

PAGED hardwood plywood produced in Pisz and Morař



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EPD program operator:

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ITB is the verified member of The European Platform for EPD program operators and LCA practitioners.

Manufacturer:

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Basic information

This declaration is the type III Environmental Product Declaration (EPD) based on EN 15804 and verified according to ISO 14025 by an external auditor. It contains the information on the impacts of the declared construction materials on the environment. Their aspects were verified by the independent body according to ISO 14025. Basically, a comparison or evaluation of EPD data is possible only if all the compared data were created according to EN 15804 (see point 5.3 of the standard).

Life cycle analysis (LCA): A1-A3 modules in accordance with EN 15804 (Cradle to Gate)

The year of preparing the EPD: 2021

Declared durability: Under normal conditions, Paged hardwood plywood has reference service life (RSL) of 50 years

PCR: ITB PCR A (PCR based on EN 15804)

Declared unit: 1 m³ of ready-to-use hardwood plywood

Reasons for performing LCA: B2B

Representativeness: Polish product

Manufacturer and Product Information

For over eighty years, Paged has been offering a wide range of products and services to its customers in Europe. Product portfolio includes natural hardwood and conifer plywood, coated and film-faced plywood, fire-retardant plywood as well as specialty plywood composites such as ELKON® or COMPREG. As a business Paged strives to deliver the industry's best solutions and products to its partners. As a result, their products create value in a range of applications, from construction sites to heavy duty road transportation, specialty packaging and furniture industries

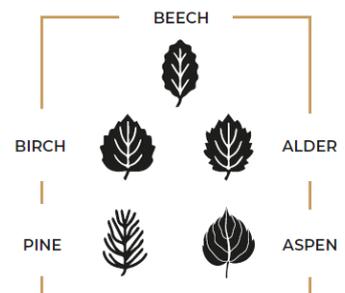


Production of all Pageds plywood is located in two sites, one in Morağ and one in Pisz. Raw wood like pine, birch, alder, aspen and beech comes from sustainably managed forests, under FSC® or PEFC™ systems for both plywood mills in north-eastern Poland. Production facilities operate in line with PN-EN ISO 9001:2015 Quality Management system, the PN-EN ISO 14001:2015 environmental management system and the occupational safety and hygiene management system PN-ISO 45001:2018.



Plywood is a natural and sustainable material. With the increasing use of modern technology, Paged is constantly improving their production facilities to increase its environmental performance. All of products adhere to the new, lower formaldehyde emission norms as confirmed by ZE05 certificate and E01 as confirmed by Hygienic Certificate according to CARB and TSCA IV regulations. Products also conform with low VOC emission norms, details of which can be found in relevant technical documentation.

Plywood is made up of thin multiple cross-banded veneers. In addition to standard cross-banded construction a range of orientated special constructions, aimed at specific end uses are available. Construction of plywood can be homogenous with all veneers throughout the construction of the same wood species or combi with same species veneers on each face and alternate inner veneers of softwood and hardwood species. Natural plywood is used widely in construction (e.g. wall, floor and roof panelling), interior design and fit-out (e.g. decorative panels), furniture manufacturing, window and door manufacturing and in the production of engineered wooden flooring and stairs. All of manufactured plywood is graded as one of the four appearance classes:

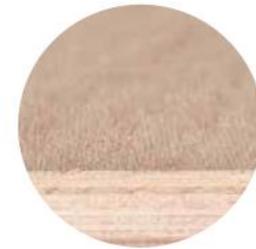


I, II, III and IV according to PN-EN 635-2 /635-3. Below you may find plywood types, which are

grouped in this Environmental declaration as hardwood plywood.

Paged BeechPly

A unique face quality plywood panel, made of locally sourced beech offers its users superb rigidity, durability and the highest face sheet quality possible. It is highly recognized by furniture makers and designers around the world.



Specification of BeechPly

| | |
|------------------------------------|-------------------------------------------------------------|
| Standard sizes | 1250/1500*2500 mm 1250*1950/2200 mm 2500*1250/1500 mm |
| Nominal thickness | 4-30 mm* |
| Density | 720-880 kg/m ^{3**} |
| Release of formaldehyde (EN 717-1) | ½ E1 |
| Bonding quality (EN 314-2) | Class 1 Class 2 Class 3 |

*other thicknesses available upon request

** as measured at 8-12% moisture content

Advantages

- ✓ high quality face veneers
- ✓ natural finish and uniform wood structure
- ✓ increased moisture resistance
- ✓ durability and strength
- ✓ easy to coat, varnish and paint
- ✓ impact resistant



Natural product



Sustainable manufacturing process



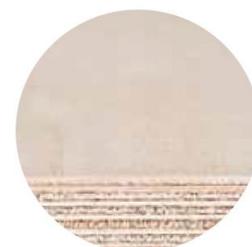
Dimensional stability



Compliance E20 R11811 - 02 4000

Paged BirchPly

High quality hardwood plywood made of sustainably sourced Baltic birch and available in a wide range of thicknesses and formats. Paged BirchPly is noted for its strength, durability, rigidity, and resistance to splitting and warping. It can be used where special strength and high quality is required, especially for construction, joinery and transport industries.



