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AMERICAN SOCIETY FOR TESTING AND MATERIALS
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Standard Method for Moisture Analysis of Particulate Wood Fuels[1]

This standard is issued under the fixed designation E 871; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This method covers the determination of total weight basis moisture in the analysis sample of particulate wood fuel. The particulate wood fuel may be sanderdust, sawdust, pellets, green tree chips, hogged fuel, or other type particulate wood fuel having a maximum particle volume of 16.39 cm^3 (1 $in.^3$). It is used for calculating other analytical results to a dry basis. Moisture, when determined as herein described, may be used to indicate yields on processes, to provide the basis for purchasing and selling, or to establish burning characteristics.

1.2 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.3 *This standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*

D 346 Practice for Collection and Preparation of Coke Samples for Laboratory Analysis[2]

D 2013 Method of Preparing Coal Samples for Analysis[2]

3. Significance and Use

3.1 The test procedures described in this method can be used to determine the total weight basis moisture of any particulate wood fuel meeting the requirements specified in this method.

4. Summary of Method

4.1 Moisture is determined by establishing the loss in weight of the sample when heated under rigidly controlled conditions of temperature, time and atmosphere, sample weight, and equipment specifications.

5. Apparatus

5.1 *Drying Oven*—For determining the moisture of wood, an ordinary drying oven with openings for natural air circulation and capable of temperature regulation of 103 ± 1°C shall be used.

5.2 *Open Containers*, nonporous glass, metal, or ceramic and of a configuration so as to accommodate the test sample. The minimum volume shall be 32.18 cm^3 (2 $in.^3$).

5.3 *Desiccator*, of sufficient size to contain the open container.

6. Procedure

6.1 *Sampling*:

6.1.1 *Place of Sampling*—Take the sample where the wood is being loaded into or unloaded from means of transportation or when discharged from storage bins or conveyors.

NOTE 1—Samples collected from the surface of piles are, in general, unreliable because of the exposure to the environment. If necessary, collect nine increments from a foot or more below the surface at nine points covering the pile.

6.1.2 *Collection of Gross Sample*:

6.1.2.1 Collect increments regularly, systematically, and with such frequency that the entire quantity of wood sampled will be represented proportionally in the gross sample.

6.1.2.2 The quantity of the sample shall be large enough to be representative but not less than 10 kg (22 lb).

6.1.2.3 Place the samples in an airtight container immediately after collection. Maintain the samples in the airtight container whenever possible to prevent gains or losses in moisture from the atmosphere.

6.1.3 Sample reduction may be done by two methods, a coning and dividing process, or by using a riffle. The operations of mixing, coning, and quartering are described in Practice D 346.

6.1.3.1 Accomplish coning and dividing reduction by placing the gross sample on a sheet of rubber or oil cloth. Thoroughly mix it by raising first one corner of the cloth and then the other. After mixing cone and quarter sample, continue the operations until the sample is reduced sufficiently so that one quarter weighs about 50 g (0.11 lb). This shall constitute a laboratory sample.

6.1.3.2 Accomplish riffle reduction using a standard coal riffle. Riffle the gross sample repeatedly until one half of the riffle sample equals about 50 g (0.11 lb), which will constitute a laboratory sample. Riffles and procedures are described in Method D 2013.

6.2 Dry sample container for 30 min at 103 ± 1°C in the oven, then cool in desiccator to room temperature. Weigh to the

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[1] This method is under the jurisdiction of ASTM Committee E-48 on Biotechnology and is the direct responsibility of Subcommittee E48.05 on Biomass Conversion Systems.

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[2] *Annual Book of ASTM Standards*, Vol 05.05.

nearest 0.02 g and record as container weight, W_c. Place a minimum of 50 g of sample in the container, weigh the sample and container to the nearest 0.01 g, and record as initial weight, W_i.

6.3 Place the sample and container in the oven for 16 h at 103 ± 1°C.

6.4 Remove the sample and the container from the oven and cool in the desiccator to room temperature. Remove the sample and container from the desiccator, weigh immediately to the nearest 0.01 g, and record the weight.

6.5 Return the sample and container to the oven at 103± 1°C for 2 h. Repeat 6.4.

6.6 Continue 6.4 until the total weight change between weighings varies less than 0.2 % and record as the final weight, W_f.

7. Calculation

7.1 Calculate the percent moisture in the analysis sample as follows:

Moisture in analysis sample, %

$$= [(W_i - W_f)/(W_i - W_c)] \times 100 \quad (1)$$

where:

W_c = container weight, g,
W_i = initial weight, g, and
W_f = final weight, g.

8. Precision and Bias

8.1 The following criteria should be used for judging the acceptability of results:

8.1.1 *Repeatability*—Duplicate results by the same laboratory should not be considered suspect unless they differ by more than 0.5 %.

8.1.2 *Reproducibility*—The results submitted by two or more laboratories should not be considered suspect unless they differ by more than 1 %.