Audit and Test Report: **Date:** 2021-04-30

BEA2021067

Inspection according EN*plus*®

Client:	**Ciprijanović d.o.o.** Attn.: Mr. Ivica Ivanko Bjeljevina bb 33515 Orahovica Croatia
Subject:	Wood pellets production, plant in **Orahovica**, Croatia
Content:	Inspection including pellet testing according EN*plus*®
Order:	According inspection contract
Date of audit and sampling:	2021-03-17 by Dr. Martin Englisch
Receipt of samples:	2021-03-18 and 2021-04-29
Ref:	Eng

EUROPEAN PELLET COUNCIL
AN AEBIOM NETWORK

Akkreditierung Austria 0388 ISO/IEC 17020

DIN CERTCO
Anerkanntes Prüflaboratorium
IS003 / PL232

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 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 for the Certification of Wood Pellets for Heating Purposes (Version 3.0 from August 2015) by Dr. Martin Englisch attended by Franjo Kovač and other employees (duration of audit 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. Ivica Ivanko
Quality manager:	Mr. Ivica Ivanko ivica@ciprijanovic.hr; franjo@ciprijanovic.hr
Responsible for quality assurance:	production manager Jakov Gotovic

3.1 Products

Certified products	wood pellets EN ISO 17225-2, class A1	
EN*plus*® ID-Number	HR020	
Certification Body	HFA Holzforschung Austria	
Dimensions	6 mm	
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*	1. Drveni Pelet (HR020), approved by EN*plus*®, displayed on EPC hp) – design change and approval 22.7.2020	
Produced amount*	2019: 3.636 t 2020: 4.340 t Forecast 2021: 8.000 t	
Storage capacity	bagged pellets on pallets, in 1 large hall: ~ 500 t	

* according statement of client

3.2 Raw material

Origin of wood	100% own production
Source raw material	100 % chemically untreated wood residues (1.2.1 according ISO 17225-1)
Raw material species	100 % hardwood mainly oak, since 2021 about 15% beech
Form of raw material	Sawdust chips from own saw mill, little air dried
Raw material storage	The raw material is stored in boxes on paved ground or in silos.
Control and documentation of raw material	All incoming logs are visually inspected before they enter the saw mill.
Suppliers	100% obtained from Croatian National Forest (Hvratske sume), all FSC certified.
Sustainability of raw material	FSC SA-COC 001266

Other raw materials used (e.g. pressing aids)	No additives or binders are used.

3.3 Production process

Changes in production process	**A completely new production line was build** (Rudnick Enners, general supplier of whole machinery) in a new production hall. Operation was started in beginning of 2021. Capacity 2 t/h (CPM press 200 kW, Rudnick band drier).
Raw material preparation	Chipper and hammer mill
Drying	Wood chips are dried using a belt drier
Separation of contaminants and impurities	Oversized particles and impurities are removed by sieves, metal separators are used.
Pellet production	The dried raw material is grinded by a hammer mill and is pelletized by 1 ring die presses and cooled by counter current coolers.
Removal of fines	Fines are removed by vibrating sieve and wind shifter.
Non-complying pellets	A possibility for separation of low quality batches exists, they are packed in big-bags.
Documentation of failures, breakdowns and maintenance	A shift book exists containing all relevant information e.g. change of parts, produced tons, plan for greasing
Storage of pellets	Pellets are either directly packed in 15 kg bags or filled in big bags. Bags on pallets are stored in halls. Pellets are protected against contamination.
Carbon footprint of production	Carbon footprint of production was calculated by using the Excel-sheet form EPC. Emissions with old plant were: • 84,4 g $CO_{2\text{-eq}}$./kg pellets in bags; no change in 2019 New Carbon footprint to be calculated for new line in 2022

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	once a shift	humimeter
bulk density	once a shift	Stainless steel container
Mechanical durability	once a shift	BEA Tumbler
Length	once a shift	Visual, caliper rule
Fines	once a shift	3,15mm sieve

Instruments are clean and are maintained properly

Comparison of analysis results:

parameter	Unit	Ciprijanovic	BEA
moisture	%	6,77	6,1
bulk density	kg/m³	653	660
durability	%	98,7	98,8

Results comply within expected variation.

Ciprijanovic plans to add ash measurement to quality assurance.

3.5 Quality assurance

Quality management system	Quality management consists of individual documents for most important quality related topics; SOP's are available covering: • Receipt of raw materials • Requirements for measuring and test equipment • Instruction of self-inspection • Responsibilities • Customer complaint management
Documentation raw material	All incoming raw materials are documented, data are collected electronically including date. A declaration of raw material purity is not necessary since only FSC certified round-wood is processed. Since additives are not used, there is no documentation.

