

Eurofins Umwelt Ost GmbH - Lindenstraße 11
Gewerbegebiet Freiberg Ost - D-09627 - Bobritzsch-Hilbersdorf

ENAMA Servizi S.r.l.
Via Venafro 5
00159 Roma
ITALY

Title : **Test report for order 11940504**
Test report number : **AR-20-FR-000704-01**

Project name : **wood pellets, PB27RA**

Number of samples : **1**
Sample type : **wood pellets**
Date of sample taking : **2019-12-04**
Sample Taker: **Client**
Sampling Area: **Lorenzetti Energy Fabricacao de Pellets LTDA**

Sample reception date : **2019-12-16**
Sample processing time : **2019-12-16 - 2020-01-08**

The test results refer solely to the analysed test specimen. Unless the sampling was done by our laboratory or in our sub-order the responsibility for the correctness of the sampling is disclaimed. This test report is only valid with signature and may only be further published completely and unchanged. Extracts or changes require the authorisation of the EUROFINS UMWELT in each individual case.

Our General Terms & Conditions of Sale (GTCS) are applicable, as far as no specific agreements do exist. The GTCS are available on <http://www.eurofins.de/umwelt/avb.aspx>.

Accredited test laboratory according to DIN EN ISO/IEC 17025:2005 notification under the DAkkS German Accreditation System for Testing. The laboratory is according (D-PL-14081-01-00) accredited.

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Digitally signed 1/8/2020
Dr. Ulrich Erler
Prüfleitung



Parameter	Lab	Accr.	Method	Limit values						Description		PB27RA	
				ENplus A1 ar	ENplus A1 db	ENplus A2 ar	ENplus A2 db	ENplus B ar	ENplus B db	Date and time of sample taking	Sample number	ar	db
										LOQ	Unit		
Quality characteristics													
Length	FR	JE02	DIN EN ISO 17829: 2016-03	1)		1)		1)				o.k.	-
Diameter	FR	JE02	DIN EN ISO 17829: 2016-03	2)		2)		2)			mm	6.2	-
Moisture	FR	JE02	DIN EN ISO 18134-2: 2017-05	10		10		10		0.1	% (w/w)	7.9	-
Ash content (550°C)	FR	JE02	DIN EN ISO 18122: 2016-03		0.7		1.2		2	0.1	% (w/w)	0.4	0.4
Durability	FR	JE02	DIN EN ISO 17831-1: 2016-05	≥ 98		≥ 97.5		≥ 97.5			% (w/w)	99.4	-
Fine portion < 3,15 mm	FR	JE02	DIN EN ISO 18846: 2016-12	1 ³⁾		1 ³⁾		1 ³⁾		0.1	% (w/w)	0.1	-
Bulk density	FR	JE02	DIN EN ISO 17828: 2016-05	600 - 750		600 - 750		600 - 750			kg/m ³	659	-
Gross calorific value (qV,gr)	FR	JE02	DIN EN ISO 18125: 2017-08							200	kJ/kg	19000	20700
Net calorific value (qp,net)	FR	JE02	berechnet nach DIN EN ISO 18125: 2017-08	≥ 4.6 ⁴⁾		≥ 4.6 ⁴⁾		≥ 4.6 ⁴⁾		0.06	kWh/kg	4.90	5.37
Carbon	FR	JE02	DIN EN ISO 16948: 2015-09							0.2	% (w/w)	47.2	51.2
Nitrogen	FR	JE02	DIN EN ISO 16948: 2015-09		0.3		0.5		1	0.05	% (w/w)	0.14	0.15
Hydrogen	FR	JE02	DIN EN ISO 16948: 2015-09							0.1	% (w/w)	5.6	6.0
Oxygen	FR	JE02	DIN EN ISO 16993: 2016-11								% (w/w)	38.9	42.2
Sulphur	FR	JE02	DIN EN ISO 16994: 2016-12		0.04		0.05		0.05	0.005	% (w/w)	0.008	0.009
Chlorine	FR	JE02	DIN EN ISO 16994: 2016-12		0.02		0.02		0.03	0.005	% (w/w)	< 0.005	< 0.005

Parameter	Lab	Accr.	Method	Limit values						Description		PB27RA	
				ENplus A1 ar	ENplus A1 db	ENplus A2 ar	ENplus A2 db	ENplus B ar	ENplus B db	Date and time of sample taking	Sample number	ar	db
										LOQ	Unit	119162634	

Trace elements acc. to DIN EN ISO 16968: 2015-09

Arsenic (As)	FR	JE02	DIN EN ISO 17294-2: 2017-01		1		1		1	0.8	mg/kg	-	< 0.8
Lead (Pb)	FR	JE02	DIN EN ISO 17294-2: 2017-01		10		10		10	2	mg/kg	-	< 2
Cadmium (Cd)	FR	JE02	DIN EN ISO 17294-2: 2017-01		0.5		0.5		0.5	0.2	mg/kg	-	< 0.2
Chromium (Cr)	FR	JE02	DIN EN ISO 17294-2: 2017-01		10		10		10	1	mg/kg	-	< 1
Copper (Cu)	FR	JE02	DIN EN ISO 17294-2: 2017-01		10		10		10	1	mg/kg	-	< 1
Nickel (Ni)	FR	JE02	DIN EN ISO 17294-2: 2017-01		10		10		10	1	mg/kg	-	< 1
Mercury (Hg)	FR	JE02	DIN EN ISO 12846: 2012-08		0.1		0.1		0.1	0.05	mg/kg	-	< 0.05
Zinc (Zn)	FR	JE02	DIN EN ISO 17294-2: 2017-01		100		100		100	1	mg/kg	-	8

Ash melting behaviour (ox. atmo.) 815°C

Shrinkage start temp SST	FR	JE02	CEN/TS 15370-1: 2006-12		5)		5)		5)		°C	-	960
Deformation temp DT	FR	JE02	CEN/TS 15370-1: 2006-12		≥ 1200		≥ 1100		≥ 1100		°C	-	1380&
Hemisphere temp HT	FR	JE02	CEN/TS 15370-1: 2006-12		5)		5)		5)		°C	-	1450*
Flow temp FT	FR	JE02	CEN/TS 15370-1: 2006-12		5)		5)		5)		°C	-	1480

Explanations

LOQ - Limit of quantification

ar - as received

db - dry basis

Lab - Abbreviation of the performing laboratory

Accr. - Abbreviation of the accreditation of the performing laboratory

& - overlaid by strong volume magnification

* - no definite hemisphere (hill-like form)

The parameters identified by FR have been performed by the laboratory Eurofins Umwelt Ost GmbH (Bobritzsch-Hilbersdorf). The accreditation code JE02 identifies the parameters accredited according to DIN EN ISO/IEC 17025:2005 D-PL-14081-01-00 .

Explanations regarding Limits

Analysis performed according to EN plus (wood pellets) - edition August 2015.

- 1) 3,15 - 40 mm; up to 1 % of pellets can be longer than 40mm. Maximum length should be <45mm.
- 2) D06 or D08 pellets +/- 1mm
- 3) at the end of production or by loading vehicles for delivery to the customer ($\leq 0,5$ for filling in pellet bags or big bags)
- 4) qp,net: net calorific value at constant pressure
- 5) should be given

EUROFINS UMWELT assumes no responsibility for the legal liability of the cited limits.