

Laboratory Protocol for Dry Matter Assessment

Introduction

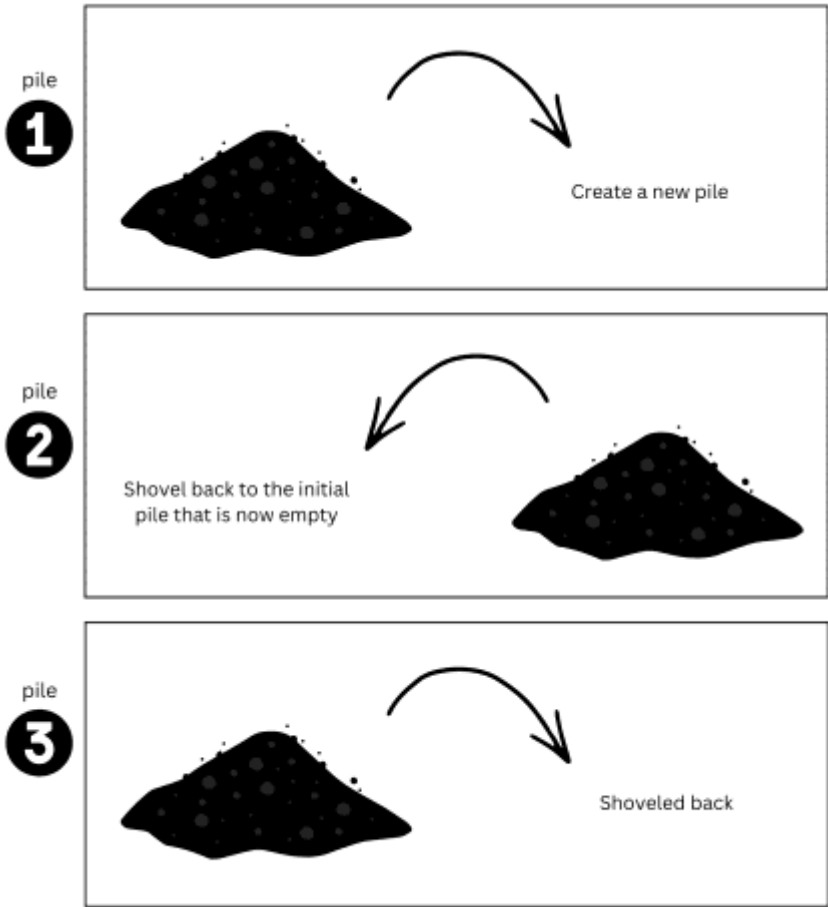
This laboratory protocol of Dry Matter Assessment – Bulk Density provides guidance for local laboratories conducting bulk density analysis under the Global Artisan C-Sink Standard.

The analysis should be conducted in accordance with DIN EN ISO 17828, ASTM D291/D291M-20, or the alternative protocol described below. Laboratories must ensure that all measurements are performed carefully, documented transparently, and reported in a way that allows the results to be verified.

The protocol covers two options of instruments used: thermogravimetric moisture analyzer or drying oven. These analyses are used to support accurate determination of biochar dry matter content and to ensure consistency in reporting across different project locations and laboratories.

Tools and Materials

- Biochar sample
- Tarp and shovel
- Mortar and pestle
- Ziplock bag
- Thermogravimetric moisture analyzer or Drying oven
- Notebook

Step	Description
1.1.	Sample delivery Client must send three samples of 30L biochar (3 x 30L) to the laboratory. Three samples must be evaluated individually. Volume may have altered due to transport. However, 30L shall be used as reference volume.
1.2	Fresh weight measurement The fresh weight of the bag (containing 30L biochar) must be recorded immediately before the dry matter analysis.
1.3	Homogenization of biochar After weighing, the bag is opened and the biochar is emptied onto a tarp. The material is then thoroughly homogenized by shovelling it from one pile to another three times.  The diagram illustrates the homogenization process in three steps: Step 1: A pile of biochar is shown. An arrow points from it to a new pile, labeled "Create a new pile". Step 2: A pile of biochar is shown. An arrow points from it back to the initial pile, labeled "Shovel back to the initial pile that is now empty". Step 3: A pile of biochar is shown. An arrow points from it back to itself, labeled "Shoveled back".
1.4	Sampling From the homogenized pile, one subsample of 250 ml is taken from random locations across the pile. Use at least 10 spots of the pile to collect the subsample. Either proceed directly to the next step or store and label the subsample in a double-layered zip-lock bag.
1.5	Sample preparation The 250 ml sample is milled using a mortar and pestle. From the milled sample, an approximately 10 g sub-sample is collected. 1.5.1 Thermogravimetric moisture analyzer

	immediately transfer the 10g sub-sample into the thermogravimetric moisture analyzer. 1.5.2 Drying oven If a drying oven is used, weighed on a high precision scale (precision 1 mg) and placed in the pre-heated drying oven (105 °C). Steps 1.2 to 1.5 must be carried out in the shade and protected from wind and completed within 30 minutes of the fresh weight measurement to avoid moisture loss. If preparation exceeds this period, the 250 ml subsample must be stored in a double-layered zip-lock bag until analysis.
1.6	Drying and measurement 1.6.1. Thermogravimetric moisture analyzer Utilizing the thermogravimetric moisture analyzer the sub-sample is dried at 105 °C, a weight loss of less than 20 mg within 60s is selected as stop-criteria. The resulting moisture content and dry matter values are recorded. 1.6.2. Drying oven For the drying oven, the sample is dried for 24h at 105 °C and weighed on a high precision scale (precision 1 mg) immediately afterwards.

Reporting

- As part of the verification process, laboratories are required to write on the laboratory report the results of:
 - What kind of protocol is used in the measurement.
 - Step 1.2: Fresh weight measurement (kg) from three different 30L samples.
 - Step 1.6: Moisture content (%) from three different samples.
 - Optional: Dry bulk density of the 3 samples in relation to the 30L original volume.

For any questions or clarifications regarding this protocol, please contact Carbon Standards International at service@carbon-standards.com.