



AB 053

Test report

no. DBL-2025-0132-01-BLS of 06.02.2025

SUBJECT OF THE ORDER

Quality testing of wood pellets –
IKEA Industry Poland Sp z o.o. Oddział w Stalowej Woli

ORDER NUMBER

A/DBL/BLS/0132/2025

NAME AND ADDRESS OF ORDERING PARTY

Control Union Poland Sp. z o.o.
al. Wojska Polskiego 45, 65-764 Zielona Góra

IDENTIFICATION OF TESTED OBJECTS

| ORDERING PARTY | |
|---|--|
| Control Union Poland Sp. z o.o. al. Wojska Polskiego 45, 65-764 Zielona Góra | |
| TESTED OBJECT | |
| Name | Wood pellets |
| Producer | IKEA Industry Poland Sp z o.o. Oddział w Stalowej Woli ul. Władysława Grabskiego 43/43a 37-450 Stalowa Wola |
| ENplus® ID/ Sample No. | PL031; IKEAST-1/2024 |

DATE OF ACCEPTANCE OF OBJECTS FOR TESTS

13.12.2024

PERFORMANCE DATE

08.01 – 06.02.2025

TESTING LOCATION

Laboratory headquarters

OPERATORS

Dawid Matusiak, M.Sc.Eng
Jacek Pawłowski, M.Sc.
Dariusz Radoński, B.Eng.
Klaudia Sikorska, B.Eng.

| | FULL NAME POSITION | DATE, SIGNATURE |
|---------------|--|-----------------|
| Authorized by | Małgorzata Walkowiak, M.Sc.Eng. Chief Specialist - Deputy Manager for Environmental Research | 06.02.2025 |

Test results relate only to the objects tested.

The test report may not be reproduced other than in its entirety without the written consent of the Laboratory Manager.

1. TEST METHODS

| Name of the test | Document | Method status (A/NA)* |
|--|---------------------|-----------------------|
| Total moisture | EN ISO 18134-2:2017 | A |
| Analytical moisture | EN ISO 18134-3:2023 | A |
| Ash content | EN ISO 18122:2022 | A |
| Calorific value | EN ISO 18125:2017 | A |
| Content of carbon, hydrogen and nitrogen | EN ISO 16948:2015 | A |
| Content of sulfur and chlorine | EN ISO 16994:2016 | A |
| Particle density of pellets | EN ISO 18847:2016 | A |
| Bulk density | EN ISO 17828:2016 | A |
| Fines content | EN ISO 18846:2016 | A |
| Coarse fines | EN ISO 18846:2016 | NA |
| Mechanical durability of pellets | EN ISO 17831-1:2016 | A |
| Length and diameter of pellets | EN ISO 17829:2016 | A |
| Minor elements | EN ISO 16968:2015 | A |
| Ash melting behaviour | EN ISO 21404:2020 | A |

*A – accredited method; NA – non-accredited method

2. EQUIPMENT OF THE TEST STANDS

| Name | Type | Producer | ID No. |
|---|---------------|-----------------------------|---------|
| Analytical balance | LE26P-OCE | SARTORIUS | M7/2 |
| Analytical balance | CPA225D-OCE | SARTORIUS | M8/57 |
| Laboratory balance | PS 6000/C/2 | RADWAG | M3/50 |
| Laboratory drier | RF115 | BINDER | M1/48 |
| Calorimeter | C6000 | IKA | M6/83 |
| Elemental analyzer | Flash EA 1112 | Thermo ELECTRON CORPORATION | M7/8 |
| Furnace | FCF 7SM/pl | CZYLOK | M2/4 |
| Ionic chromatograph | ICS-1100 | Thermo Scientific | M8/54 |
| Laboratory balance | WLC 6/F1/R | RADWAG | M9/46 |
| Pellets durability tester | TUMBLER 3000 | BIOENERGY ANLAGENPLANUNG | M10/42 |
| Sieve 3.15 mm | - | RETSCH | M9/34 |
| Sieve 5.6 mm | - | Haver&Boecker | M9/128 |
| Measuring container 5 dm ³ | - | ANDRITZ | M4/26 |
| Caliper | SD-10 | BAKER | M3/14 |
| Microwave oven | MARS 6 | CEM CORPORATION | M13/80 |
| Atomic Absorption Spectrometer | 280FS AA | AGILENT TECHNOLOGIES | M13/66 |
| Atomic Absorption Spectrometer | 280Ze AA | AGILENT TECHNOLOGIES | M13/67 |
| Mercury analyzer | DMA80 | Milestone | M13/117 |
| System for determination of ash melting behaviour | PR-37/1600 | Radio Research Institute | M14/88 |
| Sieve 0.075 mm | - | ATEST | M14/91 |

3. DESCRIPTION OF TEST SAMPLE

The object of the assessment was the sample of pellets with the diameter of 6 mm, described by the customer as pellets made of post-production chemically uncontaminated sawdust. Sample number: IKEAST-1/2024.

