FOR WOOD CELLULOSE FIBER MULCHES

1.0 PURPOSE

1.1 This procedure was developed to establish standard test methods to determine the moisture content, net dry weight (mass), water holding capacity, pH, and color of wood cellulose fiber mulch as packaged.

2.0 SCOPE

2.1 This procedure is applicable to all wood cellulose fiber mulches used for vegetation establishment.

3.0 APPARATUS AND EQUIPMENT

3.1 Scale capable of weighing 50kg accurately to the nearest 50 grams.

3.2 Scale capable of weighing accurately to the nearest 0.1 gram.

3.3 Oven capable of maintaining a temperature of 100 ± 2ºC.

3.4 Three 4-liter containers.

3.5 Three pieces of 75µm (No. 200) mesh of sufficient size to cover containers.

3.6 One 75µm (No. 200) standard 203.2mm (8 inch.) diameter sieve.

3.7 Aluminum foil to be used to cover sieve.

3.8 One 1-liter graduated glass beaker.

3.9 Pan of sufficient size and depth to partly submerge the 203.2mm (8 inch.) diameter sieve.

3.10 Demineralized water.

3.11 Sink and draft free area to drain sample.

3.12 One 250mL beaker.

3.13 One 100mL graduated cylinder.

3.14 Wooden tongue depressors

4.0 PROCEDURES

4.1 Moisture Content

4.1.1 Weigh the unopened container (bag) of mulch as received and record the weight. This weight will be used to determine the Net Dry Weight (4.2.2). The moisture content shall be reported as the average of three samples from a single mulch container (bag). One sample will be taken from the top, center, and bottom of the bag.

4.1.2 For each sample, loosely fill a 4 liter container of known weight with mulch to approximately 25mm (1") from the top.

4.1.3 Weigh each sample immediately and cover the containers with a piece of 75µm mesh to prevent loss of mulch from container while drying.

4.1.4 Dry all samples in the oven at 100 ± 2ºC until constant weight is achieved.

4.1.5 Cool the samples to room temperature, then remove the 75µm mesh from each sample and weigh containers and mulch.

4.1.6 The percent (%) moisture (as received) for each sample is determined by the following formula:

$$\% \text{ Moisture} = (A - B \,/\, B - C) \times 100$$

where: A = original weight of container and mulch (grams)
B = weight of container and dry mulch (grams)
C = weight of empty container (grams)

4.1.7 Final percent moisture is reported as the average of the three samples.

4.2 Net Dry Weight

4.2.2 The Net Dry Weight (NDW) of the packaged mulch is determined by the following formula:

$$NDW = X - [(X \cdot Y) / 100]$$

where: X = weight of packaged mulch as determined in Section 4.1.1.
Y = percent average moisture as determined in Section 4.1.7

4.2.3 Compare the calculated NDW with the net dry weight printed on the mulch container.

4.2.4 If the NDW is less than the net dry weight as recorded on the mulch container, the contractor shall supply extra material to make up the difference.

4.3 Water Holding Capacity

4.3.1 Determine the average percent moisture content in accordance with Section 4.1.

4.3.2 Obtain and weigh-out a quantity of "as received" mulch equivalent to 12.0 grams of oven-dry mulch. The weight of the "as received" mulch is determine by the following formula:

$$\text{"as received" weight} = 12.0 / [1 - (\%\ \text{Average moisture} / 100)]$$

4.3.3 Weigh "as received" mulch to the nearest 0.1 gram and place mulch in a 1-liter beaker. Add 800ml of demineralized water (room temperature) to the beaker. Stir until the mulch is thoroughly mixed with the water. Allow to stand for 30 minutes.

4.3.4 Thoroughly wet a clean 75µm (No. 200) 203.2mm (8 inch.) standard diameter sieve. Cover the top of the sieve with aluminum foil or other material to prevent evaporation. Prop (or lean) the sieve up against something at an angle of 30º to 45º and allow to "drain" for 10 minutes, after which remove the aluminum foil cover and wipe any excess water from the outside of the sieve and weigh immediately to the nearest 0.1 gram.

4.3.5 Place the sieve in a pan of sufficient depth to allow enough water to be added to cover mesh area. Pour the beaker contents onto the sieve. Use additional water to remove any mulch as necessary from the beaker. To the pan add water as needed to float the mulch inside of the sieve, being careful not to lose any mulch over the side of the sieve. Stir so the mulch will form a uniform mat over the mesh area upon removal from the pan. Carefully cover the sieve with aluminum foil to prevent evaporation and remove sieve from pan.

4.3.6 As before, prop or lean the sieve at an angle of 30º to 45º and allow to "drain" for 10 minutes. Remove cover and wipe any excess water from the outside of sieve and weigh immediately to the nearest 0.1 gram.

4.3.7 Obtain the weight of the wet mulch by subtracting the sieve weight (4.3.4) from the total weight (4.3.6).

4.3.8 Calculate the percent water holding capacity by using the following formula:

% Water Holding Capacity =

[(Weight of Wet Mulch - 12)／ Weight of Wet Mulch] x 100

4.4 Potential of Hydrogen (pH)

4.4.1 The pH of the mulch will be determined using a pH meter and electrode capable of determining pH to 0.1 units and having automatic temperature compensation.

4.4.2 For each sample, weigh 10 ± 0.1 grams of mulch into a 250mL beaker. Measure 100mL of demineralized water with the graduated cylinder and pour into beaker containing the mulch.

4.4.3 Using a wood tongue depressor, press the mulch into the water so that the mulch has absorbed the water.

4.4.4 Let set for approximately one hour.

4.4.5 Calibrate the pH meter as per the manufacturer's instructions, place the electrode into the wet mulch and record the pH after the reading has stabilized.

4.5 Color

4.5.1 The determination of mulch color will be by visual inspection only. The color will be recorded on the laboratory worksheet to the nearest primary or secondary color.

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