

Test Report No.: **308.866**Date: **2007-07-31**

Analysis of specified fuel parameters of wood pellets

Client: Ebaki xxi, S.A.-Ebepellets
Att. Mr. David Diez Lopez
B° UGARTE, s/n
48392 MUXIKA
Bizkaia, SPAIN

Test item(s): 1 sample wood pellets

Task: Determination of fuel parameter of pellets

Order: Order of 2007-07-16

Date of sampling: —

Location of sampling: No samples taken by **ofi** staff
Samples provided by **ofi's** client

Receipt of samples: 2007-07-16

Ref: Dr. Eng / Woj

1 SCOPE OF WORK

According to the order, the following specified fuel parameters were to be determined for the biomass samples delivered by the client:

- moisture content
- ash content
- calorific value
- chlorine and sulphur content
- nitrogen content
- chromium content

2 SCOPE OF APPLICATION

The results given in this test report have been obtained under the specific conditions of the individual tests. As a rule they are not the only criteria for assessing the product in question and its suitability for a specific purpose of application.

3 SAMPLE MATERIAL

Our client submitted the following samples for the purpose of testing:

- **Pellets**, one box with approximately 2 kg, internal sample number 308.866/1

Other documents submitted by our client:

No (other) documents were submitted.

4 SAMPLE PREPARATION

No specified sample preparation needed.

5 TESTS

Testing took place in July 2007. The tests were carried out in the individual technical departments within the scope of competence of the authorised signatories according to the *ofi* QM manual. The tests were carried out in cooperation with ARC Seibersdorf Research GmbH.

5.1 Testmethods

Parameter	Operating procedure	Test conditions	Test apparatus (<i>ofi</i> – equipment #)
Moisture content(*)	CEN TS 14772-2	drying temperature: 105°C	Analytical balance, # 2200 Drying oven, # 2186
Ash content (*)	CEN TS 14775	ashing temperature: 815°C	Analytical balance, # 2200 Muffle furnace, # 2187
Calorific value (*)	CEN TS 14918 (equal to DIN 51900)		Analytical balance, # 2200 Bomb calorimeter IKA C 5000, # 1715
Nitrogen content	CEN/TS 15104		Apparatus: Büchi 430, Büchi 323 distillation unit
Sulphur- and Chlorine content (*)	CEN TS 15289; quantification: Ion chromatography ÖNORM EN ISO 10304		Bomb: IKA C 5000, # 1715; ion chromatography (DIONEX DX-320), # 1780
Chromium content	CEN/TS 15297 and/or AA-G. 1/27 Ver.2.0		ICP Perkin Elmer Elan 5000A

(*) accredited method

6 RESULTS

The results of the analysis are compiled in table 1.

Table 1: Results for the determination of fuel parameter

		Pellets	demands according to ÖNORM M 7135	demands according to Dinplus
sample number		308.866-1	-	-
moisture content	[%]	6,15	≤ 10	≤ 10
ash content (db)	[%]	0,28	≤ 0,5	≤ 0,5
mechanical durability	[%]	98,71	≥ 97,7 ¹	≥ 97,7 ¹
density	[kg/dm ³]	1,26	≥ 1,12 ²	≥ 1,12 ²
length	[mm]	21,32	≤ 5*D ³	≤ 5*D ³
diameter	[mm]	6,06	4 ≤ D < 10	4 ≤ D < 10
net calorific value (db)	[MJ/kg]	18,73	≥ 18,0	≥ 18,0
net calorific value (ar)	[MJ/kg]	17,43	-	-
Nitrogen content (db)	[%]	0,06	≤ 0,30	≤ 0,30
Sulphur content (db)	[%]	0,007	≤ 0,04	≤ 0,04
Chlorine content (db)	[%]	0,002	≤ 0,02	≤ 0,02
Chromium content (db)	[mg/kg]	1,1	-	≤ 8

1 Due to the uncertainty of measurement a deviation of the mean value of up to 0,02 kg/dm³ are accepted

2 Due to the uncertainty of measurement a deviation of the mean value of up to 0,2 % are accepted

3 A maximum of 20% w/w of the pellets may have 7,5 * D

This test report no. **308.866**

comprises 5 sheets with 1 table(s), 0 figure(s), 0 appendix(es).

Testing staff

Director in charge
Department Eco-Engineering

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Dipl. Ing. (FH) Magdalena Wojcik

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Dipl.-Ing. Dr. Martin Englisch