

TEST REPORT

BEA2023269a

Date of report: 2023-08-28

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Client: Ten Damme B.V.

Address: Bolwerk 9, 7141 JM GROENLO, The Netherlands

Order: Fuel testing according ENplus® certification program of wood pellets ENplus® ST.1001:2022

Order date: 2023-07-14

Receipt of samples: 2023-07-21; 2023-08-21

Sample(s): Wood pellets




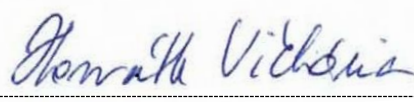
Testing period: 2023-07-21 – 2023-08-25

Sample details: approx. 15 kg wood pellets in plastic bag; internal sample no.: BEA2023269

parameter ENplus®	limit values A1	limit values A2	result	unit
diameter	6 ± 1, 8 ± 1	6 ± 1, 8 ± 1	6,0	mm (ar)
length (3,15 ≤ L ≤ 40 mm)	(3,15 ≤ L ≤ 40)	(3,15 ≤ L ≤ 40)	13,6 ± 4,3	mm (ar)
length (40 ≤ L ≤ 45 mm)	≤ 1	≤ 1	0,0	% in mass (ar)
length (> 45 mm)	0	0	0	piece(s)
share of pellets with a length < 10mm	-	-	10,1	% in mass (ar)
category L < 20%, 20% ≤ M ≤ 30%, S > 30%	-	-	L	-
amount of pellets for length determination	≥ 100	≥ 100	1 340	piece(s)
moisture content	≤ 10,0	≤ 10,0	6,2	% in mass (ar)
ash content*	≤ 0,70	≤ 1,20	0,34	% in mass (db)
mechanical durability	≥ 98,0	≥ 97,5	98,7	% in mass (ar)
bulk density	600 ≤ BD ≤ 750	600 ≤ BD ≤ 750	720	kg/m ³ (ar)
particle density	-	-	1,33	g/cm ³ (ar)
coarse fines (3,15 ≤ CPF < 5,6 mm)	-	-	0,4	% in mass
fines content (< 3,15 mm), bulk	≤ 1	≤ 1	-	% in mass (ar)
fines content (< 3,15 mm), bags	≤ 0,5	≤ 0,5	0,2	% in mass (ar)
net calorific value q _{P,net}	≥ 16,5	≥ 16,5	17,2	MJ/kg (ar)
net calorific value q _{P,net}	≥ 4,6	≥ 4,6	4,77	kWh/kg (ar)
net calorific value q _{P,net}	-	-	18,5	MJ/kg (db)
net calorific value q _{P,net}	-	-	5,13	kWh/kg (db)
gross calorific value q _{V,gr}	-	-	18,6	MJ/kg (ar)
gross calorific value q _{V,gr}	-	-	5,18	kWh/kg (ar)
nitrogen content	≤ 0,3	≤ 0,5	0,12	% in mass (db)
sulphur content	≤ 0,04	≤ 0,04	0,006	% in mass (db)
chlorine content	≤ 0,02	≤ 0,02	<0,005	% in mass (db)
arsenic	≤ 1	≤ 1	< 0,5	mg/kg (db)
cadmium	≤ 0,5	≤ 0,5	0,18	mg/kg (db)
chromium	≤ 10	≤ 10	< 1	mg/kg (db)
copper	≤ 10	≤ 10	2,0	mg/kg (db)
lead	≤ 10	≤ 10	5,0	mg/kg (db)
mercury	≤ 0,1	≤ 0,1	< 0,075	mg/kg (db)
nickel	≤ 10	≤ 10	< 1	mg/kg (db)
zinc	≤ 100	≤ 100	14	mg/kg (db)
shrinking temperature SST	-	-	1150	°C
deformation temperature DT	≥ 1200	≥ 1100	1310	°C
hemisphere temperature HT	-	-	1480	°C
flow temperature FT	-	-	1510	°C

db... dry basis, ar... as received *... measured on the re-sample arrived on 2023-08-21

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.

 	director in charge	
	 Dr. Viktoria Horvath	



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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 18122:2022, 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
coarse pellets fines 3,15 < CPF < 5,6 mm	ISO 18846:2016: / ISO 5370:2023 non accredited method
particle density	ISO 18847:2017

remarks

none

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