

Laboratory for testing of solid biofuels and compost



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Certificate of Accreditation, Reg. No. 192 LI / 08.01.2024 valid until 08.01.2028, issued by EA BAS, in accordance with the requirements of standard BDS EN ISO/IEC 17025:2018

TEST REPORT

№ 2234 / 13.02.2024

CUSTOMER /customer's name and information/

ENAMA SERVIZI SRL
00159 Roma - Italia, Via Venafro 5
Alessandra Truffini

Ledro Energie

/name of the certified company / ENplus® ID number /

SOLID BIOFUELS - WOOD PELLETS

/sample name - type /

2234 / 05.02.2024

/number of the request/

5.2.2024

/sample receiving day in the laboratory/

2234, wood pellets, 1 pcs., plastic bag, 10 kg, PT012N-A1

/sample number, type, identification, pcs, quantity, other information about sample/

SAMPLING CERTIFICATE for ENplus® certification, from 25.01.2024

/number and date of sampling report and sampling plan/

TEST METHODS

ISO 17829:2015
ISO 18134-2:2015
ISO 18122:2023
ISO 17831-1:2015
ISO 18846:2016
ISO 18125:2017

ISO 17828:2015
ISO 16948:2015
ISO 16994:2016
EN ISO 21404:2020
ISO 16968:2015
ISO 18847:2017

05.02 - 12.02.2024

/sample test performing period/

Laboratory for testing of solid biofuels and compost

/location of the test/

HEAD OF LABORATORY:



/Ani Ivancheva/

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TEST RESULTS

Sample number, type, identification: 2234, wood pellets, PT012N-A1

№	PARAMETER	UNIT	TEST STANDARD	TEST RESULTS	LIMITS ¹⁾			TEST CONDITION
					ENplus® A1	ENplus® A2	ENplus® B	
1	2	3	4	5	6			7
1	Diameter	mm	ISO 17829:2015	6,05 ± 0,02	6 ± 1 or 8 ± 1			T 22,2 °C RH 42 % ²⁾
2	Length	mm	ISO 17829:2015	13,55 < L ≤ 27,89	3,15 < L ≤ 40 ⁷⁾			
2	Length 40 mm > X < 45 mm	w-%	ISO 17829:2015	< 0,5				
3	Share of pellets with a length <10mm	w-% ⁵⁾	ISO 17829:2015	2,8 ± 0,1	-			
4	Moisture	w-% ⁵⁾	ISO 18134-2:2015	7,55 ± 0,04	≤ 10			T 105 °C ³⁾
5	Ash content	w-% ⁶⁾	ISO 18122:2023	0,60 ± 0,09	≤ 0,7	≤ 1,2	≤ 2	T 550 °C ³⁾
6	Mechanical durability	w-% ⁵⁾	ISO 17831-1:2015	98,8 ± 0,4	≥ 98,0 ⁸⁾	≥ 97,5 ⁸⁾		T 22,2 °C
7	Bulk density	kg/m ³ ^{6,5)}	ISO 17828:2015	706 ± 1	600 ≤ BD ≤ 750			RH 42 % ²⁾
8	Particle density	g/m ⁵⁾	ISO 18847:2017	1,2 ± 0,1	-			T 22,2 °C RH 42 % ²⁾
9	Coarse fines (3,15 mm≤ FR ≤ 5,6mm)	w-% ⁵⁾	ISO 18846:2016	2,7 ± 0,2	-			
10	Fines (<3,15 mm)	w-% ⁵⁾	ISO 18846:2016	0,045 ± 0,001	≤ 1,0 ⁹⁾ (≤ 0,5 ¹⁰⁾)			
11	Net calorific value	kWh/kg ⁵⁾	ISO 18125:2017	4,846 ± 0,004	≥ 4,6 ¹¹⁾			T 22,1 °C RH 43 % ²⁾
12	Gross calorific value	kWh/kg	ISO 18125:2017	5,24 ± 0,01				
13	Additives	%		0	≤ 2 ¹²⁾			
14	Nitrogen	w-% ⁶⁾	ISO 16948:2015	0,2103 ± 0,0004	≤ 0,3	≤ 0,5	≤ 1,0	T 960 °C ³⁾
15	Sulfur	w-% ⁶⁾	ISO 16994:2016	0,00244 ± 0,00004	≤ 0,04	≤ 0,05		T 22,1 °C RH 43 %***
16	Chlorine	w-% ⁶⁾	ISO 16994:2016	0,00119 ± 0,00001	≤ 0,02		≤ 0,03	
17	Ash deformation Temperature ⁴⁾	°C	EN ISO 21404:2020	1325 ± 5	≥ 1200	≥ 1100		T 22,3°C RH 44 %***
18	Arsenic	mg/kg ⁶⁾	ISO 16968:2015	< 0,5 ¹³⁾	≤ 1			
19	Cadmium	mg/kg ⁶⁾	ISO 16968:2015	< 0,1 ¹³⁾	≤ 0,5			
20	Chromium	mg/kg ⁶⁾	ISO 16968:2015	1,08 ± 0,02	≤ 10			
21	Copper	mg/kg ⁶⁾	ISO 16968:2015	1,35 ± 0,04	≤ 10			
22	Lead	mg/kg ⁶⁾	ISO 16968:2015	< 1,7 ¹³⁾	≤ 10			
23	Mercury	mg/kg ⁶⁾	ISO 16968:2015	< 0,05 ¹³⁾	≤ 0,1			
24	Nikel	mg/kg ⁶⁾	ISO 16968:2015	1,18 ± 0,02	≤ 10			
25	Zinc	mg/kg ⁶⁾	ISO 16968:2015	11,9 ± 0,1	≤ 100			

Notes:

The test report or extracts from the test report may not be reproduced without written consent of the testing laboratory.

The laboratory is not responsible for the data and information provided by the customer, which may affect the validity of the results.

The sample is supplied by the customer and the Laboratory is not responsible for the activities performed by the customer.

1) The information in column 6 correspond to the requirements of ENplus® Handbook, Part 3 - Pellet Quality Requirements (Version 3.0, August 2015)

2) Test conditions (temperature and relative humidity) in the laboratory

3) Test conditions according to the requirements of the used standards

4) ash is produced at 815 °C

5) as received

6) dry basis

7) a maximum of 1% of the pellets may be longer than 40mm, no pellets longer than 45mm are allowed.

8) at the loading point of the transport unit (truck, vessel) at the production site

9) at factory gate when loading truck for deliveries to end-users (Part Load Delivery and Full Load Delivery)

10) at factory gate, when filling pellet bags or sealed Big Bags.

11) equal ≥ 16,5 MJ/kg as received

12) the amount of additives in production shall be limited to 1,8 w-%, the amount of post-production additives (e.g. coating oils) shall be limited to 0,2 w-% of the pellets.

13) The limit is determined by the scope of the method. The limit of quantification method LOQ is determined experimentally by repeated analysis of the blank and calculation the standard deviation SDblank. LOQ = 10 * SDblank * dilution factor

RESPONSIBLE FOR THE TESTS:

/D. Nachev/

/N. Banyaleva/

HEAD OF LABORATORY:

/Ani Ivancheva/