Customer complaints	Customer complaints are documented. 0 complaints in 2019 1 complaint in 2020: transport problem since driver did not secure pallets, pallets broke and small bags had to be sold one by one (this was not complaint)
Documentation of outgoing goods	Documentation of outgoing goods is done according to the requirements. EN*plus*® requirements to be implemented
Calibration of scales (bagging machine)	The bagging machine is manual. There are calibrated scales (new one from new line) used for check of weight. There are 3 different scales which are used for comparison. Certificate from external calibration service required 2022.
Measuring pellets temperature at loading station	Not necessary, no part load delivery
Training of staff	External trainings: Ivica Ivanko attended training on 27.6.2019. Internal trainings: Internal training was done by Rudnick.

3.6 Retain samples

Retain samples pellets	Not required, no part load delivery
Retain sample labelling	Not required
Storage for retain samples	Not required

3.7 Labelling

Labelling of bags is implemented according EN*plus*® regulations.

4 SAMPLING

Samples were taken following the principles of EN 14778.

One 15 kg bag was taken from running production. Sample was delivered to the laboratory by the auditor. A second sample was taken by the company and was sent with parcel service.

5 TESTS

Testing took place in March and April 2021.

6 PELLET LAB ANALYSIS RESULTS

BEA2021067			Pellets	Limit values according EN*plus*®	
	Standard	unit		Class A1	Class A2
mechanical durability	ISO 17831-1	[%]	98,8	≥ 98,0	≥ 97,5
bulk density (ar)	ISO 17828	[kg/m³]	660	750≥BD≥600	750≥BD≥600
moisture content	ISO 18134-2	[%]	6,1	≤ 10	≤ 10
ash content 550°C (db)***, ****	ISO 18122	[%]	0,6	≤ 0,7	≤ 1,2
net calorific value (ar)	ISO 18125	[MJ/kg]	17,0	≥ 16,5	≥ 16,5
net calorific value (ar)	ISO 18125	[kWh/kg]	4,7	≥ 4,6	≥ 4,6
net calorific value (db)	ISO 18125	[MJ/kg]	18,3	-	-
net calorific value (db)	ISO 18125	[kWh/kg]	5,1	-	-
gross calorific value (ar)	ISO 18125	[MJ/kg]	18,4	-	-
gross calorific value (ar)	ISO 18125	[kWh/kg]	5,1	-	-
Sulphur content (db)	ISO 16994	[%]	0,014	≤ 0,04	≤ 0,05
Chlorine content (db)	ISO 16994	[%]	< 0,005	≤ 0,02	≤ 0,02
Nitrogen content (db)	ISO 16948	[%]	0,15	≤ 0,30	≤ 0,50
pressing aid / additives**	-	[%]	none	≤ 1,8	≤ 1,8
dimensions					
fines (< 3,15 mm)****	ISO 18846	[%]	0,1	≤ 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	[%]	0,0	≤ 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]	< 1,0	≤ 10	≤ 10
Copper (db)	ISO 16968	[mg/kg]	1,9	≤ 10	≤ 10
Zinc (db)	ISO 16968	[mg/kg]	< 5,0	≤ 100	≤ 100
Lead (db)	ISO 16968	[mg/kg]	0,63	≤ 10	≤ 10
Mercury (db)	ISO 16968	[mg/kg]	< 0,075	≤ 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]	< 1,0	≤ 10	≤ 10
ash melting behaviour (ash preparation at 815°C, measurement at oxidizing atmosphere)					
shrinking temperature SST	CEN/TS 15370-1	[°C]	1070	-	-
deformation temperature DT	CEN/TS 15370-1	[°C]	1450	≥ 1200	≥ 1100
hemisphere temperature HT	CEN/TS 15370-1	[°C]	> 1550	-	-
flow temperature FT	CEN/TS 15370-1	[°C]	> 1550	-	-

db… dry basis; ar… as received

*1% at factory gate or when loading truck for delivery to end-users, 0,5% when filling pellets bags/sealed big bags

**according EN*plus* 1,8% production additives and 0,2% post production additives are allowed

*** performed with proximate analyzer on the resample arrived on 29.04.2021

**** determinded on the resample arrived on 29.04.2021

7 SUMMARY

The pellet production of **Ciprijanović d.o.o.** in Orahovica, Croatia, is complying with all requirements of:

EN*plus*®, quality A1.

Deviations and suggested improvements from 2020:

- EN*plus*® A1 was added on invoices/delivery notes
- Fines are now tested every shift

Type A and type B non-conformities:

- A-non conformity: the content of fines in the bag taken during the Audit was too high (1,2%). This was explained since the new line was just started and not completely optimized. It was already planned to improve the aspiration together with a service of the boiler system. This was done and a new sample was submitted right after service was completed. The new sample was very low in fines content. Remark: ash content was just within the limit for the original sample and it was safely below the limit for the second sample.

Type C non-conformities and recommendations:

- Observation: Certificate from external calibration service required 2022.

EPC-listed Auditor in charge

Dipl.-Ing. Dr. Martin Englisch