

**Audit and Test Report:**  
**BEA2021294**

**Date:** 2021-11-27

## Inspection according ENplus®

**Client:** PIN d.o.o.  
Attn.: Mr. Predag Vučičević  
Vladimira Nazora 89A  
44324 Jasenovac  
Croatia

**Subject:** Wood pellets production PIN d.o.o. in Jasenovac, Croatia

**Content:** Surveillance Audit and pellet testing according to ENplus®

**Order:** According inspection contract

**Date of audit  
and sampling:** 2021-11-10 by Dr. Martin Englisch

**Receipt of samples:** 2021-11-12

**Ref:** Eng



EUROPEAN PELLET  
COUNCIL  
AN AEBIOM NETWORK



**DIN CERTCO**

Anerkanntes Prüflaboratorium  
ISO 9001 / PL 232



BEA Institut für Bioenergie GMBH - Accredited inspection body acc. to EN ISO/IEC 17020 | Accredited testing laboratory acc. to EN ISO/IEC 17025

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SWIFT: AT47 1200 0529 4901 1803 | BIC: BKAUATWW | Bank: Bank Austria AG | EORI: ATEOS1000004531 | CEO: DI Dr. Martin Englisch

## 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 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 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. Predag Vučičević (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. Predag Vučičević                    |
| Director in charge:                | Mr. Predag Vučičević                    |
| Quality manager:                   | Mr. Predag Vučičević<br>pin@sk.t-com.hr |
| Responsible for quality assurance: | Mr. Mio Plasević                        |

### 3.1 Products

|                                                              |                                                                                                                                                                                                                             |     |
|--------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| Certified products                                           | wood pellets ISO 17225 class A1                                                                                                                                                                                             |     |
| ENplus® ID                                                   | HR 007                                                                                                                                                                                                                      |     |
| Certification Body                                           | HFA Holzforschung Austria                                                                                                                                                                                                   |     |
| Dimensions                                                   | 6 mm                                                                                                                                                                                                                        |     |
| Subcontracted service providers                              | None                                                                                                                                                                                                                        |     |
| Affiliated Companies                                         | 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  |
| Produced amount <sup>1</sup>                                 | 2018: 15.342 t<br>2019: 14.206 t<br>2020: 11.583 t<br>forecast 2021: max. 14.000 t                                                                                                                                          |     |
| Brand names                                                  | 1. PIN Pellets (HR007, design as on EPC hp)<br>2. Mister Faggio (HR 007, design as on EPC hp)<br>Other brands:<br>3. BlueOro company GreenGold (AT346)<br>4. BelFaggio (IT380)<br>5. Pellet 100% Faggio Pallavicini (IT389) |     |
| Storage capacity                                             | bagged pellets on pallets, in halls: ~ 50 t (storage area is a little reduced since new packaging machine was build)                                                                                                        |     |
| Relevant storage sites                                       | None                                                                                                                                                                                                                        |     |

### 3.2 Raw material

|                      |                                                   |
|----------------------|---------------------------------------------------|
| Origin of wood       | 100% purchase from external suppliers             |
| Source raw material  | 100 % stemwood (roundwood 1.1.3 acc. ISO 17225-1) |
| Raw material species | 100 % hardwood (beech, hornbeam)                  |

<sup>1</sup> Data provided by client

|                                               |                                                                              |
|-----------------------------------------------|------------------------------------------------------------------------------|
| Form of raw material                          | Round wood                                                                   |
| Raw material storage                          | The raw material is stored outside mainly on paved ground.                   |
| Control and documentation of raw material     | All incoming raw material is weighed and a visual inspection is carried out. |
| Suppliers                                     | 100 % Hrvatske Sume (Croatian National Forest)                               |
| Sustainability of raw material                | No certification However, only supplier Hrvatske Sume is FSC certified.      |
| Other raw materials used (e.g. pressing aids) | No additives or binders are used.                                            |

### 3.3 Production process

|                                                       |                                                                                                                                                                                                                                                                                                                                         |
|-------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Changes in process                                    | <ul style="list-style-type: none"> <li>• multicyclone between burner and drier (removes about 150 kg ash per week production of about 420 t pellets) =&gt; lifetime of rollers and die increased (die from 1800 h =&gt; 2100 h)</li> <li>• New packaging line with palletizer</li> </ul>                                                |
| Raw material preparation                              | Stationary chipper and hammer mill. Roundwood is debarked by chain debarker and by pressure-washing with water.                                                                                                                                                                                                                         |
| Drying                                                | Raw material is dried by flight stream dryer using biomass fuel                                                                                                                                                                                                                                                                         |
| Separation of contaminants and impurities             | Oversized particles and impurities are removed by sieves, metal separators are used.                                                                                                                                                                                                                                                    |
| Pellet production                                     | The dried raw material is pelletized by 1 ring die press and cooled by counter current cooler.                                                                                                                                                                                                                                          |
| Removal of fines                                      | Fines are removed by vibrating sieves and shifters with suitable size and sieve aperture, dust is removed by air separators.                                                                                                                                                                                                            |
| Bagging line: calibration of scales                   | The scales of bagging machine are calibrated automatically and it is controlled every 3 month by staff internally using weighs which are weighed at the precision scales; Precision scales are calibrated externally every 2 years. Last calibration was in March 2020. New packaging machine installed in 2021 with calibrated scales. |
| 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.                                                                                                                                                                                                                                                                                |
| Storage of pellets                                    | Pellets are mainly directly packed in 15 kg bags small amount in big bags. Bags on pallets are stored in halls. Pellets are protected against contamination.                                                                                                                                                                            |