Specification of BirchPly

| | |
|------------------------------------|-----------------------------------------------------------------------------------|
| Standard sizes | 1250/*2500/3000 mm 1500*2500/3000/3300 mm 1530*2230 mm 2500*1250/1500 mm |
| Nominal thickness | 4-45 mm* |
| Density | 640-760 kg/m ^{3**} |
| Release of formaldehyde (EN 717-1) | ½ E1 |
| Bonding quality (EN 314-2) | Class 1 Class 2 Class 3 |

*other thicknesses available upon request
 ** as measured at 8-12% moisture content

Advantages

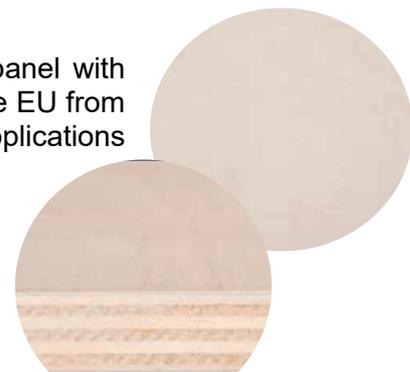
- ✓ high durability
- ✓ natural finish and uniform wood structure
- ✓ increased moisture resistance
- ✓ high resistance and durability
- ✓ low swelling
- ✓ easy to coat, varnish and paint



| | | | | | |
|------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|
|  Natural product |  Sustainable manufacturing process |  Dimensional stability |  Compliance E20 R118II – 02 4000 |  Vapour permeability |  Easy to machine |
|------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------|

Paged LightPly

Paged LightPly is an ultralight, high quality decorative plywood panel with elegant Baltic birch face veneer and Nordic aspen core made in the EU from sustainable Estonian forests. It is characterised by a plethora of applications thanks to its lightness, surface quality and excellent mechanical properties. Paged LightPly has been specifically designed to bring natural design, panel lightness and ease of machining to the interior design and furniture customers.



Specification of LightPly

| | |
|------------------------------------|------------------------------|
| Standard sizes | 2440*1220 mm 2500*1250 mm |
| Nominal thickness | 7-27 mm* |
| Density | 520-590 kg/m ^{3**} |
| Release of formaldehyde (EN 717-1) | ½ E1 |
| Bonding quality (EN 314-2) | Class 2 Class 3 |

*other thicknesses available upon request
 ** as measured at 8-12% moisture content

Advantages

- ✓ dimensional stability
- ✓ high durability
- ✓ low weight
- ✓ easy to machine
- ✓ high quality face veneers
- ✓ easy to coat, varnish and paint
- ✓ high value of face screw holding



| | | | |
|--------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
|  Natural product |  Sustainable manufacturing process |  Dimensional stability |  Easy to machine |
|--------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|

Paged Nature

Paged Nature was designed specifically for the needs of modern interior designers and furniture makers. It is built of furniture-grade birch veneers covered in natural wood veneers, depending on the customer's choice. It is a long-lasting and durable material that is easy to machine into different dimensions and shapes using any type of joinery machinery.



Specification of Nature

| | |
|------------------------------------|-----------------------------|
| Standard sizes | 2500*1250 mm |
| Nominal thickness | 4-40 mm* |
| Density | 640-760 kg/m ^{3**} |
| Release of formaldehyde (EN 717-1) | ½ E1 |
| Bonding quality (EN 314-2) | Class 2 |

*other thicknesses available upon request
 ** as measured at 8-12% moisture content

Advantages

- ✓ natural and homogenous appearance
- ✓ increased moisture resistance
- ✓ low swelling
- ✓ easy to coat, varnish and pain
- ✓ low weight
- ✓ strong and dimensionally stable



Paged TwinPly

Paged TwinPly offers a perfect balance between the high quality surface of face birch veneers and the lightness and natural moisture resistance that softwood brings to its core. The natural wood surface is an elegant interior material. It works in both modern housing, construction and shopfitting as well as traditional interior design. Paged TwinPly brings natural atmosphere to the room. It is easy to handle and can be machined with common hand tools.



