

Audit and Test Report:
BEA2018001

Date: 2018-03-27

Inspection according ENplus®

Client: **Eko Step pellet doo**
Srpskih vladara br. 3
12300 Petrovac na Mlavi
Srbija - Serbia

Subject: Wood pellets production **Eko Step pellet doo**
plant in **Petrovac**, Serbia

Content: **Site Audit 2018** including pellet testing according ENplus®

Order: According to the inspection contract

**Date of audit
and sampling:** 2018-01-19 and 16.3.2018 by Dr. Martin Englisch

Receipt of samples: 2018-01-22

Ref: Eng



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Gerichtsstand: Wien

1 SCOPE OF WORK

Inspection of the wood pellet production plant especially of quality measures, evaluation of quality related documents and internal testing of product quality of wood pellets production according ENplus® requirements. A sample of the production is to be taken and tested according ISO 17225-2 for verification of pellet quality.

2 SCOPE OF APPLICATION

The test results given in this report have been obtained under the specific conditions of the individual tests. They shall serve as proof for the conformity of the sample(s) tested. The client is responsible for the conformity of products with ENplus® regulations which will be assured when quality assurance measures according ENplus® regulations are continuously applied.

3 INSPECTION AUDIT

The inspection audit was carried out according ENplus® Handbook for the Certification of Wood Pellets for Heating Purposes (Version 3.0 from August 2015) by Dr. Martin Englisch attended by Mr. Dragan Filimonović and Mr. Đurica Zarić, Mr. Igor Popović and others. Duration of the audit was approximately 3 hours.

Responsibilities in the factory are assigned clearly, a company organigram exists.

The responsibility in the company is divided as follows:

Contact person:	Mr. Svetlana Božinović
Quality manager:	Mr. Dragan Filimonović Dragan.filimonovic@ekostep-pellets.rs
Responsible for quality assurance:	Mr. Dragan Filimonović

3.1 Products

Certified products	wood pellets EN ISO 17225 – 2, class A2	
Dimensions	6 mm	
ENplus® ID-number	Not assigned jet	
Certification Body ENplus	HFA Holzforschung Austria	
Subcontracted service providers	None	
Affiliated Companies	None	
Business activities (except activities of service providers)	Production	Yes
	Full load deliveries of bulk pellets to end-users including unsealed big-bags	No
	Part load deliveries of bulk pellets to end-users	No
	Bagging of pellets including sealed big-bags	Yes
	Sourcing pellets from another certified company	No
Brand names*	Eco step pelet;	
Produced amount*	2017: ~ 3.500 t (production started September 2017)	
Storage capacity	up to 2.000 t bagged pellets on pallets in halls;	
Relevant storage sites	up to 5.000 t bagged pellets on pallets in hall in Belgrad (headquarter and sales)	

* according statement of client

3.2 Raw material

Origin of wood	100 % external suppliers
Source raw material	100 % stemwood (1.1.3 acc. EN ISO 17225-1)
Raw material species	100% hardwood (beech)
Form of raw material	100% logs (stemwood, some cut in 1 m logs (firewood))
Raw material storage	Outdoor storage; partly on paved wood-yard and on gravel ground; more area to be paved during this year
Control and documentation of raw material	All deliveries are checked visually; there is a sorting of logs before chipping; low quality round-wood (e.g. with mould) is chipped and used for boiler.
Suppliers	~ 80 % Serbian National Forest (Srbijašume), 20 % from Serbian forests, private owners

Sustainability of raw material	No certification (FSC planned for 2018)
Other raw materials used (e.g. pressing aids)	None

3.3 Production process

Changes in process	Not applicable, first Audit
Raw material preparation	Some raw material is manually cleaned with high pressure water, majority of logs is used as received
Drying	Drum drier (with hot gas cyclone)
Separation of contaminants and impurities	Oversized particles and impurities are removed by a disk-sieve and stone traps. Metal separators are used.
Pellet production	Raw material is conditioned using water and is pelletized by 1 ring die press. Pellets are cooled in a counter current cooler.
Removal of fines	Fines are removed by a vibrating sieve and by a star sieve with suitable size and sieve aperture, dust is removed by air separators.
Non-complying pellets	A possibility for separation of low quality batches exists. Non-conforming pellets are recycled or burned depending on type of non-conformity.
Documentation of failures, breakdowns and maintenance	A shift book exists containing all relevant information.
Storage of pellets	Pellets are stored in bags on pallets only.
Carbon footprint of production	Carbon footprint of production could not be calculated because production just started; will be done 2019

3.4 Quality control measures

The factory production control is carried out in accordance with the requirements of the regulations. Tests are done regular and are documented properly.

Parameter	Test frequency	Test equipment
Moisture	Every 3 hours	IR-dryer
bulk density	Every 3 hours	Bulk density container acc. EN 15103
Durability	Every 3 hours	Ligno-Tester
Length	Every 3 hours	Visual, occ. with ruler
Fines	Every 3 hours	3,2 mm square whole sieve New: 3,15 mm round hole sieve
Ash content	once per day	Similar to ISO 18122

Instruments for quality control are maintained properly, calibration and/or performance tests are done.

3.5 Quality assurance

Quality management system / Factory Production Control	<p>Quality management is in place and based on a quality manual. ISO 9001 certification is in preparation. SOP's exist which cover:</p> <ul style="list-style-type: none"> • Strategic development • Responsibilities • Inspection procedure incoming logs • Customer complaint management • Procedure for self-inspection • Requirements for lab equipment calibration and maintenance • Education • Health & Safety
Documentation raw material	Is done accordingly
Customer complaints	<p>Customer complaint management system exists. All complaints are compiled in a database.</p> <p>Since the start of operation in September 2017 0 complaints were recorded</p>
Documentation of outgoing goods	Documentation of outgoing goods is done according to the requirements (ENplus® requirements to be implemented after certification).
External training of employees	The Quality manager will try to attend the next training offered by EPC.