|                                |                                                                                                                                                                                                                                                                            |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Carbon footprint of production | <p>Carbon footprint of production was calculated by using the Excel-sheet form EPC. Emissions are:</p> <ul style="list-style-type: none"> <li>• 96,3 g CO<sub>2-eq</sub>./kg bulk-pellets (in big-bags)</li> <li>• 104,2 g CO<sub>2-eq</sub>./kg bagged-pellets</li> </ul> |
|--------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

### 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         | BEA IR-drier              |
| bulk density          | once a shift         | Stainless steel container |
| Mechanical durability | once a shift         | Tumbler, own construction |
| Length                | once a shift         | Visual, caliper rule      |
| Fines                 | once a day, full bag | 3,15mm sieve              |
| Ash content           | once a day           | According ISO 18122       |

#### Comparison BEA lab – PIN

| Parameter             |                   | BEA  | PIN  |
|-----------------------|-------------------|------|------|
| bulk density          | kg/m <sup>3</sup> | 630  | 621  |
| fines                 | %                 | 0,29 | 0,10 |
| Water content         | %                 | 6,1  | 5,9  |
| mechanical durability | %                 | 98,6 | 98,4 |
| Ash content           | %                 | 0,70 | 0,70 |

Results comply very well within expected variation. Fines increased due to fairly long transport to Vienna (first Audit of a week).

Instruments for quality control maintained properly, performance tests are done.

### 3.5 Quality assurance

|                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Quality management system              | <p>Quality management consists of individual documents for most important quality related topics; SOP's are available covering:</p> <ul style="list-style-type: none"> <li>• Receipt of raw materials</li> <li>• Requirements for measuring and test equipment</li> <li>• Instruction of self-inspection</li> <li>• Responsibilities</li> <li>• Customer complaint management</li> </ul>                                                                                |
| Documentation raw material             | <p>All incoming raw materials are documented, data are collected electronically including date.</p> <p>A list of suppliers not necessary, at the moment it is only Hvratske sume, a contract exists.</p> <p>A declaration of raw material purity is not necessary since only FSC certified roundwood is processed.</p> <p>Since additives are not used, there is no documentation.</p>                                                                                  |
| Customer complaints                    | <p>Customer complaints are documented. Documentation contains date, reason and action to achieve customer satisfaction.</p> <p>2019: 0 complaints</p> <p>2020: 4 complaints total, all due to packaging (1 broken pallet, 2 weldseams; 1 (minor) complaint pallets shifted sideways during transport and wrapping foil was not to bottom of pallet; all accepted</p> <p>Remark: EPC complaint: Dragon pellet was not produced by PIN; thus not listed as complaint.</p> |
| Documentation of outgoing goods        | Documentation of outgoing goods is done according to the requirements.                                                                                                                                                                                                                                                                                                                                                                                                  |
| Check of temperature of outgoing goods | Since the hole production is bagged, check of temperature is not necessary.                                                                                                                                                                                                                                                                                                                                                                                             |
| External training of staff             | Quality manager attended ENplus quality manager training in 2019.                                                                                                                                                                                                                                                                                                                                                                                                       |
| Internal trainings of staff            | Included in quality management system                                                                                                                                                                                                                                                                                                                                                                                                                                   |

### 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**

The requirements concerning labelling are fulfilled.

## **4 SAMPLING**

Samples were taken following the principles of ISO 18135.

One 15 kg bags was taken from running production, one from stock and both were taken to the lab of the Auditor.

## **5 TESTS**

Laboratory testing took place in November 2021 according EN ISO 17225-2.

