

Audit and Test Report:
BEA2015124

Date: 2015-11-11

Inspection according ENplus

Client: Sparrow d.o.o.
Attn.: Mr. Igor Milekić
Marina Marinovića 1
37260 Varvarin
Srbija - Serbia

Subject: Wood pellets production Sparrow d.o.o.;
plant in **Varvarin**, Serbia

Content: Site Audit and pellet testing according to ENplus

Order: According to the inspection contract

**Date of audit
and sampling:** 2015-08-24 by Dr. Martin Englisch

Receipt of samples: 2015-08-30

Ref: Eng

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 EN*plus* requirements. A sample of the production is to be taken and tested according EN 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 EN*plus* regulations which will be assured when quality assurance measures according EN*plus* regulations are continuously applied.

3 INSPECTION AUDIT

The inspection audit was carried out according EN*plus* Handbook 3.0 (version August 2015) on 2015-08-24 by Dr. Martin Englisch attended by Mr. Igor Milekić and Mr. Nemanja Aleksić. Duration of 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. Igor Milekić
Director in charge:	Mr. Igor Milekić
Responsible for the production of pellets:	Mr. Nemanja Aleksić
Responsible for quality assurance:	Mr. Nemanja Aleksić

3.1 Products

Certified products	wood pellets EN ISO 17225-2, class A2
ENplus ID-Number	RS 007
Certification body	HFA
Dimensions	6 mm
Delivery to end customer	No direct delivery of certified pellets to end customer, small amount of low quality pellets is sold to local customers, picked up at production plant
Brand name	<ul style="list-style-type: none"> • Sparrow • Faggio misto Abete (Obex) • Ecologico (Squirrel Pellet) • Ekofocus (Ronchiato & co) • Max Pellet (Ingles doo)
Produced amount	2014: 0 t (production started December 2014) 2015: new goal 20.000 t
Storage capacity	Currently 3.000 t bagged pellets on pallets in warehouses, an extension to 5.000 t is planned; all warehouses were inspected and are suitable for storage.

3.2 Raw material

Origin of wood	100 % stemwood from local forests
Source raw material	100 % stemwood (1.1.3 acc. ISO 17225-2)
Raw material species	75 % beech 25 % spruce
Form of raw material	Roundwood, 3 - 6 m
Raw material storage	Outdoor storage on paved wood-yard
Control and documentation of raw material	All deliveries are checked visually
Suppliers	100 % Serbian National Forest (Srbijašume)
Sustainability of raw material	100% FSC certified
Other raw materials used (e.g. pressing aids)	No additives or binders are used

3.3 Production process

Raw material preparation	Some raw material is manually cleaned, majority of logs is debarked and chipped
Drying	Material is dried with a directly fired drum drier
Separation of contaminants and impurities	Oversized particles and impurities are removed by sieves and stone traps. Metal separators are used
Pellet production	raw material is conditioned using water and is pelletized by 3 ring die press. Pellets are cooled in a counter current cooler.
Removal of fines	Fines are removed by 2 vibrating sieves 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 filled in big bags and are sold to local customers at factory gate.
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 will be calculated next year when sufficient data are available.

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.

Internal test results comply well with BEA lab results. The higher durability measured at BEA can be explained since pellets harden with time.

parameter	Frequency	Test equipment	Test result on site	Test Result BEA
moisture	3 times/8h-shift	IR-dryer	8,5	8,0
bulk density	3 times/8h-shift	Bulk density container acc. EN 15103	600	605
durability	3 times/8h-shift	BEA Tumbler 1000	98,2	98,8
length	3 times/8h-shift	Visual, occ. with ruler	-	-
fines	3 times/8h-shift	3,15 mm sieve	0,14	0,25
ash content	once per day	Similar to ISO 18122	0,9	0,9

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

3.5 Quality assurance

Quality management system	Quality management is in place and based on SOP's which cover: <ul style="list-style-type: none"> • Responsibilities are clearly assigned, organigram exists • Inspection procedure incoming logs • Customer complaint management • Procedure for self-inspection • Requirements for lab equipment calibration and maintenance
Documentation raw material	Is done accordingly
Customer complaints	Customer complaint management system is implemented. 1 complaints occurred since start of production (not concerning pellet quality but logistics)
Documentation of outgoing goods	Documentation of outgoing goods state of the art.
Check of temperature of outgoing goods	Not necessary, no part load delivery.

3.6 Retain samples

Retain samples pellets	One whole bag per shift (Remark is not necessary, only bagged pellets since ENplus handbook 3.0).
Retain sample labelling	Is corresponding with requirements
Storage for retain samples	Last Audit

3.7 Labelling

Labelling on bags is according ENplus regulations.

