

TEST REPORT

BEA2023133

Date of report: 2023-05-30

page 1 of 2

Client: WARMESTON OÜ

Address: Magasini 3-4, 51006 Tartu, ESTONIA

Order: Fuel testing according DINplus certification Scheme for wood pellets (Version 11/2021)

Order date: 2023-04-14

Receipt of samples: 2023-04-28

Samples: Wood pellets production plant Järvere



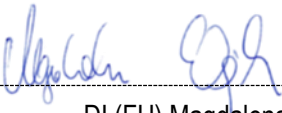

Testing period: 2023-04-28 – 2023-05-26

Sample details: 15kg pellets in plastic bag class A1 marked with the internal sample no. BEA2023133-1

parameter DINplus	limit values A1	result class A1	unit
diameter	6 ± 1, 8 ± 1	6,1	mm (ar)
length (3,15 ≤ L ≤ 40 mm)	(3,15 ≤ L ≤ 40)	10,1 ± 3,9	mm (ar)
length (40 ≤ L ≤ 45 mm)	≤ 1	0,0	%in mass (ar)
length (> 45 mm)	0	0	piece(s)
share of pellets with a length < 10mm	-	39,4	%in mass (ar)
moisture content	≤ 10,0	7,3	%in mass (ar)
ash content	≤ 0,6	0,30	%in mass (db)
mechanical durability	≥ 98,0	99,4	%in mass (ar)
bulk density	600 ≤ BD ≤ 750	680	kg/m ³ (ar)
finer content (< 3,15 mm), bulk	≤ 1	-	%in mass (ar)
finer content (< 3,15 mm), bags	≤ 0,5	0,0	%in mass (ar)
net calorific value q _{P,net}	≥ 16,5	17,3	MJ/kg (ar)
net calorific value q _{P,net}	≥ 4,6	4,81	kWh/kg (ar)
net calorific value q _{P,net}	-	18,9	MJ/kg (db)
net calorific value q _{P,net}	-	5,24	kWh/kg (db)
gross calorific value q _{V,gr}	-	18,8	MJ/kg (ar)
gross calorific value q _{V,gr}	-	5,23	kWh/kg (ar)
nitrogen content	≤ 0,3	0,10	%in mass (db)
sulphur content	≤ 0,04	0,006	%in mass (db)
chlorine content	≤ 0,02	<0,005	%in mass (db)
arsenic	≤ 1	<0,5	mg/kg (db)
cadmium	≤ 0,5	<0,1	mg/kg (db)
chromium	≤ 10	<1	mg/kg (db)
copper	≤ 10	<1	mg/kg (db)
lead	≤ 10	<0,5	mg/kg (db)
mercury	≤ 0,1	<0,075	mg/kg (db)
nickel	≤ 10	<1	mg/kg (db)
zinc	≤ 100	8,0	mg/kg (db)
shrinking temperature SST	-	1110	°C
deformation temperature DT	≥ 1200	1400	°C
hemisphere temperature HT	-	>1550	°C
flow temperature FT	-	>1550	°C

db... dry basis, ar... as received

The test results apply only to the samples investigated. As a rule, they are not the only criteria for assessing the raw material or product in question and its suitability for a specific purpose of application. Test Reports may only be made available to third parties, either free of charge or against payment, if the full wording is given and if the author is expressly named. Unless otherwise indicated, at client's request neither the measurement uncertainty was stated, nor were decision rules agreed. The General Terms and Conditions of BEA Institut für Bioenergie GmbH shall apply as amended.

		<p>director in charge</p>  <p>DI (FH) Magdalena Wojcik</p>	
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BEA Institut für Bioenergie GMBH - Accr. inspection body acc. to EN ISO/IEC 17020 | Accr. testing laboratory acc. to EN ISO/IEC 17025

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testing methods



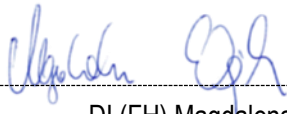

standard

sample preparation	ISO 14780:2020
diameter and length	ISO 17829:2015
moisture content	ISO 18134-2:2017
ash content	ISO 18122:2015, performed with proximate analyzer
mechanical durability	ISO 17831-1:2015
finer content < 3,15 mm	ISO 18846:2016
net calorific value /gross calorific value	ISO 18125:2017
bulk density	ISO 17828:2015
carbon, hydrogen, nitrogen content	ISO 16948:2015
chlorine, sulphur content	ISO 16994:2016, quantification according to ISO 10304-1:2007
minor elements	ISO 16968:2015, quantification according to ISO 17294-2:2016
ash melting behaviour	ISO 21404:2020, ash preparation at 815°C, oxidizing atmosphere

remarks

none

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