Internal training of employees	There is an internal training schedule which is included in quality management system
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3.6 Retain samples

Retain samples	Not necessary, only bagged pellets. However, reference samples are taken every 3 hours.
Retain sample labelling	Labelling is sufficient
Storage for retain samples	Retain samples are kept for 12 month-

3.7 Labelling

Labelling (delivery notes including dispatch form and bags) will be implemented after ENplus® certification.

4 SAMPLING

Samples were taken following the principles of ISO 18135. A sample (two 15 kg bags) were taken from the running production from the bagging station. The sample was taken to the auditor's lab by the auditor. Analysis of this sample showed an ash content slightly exceeding the ash limit. An ash content of 1,2-1,5 is typical for beech with bark and some contamination with sand and soil due to logging operations.

EkoStep installed a log washing system in February 2018 (see figure 1) and improved log selection. A second Audit and sampling was done on 16.3.2018 to check the improvements and take a new sample.



Figure 1 Log washing system before chipper

5 TESTS

Testing took place in January -March 2018.

6 PELLET LAB ANALYSIS RESULTS

Sample 2018001	Standard	unit	sample 22.01.2018	Limit values according ENplus®	
				Class A1	Class A2
mechanical durability	ISO 17831-1	[%]	98,12 ^a	≥ 98,0	≥ 97,5
bulk density (ar)	ISO 17828	[kg/m ³]	680 ^a	750≥BD≥600	750≥BD≥600
moisture content	ISO 18134-2	[%]	4,42 ^a	≤ 10	≤ 10
ash content 550°C (db)	ISO 18122	[%]	1,16 ^a	≤ 0,7	≤ 1,2
net calorific value (ar)	ISO 18125	[MJ/kg]	16,6	≥ 16,5	≥ 16,5
net calorific value (ar)	ISO 18125	[kWh/kg]	4,6	≥ 4,6	≥ 4,6
net calorific value (db)	ISO 18125	[MJ/kg]	18,1	-	-
net calorific value (db)	ISO 18125	[kWh/kg]	5,0	-	-
Sulphur content (db)	ISO 16994	[%]	0,012	≤ 0,04	≤ 0,05
Chlorine content (db)	ISO 16994	[%]	<0,005	≤ 0,02	≤ 0,02
Nitrogen content (db)	ISO 16948	[%]	0,13	≤ 0,30	≤ 0,50
additives	-	[%]	none	≤ 1,8 ^{***}	≤ 1,8 ^{***}
dimensions					
finer (< 3,15 mm)	ISO 18846	[%]	0,11 ^a	≤ 0,5* / ≤ 1	≤ 0,5* / ≤ 1
length (3,15 ≤ L ≤ 40 mm)	ISO 17829	[%]	99,9	> 98,5* / >98	> 98,5* / >98
length (40 ≤ L ≤ 45 mm)	ISO 17829	[%]	0	≤ 1	≤ 1
length (> 45 mm)	ISO 17829	[amount]	none	0	0
diameter	ISO 17829	[mm]	6	6 or 8 ± 1	6 or 8 ± 1
heavy metals**					
Chromium (db)	ISO 16968	[mg/kg]	<1,00	≤ 10	≤ 10
Copper (db)	ISO 16968	[mg/kg]	1,6	≤ 10	≤ 10
Zinc (db)	ISO 16968	[mg/kg]	<5,0	≤ 100	≤ 100
Lead (db)	ISO 16968	[mg/kg]	0,62	≤ 10	≤ 10
Mercury (db)	ISO 16968	[mg/kg]	<0,05	≤ 0,1	≤ 0,1
Cadmium (db)	ISO 16968	[mg/kg]	0,10	≤ 0,5	≤ 0,5
Arsenic (db)	ISO 16968	[mg/kg]	<0,50	≤ 1	≤ 1
Nickel (db)	ISO 16968	[mg/kg]	<1,00	≤ 10	≤ 10
Ash melting behaviour (815°C ash preparation temperature)					
shrinking temp. SST	CENTS 15370-1	[°C]	930	-	-
deformation temp. DT	CENTS 15370-1	[°C]	1230	≥ 1200	≥ 1100
hemisphere temp. HT	CENTS 15370-1	[°C]	>1550	-	-
flow temperature FT	CENTS 15370-1	[°C]	>1550	-	-

db... dry basis; ar... as received

* 1% at factory gate or when loading truck for delivery to end user, 0,5% when filling pellets bags

** were performed with sub contractor

*** according ENplus 1,8% pressing aids and 0,2% additives are allowed

^a sample from 16.3.2018

7 SUMMARY

The pellet production of **EkoStep Pelets**, plant in **Petrovac, Serbia** is complying with all requirements of:

ENplus[®], quality A2.



Deviations and suggested improvements from 2017:

- ◆ Not applicable, initial Audit

Type A and type B non-conformities:

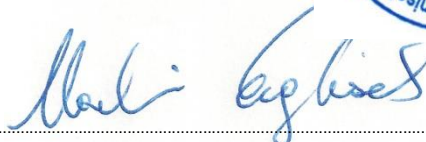
- ◆ Ash content exceeding limit; raw material preparation was improved, deviation solved

Type C non-conformities and recommendations:

- ◆ ENplus[®] logo and labelling to be implemented after certification – including EPC-approval for bag-design
- ◆ GHG emissions to be calculated till Audit 2019
- ◆ Quality manager to attend an EPC-approved QM-manager training

This inspection report no. BEA2018001 comprises 8 pages and 0 appendix(es).

EPC-listed Auditor in charge



Dipl.-Ing. Dr. Martin Englisch