4 SAMPLING

Samples were taken following the principles of EN 14778.

A sample was taken from the flat store. The sample was sent to the auditor's lab.

5 TESTS

Testing took place in October 2015. The tests were carried out in cooperation with a subcontractor (metals).

0,89 je jedini parametar
koji nas koči što nismo A1

6 PELLET LAB ANALYSIS RESULTS

2015124	Standard	unit	Pellets	Limit values according ENplus	
				Class A1	Class A2
mechanical durability	ISO 17831-1	[%]	98,8	≥ 98,0	≥ 97,5
bulk density	ISO 17828	[kg/m ³]	605	750≥BD≥600	750≥BD≥600
moisture content	ISO 18134-2	[%]	8,0	≤ 10	≤ 10
ash content 550°C(db)	ISO 18122	[%]	0,89 ✓	≤ 0,7	≤ 1,2
net calorific value (ar)	EN 14918	[MJ/kg]	17,4	≥ 16,5	≥ 16,5
net calorific value (ar)	EN 14918	[kWh]	4,8	≥ 4,6	≥ 4,6
Sulphur content (db)	ISO 16994	[%]	<0,005	≤ 0,04	≤ 0,05
Chlorine content (db)	ISO 16994	[%]	0,007	≤ 0,02	≤ 0,02
Nitrogen content (db)	ISO 16948	[%]	0,30	≤ 0,30	≤ 0,50
pressing aid / additives	-	[%]	none	≤ 2	≤ 2
dimensions					
finer (< 3,15 mm)	EN 15149	[%]	0,25	≤ 0,5* / ≤ 1	≤ 0,5* / ≤ 1
length (3,15 ≤ L ≤ 40 mm)	ISO 17829	[%]	99,0	> 98	> 98
length (40 ≤ L ≤ 45 mm)	ISO 17829	[%]	0,8	≤ 1	≤ 1
length (> 45 mm)	ISO 17829	[amount]	0**	0	0
diameter	ISO 17829	[mm]	6	6 or 8 ± 1	6 or 8 ± 1
heavy metals					
Chromium (db)	ISO 16968	[mg/kg]	<1	≤ 10	≤ 10
Copper (db)	ISO 16968	[mg/kg]	1,2	≤ 10	≤ 10
Zinc (db)	ISO 16968	[mg/kg]	<10	≤ 100	≤ 100
Lead (db)	ISO 16968	[mg/kg]	<2	≤ 10	≤ 10
Mercury (db)	ISO 16968	[mg/kg]	<0,05	≤ 0,1	≤ 0,1
Cadmium (db)	ISO 16968	[mg/kg]	<0,2	≤ 0,5	≤ 0,5
Arsenic (db)	ISO 16968	[mg/kg]	<1	≤ 1	≤ 1
Nickel (db)	ISO 16968	[mg/kg]	<1	≤ 10	≤ 10
ash melting behaviour (ash preparation at 815°C)					
shrinking temp. SST	CEN/TS 15370-1	[°C]	930	-	-
deformation temp. DT	CEN/TS 15370-1	[°C]	1380	≥ 1200	≥ 1100
hemisphere temp. HT	CEN/TS 15370-1	[°C]	1500	-	-
flow temperature FT	CEN/TS 15370-1	[°C]	1510	-	-

*...for bagged pellets

**...after correction of production settings, proof by company

ar...as received

db...dry basis

7 SUMMARY

The pellet production of **Sparrow** plant in **Varvarin, Serbia** is complying with all requirements of:

ENplus, quality A2.



Correction of deviations from last Audit:

- ◆ Labelling of bags was implemented according ENplus regulations

Type A and type B non-conformities:

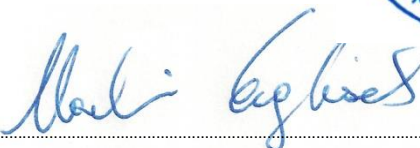
- ◆ Oversized pellets found in the production during the Audit. This A-type non-conformity were corrected by changing the settings of the knives in the press. Internal control documents were submitted as proof for the correction of the deviation.

Type C non-conformities and recommendations:

- ◆ CO₂ emissions shall be calculated till next Audit.
- ◆ External education of staff will be done when courses are supplied by EPC
- ◆ Education register (internal and external measures) to be created

This inspection report no. **BEA2015124** comprises 7 pages and 0 appendix(es).

EPC-listed Auditor in charge



Dipl.-Ing. Dr. Martin Englisch