The sample was taken by the customer and delivered to the laboratory of Łukasiewicz Research Network - Poznań Institute Of Technology on 13th December 2024.

Identification number:: A-132/2025.

4. TEST RESULTS

Tests results are presented in Record No. 1/0132/01/2025.

5. ADDITIONAL INFORMATION

1. In the case of samples taken by the client, the Laboratory is not responsible for the identification and representativeness of the object, method and place of collection.
2. The expanded uncertainty was determined for coverage factor $k = 2$ and 95% confidence level. The measurement uncertainty does not take into account the uncertainty component associated with the sampling.

Record No. 1/0132/01/2025

Sample Name: Wood pellets
Name of Producer:: IKEA Industry Poland Sp z o.o. Oddział w Stalowej Woli
 ul. Władysława Grabskiego 43/43a, 37-450 Stalowa Wola
ENplus® ID/ Sample No.: PL031; IKEAST-1/2024

| Origin: | | 1. Woody biomass | | | | |
|--|---------------------------------|---|------------------------------|---|--------|-------|
| Traded form: | | Wood pellets | | | | |
| Classification of origin according to EN ISO 17225-1:2021 | | 1.2.1 Chemically untreated by-products and residues from the wood processing industry | | | | |
| Parameter | Unit | Value | Uncertainty [±] ¹ | Threshold values acc. to ENplus® ST 1001:2022 | | |
| | | | | A1 | A2 | B |
| Diameter | mm | 6.1 | 0.1 | 6 ± 1 / 8 ± 1 | | |
| Length | mm | 9.9 | 5.0 | 3.15 ≤ L ≤ 40 | | |
| Moisture | w-% _{ar} | 6.1 | 0.2 | ≤ 10 | | |
| Ash | w-% _d | 0.31 | 0.03 | ≤ 0.7 | ≤ 1.2 | ≤ 2.0 |
| Mechanical durability | w-% _{ar} | 99.4 | 0.1 | ≥ 98.0 | ≥ 97.5 | |
| Fines (< 3.15 mm) | w-% _{ar} | 0.15 | 0.02 | ≤ 1.0 (≤ 0.5%) ² | | |
| Coarse fines (3.15 < CPF < 5.6 mm) | w-% _{ar} | 0.14 | 0.02 | Value to be stated | | |
| Gross calorific value | MJ/kg _d | 20.47 | 0.08 | - | | |
| Net calorific value | MJ/kg _{ar} | 17.74 | 0.09 | ≥ 16.5 | | |
| | kWh/kg _{ar} | 4.93 | 0.03 | ≥ 4.6 | | |
| Bulk density | kg/m ³ _{ar} | 680 | 9 | 600 ≤ BD ≤ 750 | | |
| Particle density | g/cm ³ _{ar} | 1.30 | 0.04 | Value to be stated | | |

| | | | | | | |
|---|--------------------|--------|--------|--------------------|-------|--------|
| Carbon | w-% _d | 50.8 | 0.4 | - | | |
| Hydrogen | w-% _d | 6.57 | 0.15 | - | | |
| Nitrogen | w-% _d | 0.13 | 0.01 | ≤ 0.3 | ≤ 0.5 | ≤ 1.0 |
| Sulfur | w-% _d | 0.004 | 0.001 | ≤ 0.04 | | |
| Chlorine | w-% _d | 0.007 | 0.001 | ≤ 0.02 | | ≤ 0.03 |
| Ash shrinkage temperature SST ^{3,4} | °C | 1310 | 28 | Value to be stated | | |
| Ash deformation temperature DT ^{3,4} | °C | > 1500 | - | ≥ 1200 | | ≥ 1100 |
| Ash hemisphere temperature HT ^{3,4} | °C | > 1500 | - | Value to be stated | | |
| Ash flow temperature FT ^{3,4} | °C | > 1500 | - | Value to be stated | | |
| Arsenic | mg/kg _d | < 0.1 | - | ≤ 1 | | |
| Cadmium | mg/kg _d | 0.23 | 0.01 | ≤ 0.5 | | |
| Chromium | mg/kg _d | < 0.5 | - | ≤ 10 | | |
| Copper | mg/kg _d | 0.77 | 0.05 | ≤ 10 | | |
| Lead | mg/kg _d | < 0.5 | - | ≤ 10 | | |
| Mercury | mg/kg _d | 0.0021 | 0.0002 | ≤ 0.1 | | |
| Nickel | mg/kg _d | < 0.5 | - | ≤ 10 | | |
| Zinc | mg/kg _d | 9.53 | 0.02 | ≤ 100 | | |

_d dry _{ar} as received

1. the expanded uncertainty was determined for coverage factor $k = 2$ and 95% confidence level
2. at factory gate, at the end of production or when loading truck for deliveries to end-users (< 0.5% when filling pellet bags or sealed big bags)
3. characteristic ash melting temperature determined in an oxidizing atmosphere
4. ash received at 815°C

--- END OF REPORT ---