TÜBİTAK
ULUSAL METROLOJİ ENSTİTÜSÜ

Certificate of the Reference Material

Name of the Material : Wood Pellet

Material Code : UME BIOFMET CRM 03

Issue Date : 27.12.2024

Revision Date : 27.12.2024 (Revision history can be found on the last page)

Validity Period of the Certificate : 12 months from the sales date

Certified Values :

Parameter	Certified Value [1]	Uncertainty [2]	Unit
Gross Calorific Value [$q_{V,gr,d}$] [3]	20793	140	J/g
Moisture [4]	8.46	0.24	g/100 g

[1] The certified values and uncertainties are traceable to the International System of Units (SI).

[2] The expanded uncertainty of the certified value includes characterization, homogeneity, stability components and is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95 %. The standard uncertainty of measurement has been determined in accordance with GUM "Guide to the Expression of Uncertainty in Measurement".

[3] Calculated from the arithmetic mean of the accepted results of the gross calorific value at constant volume of the dry fuel submitted by four laboratories applying ISO EN 18125 method.

[4] Calculated from the arithmetic mean of the accepted results submitted by two laboratories applying modified ISO 18134-3 method (3 gram pellet samples were used as received in pellet form without reducing the top size to below 1 mm).

Sales Date

Assoc. Prof. Mustafa ÇETİNTAŞ
Acting Director

TÜBİTAK Gebze Yerleşkesi PK 54 41470 Gebze-Kocaeli /TÜRKİYE T +90 262 679 50 00 F +90 262 679 50 01 www.ume.tubitak.gov.tr

Informative Values

Parameter	Assigned Value	Uncertainty [1]	Unit
Net Calorific Value [$q_{V,net,m}$] [2]	17815	120	J/g

[1] The expanded uncertainty of the assigned value includes characterization, homogeneity, stability components and is stated as the standard uncertainty of measurement multiplied by the coverage factor *k = 2*, which for a normal distribution corresponds to a coverage probability of approximately 95 %. The standard uncertainty of measurement has been determined in accordance with GUM "Guide to the Expression of Uncertainty in Measurement".

[2] Calculated for as received moisture from the certified gross calorific value at constant volume of dry fuel using the following equation: qV,net,m = [qV,gr,d – 206 x hydrogen content of moisture free biofuel, in percentage by mass] x (1– 0.01 x moisture, in percentage by mass) – (23.0 x moisture, in percentage by mass) as described in ISO 18125.

Element	Measured Value [1]	SD [2]	Unit
C	50.79	0.34	g/100g
H	5.43	0.20	g/100g
N	0.209	0.022	g/100g

[1] Arithmetic mean of the accepted analysis results (n = 12) by one laboratory applying ISO 16948 method.

[2] Standard deviation of the 12 measurement results.

Description

The material is approximately 100 g of wood pellet in amber glass bottle. Detailed information about the preparation of the material can be found in the certification report.

Intended Use

This material is intended to be used for method validation of the determination of calorific value and moisture in wood products and for quality control purposes.

Instructions for Use

In order to prevent contamination, it is recommended that the bottle should be opened in a clean environment. After use, the bottle should be tightly recapped immediately.

The minimum sample intake is defined by the required sample mass stipulated in the respective standard methods. Homogeneity of the material for moisture was tested on 3 g sub-samples directly in the form of pellet, without further size reduction, therefore minimum sample intake amount is 3 g for the moisture measurements.

It should be noted that the moisture content of the materials can decrease or increase after several use depending on the relative humidity (RH) of the laboratory. For moisture analysis, it is recommended to open the cap of the bottle under (50 ± 5) %rh condition and/or close the cap as quick as possible to minimize moisture change.

This material can be safely dispatched under conditions where the temperature does not exceed 45 °C for up to two weeks, i.e. at ambient temperature without applying any cooling elements.

Storage Conditions

The material should be stored at (22 ± 4) °C in a dark and clean environment. TÜBİTAK UME cannot be held responsible for changes that might happen to the material at the customer's premises due to non-compliance with the instructions for use, and the storage conditions given.

Safety Information

For laboratory use only. The usual laboratory safety measures apply as in the case of similar pellet materials. It is strongly recommended that the material must be handled and disposed according to the safety guidelines where applicable. No special precaution is necessary to work with the wood pellet material.

Participants

Information about the laboratories participated in the characterization study is presented in the following table.

Laboratory	Address
BRML-INM	BRML-INM, National Metrology Institute, Bucharest, ROMANIA
DTI	Danish Technological Institute, Aarhus, DENMARK
PTB	Physikalisch Technische Bundesanstalt, Braunschweig, GERMANY
TÜBİTAK UME	National Metrology Institute, Gebze - Kocaeli, TÜRKİYE

Methods and/or Techniques Used for the Determination of the Certified Values

Techniques used in the characterisation studies:

Method/Technique	Parameter
ISO EN 18125 / Isoperibol Calorimetry	Calorific Value
ISO 18134-3 (Modified) / Oven Drying based on gravimetry	Moisture

Revision History

Date	Remarks
27.12.2024	First issue.