## 6 LAB ANALYSIS RESULTS

| BEA2021294                                                                                   | Standard                     | unit     | Pellets | Limit values<br>according ENplus® |                            |
|----------------------------------------------------------------------------------------------|------------------------------|----------|---------|-----------------------------------|----------------------------|
|                                                                                              |                              |          |         | Class A1                          | Class A2                   |
| mechanical durability                                                                        | ISO 17831-1:2015             | [%]      | 98,6    | ≥ 98,0                            | ≥ 97,5                     |
| bulk density (ar)                                                                            | ISO 17828:2015               | [kg/m³]  | 630     | 750≥BD≥600                        | 750≥BD≥600                 |
| moisture content                                                                             | ISO 18134-2:2017             | [%]      | 6,1     | ≤ 10                              | ≤ 10                       |
| ash content 550°C (db) <sup>2)</sup>                                                         | ISO 18122:2015               | [%]      | 0,7     | ≤ 0,7                             | ≤ 1,2                      |
| net calorific value (ar)                                                                     | ISO 18125:2017               | [MJ/kg]  | 16,9    | ≥ 16,5                            | ≥ 16,5                     |
| net calorific value (ar)                                                                     | ISO 18125:2017               | [kWh/kg] | 4,7     | ≥ 4,6                             | ≥ 4,6                      |
| net calorific value (db)                                                                     | ISO 18125:2017               | [MJ/kg]  | 18,1    | -                                 | -                          |
| net calorific value (db)                                                                     | ISO 18125:2017               | [kWh/kg] | 5,0     | -                                 | -                          |
| gross calorific value (ar)                                                                   | ISO 18125:2017               | [MJ/kg]  | 18,3    | -                                 | -                          |
| gross calorific value (ar)                                                                   | ISO 18125:2017               | [kWh/kg] | 5,1     | -                                 | -                          |
| Sulphur content (db)                                                                         | ISO 16994:2016 <sup>3)</sup> | [%]      | 0,009   | ≤ 0,04                            | ≤ 0,05                     |
| Chlorine content (db)                                                                        | ISO 16994:2016 <sup>3)</sup> | [%]      | <0,005  | ≤ 0,02                            | ≤ 0,02                     |
| Nitrogen content (db)                                                                        | ISO 16948:2015               | [%]      | 0,11    | ≤ 0,30                            | ≤ 0,50                     |
| <b>dimensions</b>                                                                            |                              |          |         |                                   |                            |
| finer (< 3,15 mm)                                                                            | ISO 18846:2016               | [%]      | 0,3     | ≤ 0,5 <sup>1)</sup> / ≤ 1         | ≤ 0,5 <sup>1)</sup> / ≤ 1  |
| length (3,15 ≤ L ≤ 40 mm)                                                                    | ISO 17829:2015               | [%]      | 99,7    | > 98,5 <sup>1)</sup> / >98        | > 98,5 <sup>1)</sup> / >98 |
| length (40 ≤ L ≤ 45 mm)                                                                      | ISO 17829:2015               | [%]      | 0,0     | ≤ 1                               | ≤ 1                        |
| length (> 45 mm)                                                                             | ISO 17829:2015               | [Amount] | 0       | 0                                 | 0                          |
| diameter                                                                                     | ISO 17829:2015               | [mm]     | 6       | 6 or 8 ± 1                        | 6 or 8 ± 1                 |
| <b>heavy metals (quantification using ISO 17294-2: 2016)</b>                                 |                              |          |         |                                   |                            |
| Chromium (db)                                                                                | ISO 16968:2015               | [mg/kg]  | <1,0    | ≤ 10                              | ≤ 10                       |
| Copper (db)                                                                                  | ISO 16968:2015               | [mg/kg]  | 1,5     | ≤ 10                              | ≤ 10                       |
| Zinc (db)                                                                                    | ISO 16968:2015               | [mg/kg]  | 5,8     | ≤ 100                             | ≤ 100                      |
| Lead (db)                                                                                    | ISO 16968:2015               | [mg/kg]  | <0,50   | ≤ 10                              | ≤ 10                       |
| Mercury (db)                                                                                 | ISO 16968:2015               | [mg/kg]  | <0,075  | ≤ 0,1                             | ≤ 0,1                      |
| Cadmium (db)                                                                                 | ISO 16968:2015               | [mg/kg]  | <0,10   | ≤ 0,5                             | ≤ 0,5                      |
| Arsenic (db)                                                                                 | ISO 16968:2015               | [mg/kg]  | <0,50   | ≤ 1                               | ≤ 1                        |
| Nickel (db)                                                                                  | ISO 16968:2015               | [mg/kg]  | <1,0    | ≤ 10                              | ≤ 10                       |
| <b>ash melting behaviour</b> (ash preparation at 815°C, measurement at oxidizing atmosphere) |                              |          |         |                                   |                            |
| shrinking temperature SST                                                                    | CEN/TS 15370-1:2006          | [°C]     | 1200    | -                                 | -                          |
| deformation temperature DT                                                                   | CEN/TS 15370-1:2006          | [°C]     | 1430    | ≥ 1200                            | ≥ 1100                     |
| hemisphere temperature HT                                                                    | CEN/TS 15370-1:2006          | [°C]     | >1550   | -                                 | -                          |
| flow temperature FT                                                                          | CEN/TS 15370-1:2006          | [°C]     | >1550   | -                                 | -                          |

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

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

<sup>2)</sup> performed with proximate analyzer

<sup>3)</sup> quantification using ISO10304-1: 2007



## 7 SUMMARY

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

**ENplus<sup>®</sup>, quality:**



**Deviations and suggested improvements from 2020:**

- ◆ none

**Type A and type B non-conformities:**

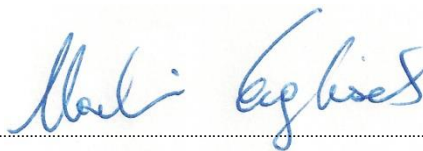
- ◆ none

**Type C non-conformities and recommendations:**

- ◆ none

This inspection report no. **BEA2021294** comprises 9 pages and 0 appendix(es).

EPC-listed Auditor in charge



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Dipl.-Ing. Dr. Martin Englisch

