

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

PCU Deutschland GmbH
Dorotheastr. 30
10318 Berlin

Title : **Test report for order 11830945**
Test report number : **AR-18-FR-030955-01**

Project name : **Pellets ENplus, PRJ 843034 Pellet Energy Ukraine**

Number of samples : **2**
Sample type : **wood pellets**
Sample Taker: **Client**
Sample reception date : **2018-11-09**
Sample processing time : **2018-11-12 - 2018-11-28**

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.

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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 10.12.2018
Dr. Ulrich Erler
Prüfleitung



										Description		Wood pellets 1		Wood pellets 2	
				Limit values						Sample number		118123259		118123260	
Parameter	Lab	Accr.	Method	ENplus A1 ar	ENplus A1 db	ENplus A2 ar	ENplus A2 db	ENplus B ar	ENplus B db	LOQ	Unit	ar	db	ar	db
Quality characteristics															
Length	FR	JE02	DIN EN ISO 17829: 2016-03	1)		1)		1)				according	-	-	-
Diameter	FR	JE02	DIN EN ISO 17829: 2016-03	2)		2)		2)			mm	6.1	-	-	-
Moisture	FR	JE02	DIN EN ISO 18134-2: 2017-05	10		10		10		0.1	% (w/w)	5.2	-	6.2	-
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	0.5	0.5
Durability	FR	JE02	DIN EN ISO 17831-1: 2016-05	≥ 98		≥ 97.5		≥ 97.5			% (w/w)	98.0	-	99.1	-
Fine portion < 3,15 mm	FR	JE02	DIN EN ISO 18846: 2016-12	1 ³⁾		1 ³⁾		1 ³⁾		0.1	% (w/w)	0.4	-	< 0.1	-
Bulk density	FR	JE02	DIN EN ISO 17828: 2016-05	600 - 750		600 - 750		600 - 750			kg/m³	658	-	-	-
Gross calorific value (qV,gr)	FR	JE02	DIN EN ISO 18125: 2017-08							200	kJ/kg	19700	20800	-	-
Net calorific value (qp,net)	FR	JE02	berechnet nach DIN EN ISO 18125: 2017-08	≥ 16.5 ⁴⁾		≥ 16.5 ⁴⁾		≥ 16.5 ⁴⁾		0.200	MJ/kg	18.3	19.5	-	-
Carbon	FR	JE02	DIN EN ISO 16948: 2015-09							0.2	% (w/w)	48.9	51.5	-	-
Nitrogen	FR	JE02	DIN EN ISO 16948: 2015-09		0.3		0.5		1	0.05	% (w/w)	< 0.05	< 0.05	-	-
Hydrogen	FR	JE02	DIN EN ISO 16948: 2015-09							0.1	% (w/w)	5.8	6.1	-	-
Oxygen	FR	JE02	DIN EN ISO 16993: 2016-11								% (w/w)	39.7	41.9	-	-
Sulphur	FR	JE02	DIN EN ISO 16994: 2016-12		0.04		0.05		0.05	0.005	% (w/w)	0.009	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	-	-

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Minor elements acc. DIN EN ISO 16968															
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	-	1010	-	-
Deformation temp DT	FR	JE02	CEN/TS 15370-1: 2006-12		≥ 1200		≥ 1100		≥ 1100		°C	-	1480	-	-
Hemisphere temp HT	FR	JE02	CEN/TS 15370-1: 2006-12		5)		5)		5)		°C	-	> 1500	-	-
Flow temp FT	FR	JE02	CEN/TS 15370-1: 2006-12		5)		5)		5)		°C	-	> 1500	-	-

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

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.