Specification of TwinPly

| | |
|------------------------------------|------------------------------|
| Standard sizes | 1250*2500 mm 1220*2440 mm |
| Nominal thickness | 9-40 mm* |
| Density | 605 kg/m ^{3**} |
| Release of formaldehyde (EN 717-1) | ½ E1 |
| Bonding quality (EN 314-2) | Class 3 |

*other thicknesses available upon request
 ** as measured at 8-12% moisture content

Advantages

- ✓ natural finish and uniform
- ✓ wood structure
- ✓ high value of modulus of elasticity
- ✓ and bending resistance
- ✓ easy to machine
- ✓ increased moisture resistance
- ✓ easy to coat, varnish and paint
- ✓ universal in application
- ✓ low swelling
- ✓ lightweight



Environmental characteristics (LCA) for Paged hardwood plywood products is scoped for hardwood products presented in table below and it is a mix of PF hardwood, MUPF hardwood, UF hardwood plywood with birch and beech wood for interior and exterior usage produced in Pisz and Morąg.

| Product | Description | % of production in Morąg | % of production in Pisz |
|----------------------|---------------------------------------------------------------------------------------------------------------------------|--------------------------|-------------------------|
| PF hardwood | Phenolic formaldehyde resin hardwood plywood for outdoor usage | 41,47 | 67,1 |
| MUPF hardwood | Melamine-urea-phenolic formaldehyde resin hardwood plywood for humid conditions | 0,02 | 9,3 |
| UF hardwood | Urea formaldehyde resin hardwood plywood for indoor usage | 17,42 | 9,3 |
| MUPF softwood | Melamine-urea-phenolic resin softwood plywood for humid conditions | 1,15 | 15,3 |
| compreg | Layered wood material, hot-pressed under high pressure, made of beech or birch veneers coated with special phenolic resin | - | 0,1 |
| elkon | Elkon is a high density wooden laminate commonly used for the production of power transformers | - | 0,8 |
| PF softwood | Phenolic resin softwood plywood for outdoor usage | 39,94 | - |

LIFE CYCLE ASSESSMENT (LCA) – general rules applied

Allocation

The allocation rules used for this EPD are based on general ITB-PCR A. The PAGED hardwood plywood products production is a line process with multiple co-products. Allocation was done on product mass basis.

All impacts from raw materials extraction are allocated in A1 module of EPD. 99,9% of impacts from line production were inventoried and allocated to PAGED hardwood plywood production. Municipal waste and waste water of whole factory were allocated to module A3. Electricity was inventoried for whole production process. Emissions are measured separately as well and presented in A3 module.

System limits

The life cycle analysis of the examined products covers “Product Stage”, A1-A3 modules (Cradle to Gate) in accordance with EN 15804+A1 and ITB-PCR A. Details on systems limits are provided in product specific report. All materials and energy consumption inventoried in factory were included in calculation. Office impacts were also taken into consideration. In the assessment, all significant parameters from gathered production data are considered, i.e. all material used per formulation, utilized thermal energy, internal fuel and electric power consumption, direct production waste, and all available emission measurements. This study also takes into account some material flows of less than 1% and energy flows with a proportion of less than 1 %. It can be assumed that the total sum of omitted processes does not exceed 5% of all impact categories. In accordance with EN 15804, machines and facilities (capital goods) required for and during production are excluded, as is transportation of employees.

A1 and A2 Modules: Raw materials supply and transport

Raw materials for PAGED hardwood plywood components production come from local suppliers and more distant locations. Data on transport of the different products to the manufacturing plants is collected and modelled for factory by assessor. Means of transport include trucks and Polish and European fuel averages are applied.

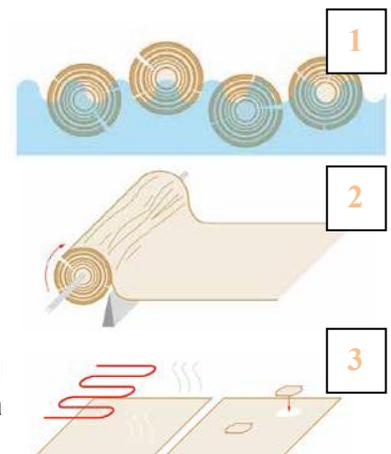
The main raw material for module A1 is wood, which has a 'negative' biogenic carbon value and contributes significantly to total fossil fuel energy. The values of the environmental impact of the product in module A1 are a component of the sum of raw materials in the production of plywood.

A3: Production

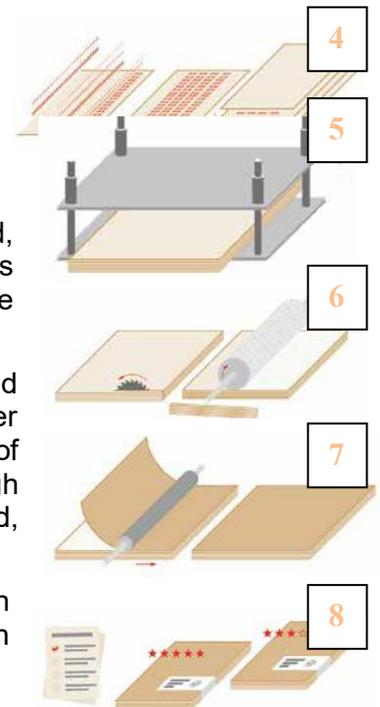
Figures to the right, show the working process during the production of PAGED hardwood plywood products in Pisz and Morąg.

1) Wood logs which are the raw material for plywood manufacturing undergo hydrothermal processing. The hydrothermal processing is carried out in soaking pools filled with water at a temperature of 40–60°C depending on the wood species. Next, through mechanical debarking, the logs are cleared of bark and mineral residues accumulated in the bark during the process of logging and transport.

2) A cut to size wood log is delivered to a rotary peeling machine. Once fitted at a right angle against a rotary lathe, a log is being rotated against the blade. The peeling blade cuts a layer of veneer in the form of a veneer band.



- 3) Drying and surface repairing of veneers.
- 4) Adhesive application and plywood sets assembly.
- 5) Hot pressing. The sets of veneers are hot-pressed under pressure in hydraulic multi-platen presses. The veneers are pressed together and from now are permanently bonded.
- 6) Final processing and sanding. Following the seasoning of plywood, the plywood sheets are finally processed and cut to target size with the excess material cut off on a profiling machine. Next the surfaces of face veneers are calibrated and sanded in a precise sanding machine.
- 7) Overlaying, filming, surface treatment. If required by the end application of plywood panel, at this stage in the process a special paper impregnated with resin (also referred to as film) is applied onto the surface of plywood board. This process is carried out in high pressure and high temperature environment, causing the resin to pass to the core veneers and, as a result, to produce a surface with new performance properties.
- 8) Quality inspection and grade sorting. Sorting of plywood is based on quality inspection and classification of plywood face veneers in line with quality systems' requirements, technical standards and specifications.



Data collection period

The data for manufacture of the examined products refer to period between 01.01.2019-31.12.2019. The life cycle assessments were prepared for Poland as reference area.

Data quality

The values determined to calculate the LCA originate from verified Paged inventory data.

Assumptions and estimates

The impacts of the representative Paged products for each hardwood plywood were aggregated using weighted average. The weighted average method was used according to the percentage of each product in hardwood plywood based on the relation to whole production quantity. Impacts for each product and factory were inventoried and calculated separately.

Calculation rules

LCA was done in accordance with PCR A document.

Databases

The data for the processes come from the following databases: Ecoinvent, ITB-Data. Specific data quality analysis was a part of external ISO 14001 audit. Characterization factors are CML ver. 4.2 based on EN 15804:2012+A1:2013 version (PN-EN 15804+A1:2014-04)



LIFE CYCLE ASSESSMENT (LCA) - Results

Declared unit

The declaration refers to 1 m³ of complete Paged hardwood plywood.

Table 2. System boundaries for environmental characteristic for Paged hardwood plywood

| Environmental assessment information (MNA – Module not assessed, MD – Module Declared, INA – Indicator Not Assessed) | | | | | | | | | | | | | | | | |
|----------------------------------------------------------------------------------------------------------------------|-----------|---------------|--------------------------------|-----------------------------------|-----------|-------------|--------|-------------|---------------|------------------------|-----------------------|---------------------------|-----------|------------------|-----------------------------------------------|------------------------------------|
| Product stage | | | Construction process | | Use stage | | | | | | | End of life | | | Benefits and loads beyond the system boundary | |
| Raw material supply | Transport | Manufacturing | Transport to construction site | Construction-installation process | Use | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | Deconstruction demolition | Transport | Waste processing | Disposal | Reuse-recovery-recycling potential |
| A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
| MD | MD | MD | MNA | MNA | MNA | MNA | MNA | MNA | MNA | MNA | MNA | MNA | MNA | MNA | MNA | MNA |



Paged hardwood plywood

| Environmental impacts: (1 m ³) | | | | | |
|-------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|-----------|----------|----------|-----------|
| Indicator | Unit | A1 | A2 | A3 | A1-A3 |
| Global warming potential | [kg CO ₂ eq.] | -9.70E+01 | 3.14E+00 | 7.11E+00 | -8.68E+01 |
| Depletion potential of the stratospheric ozone layer | [kg CFC 11 eq.] | 4.75E-05 | 0.00E+00 | 0.00E+00 | 4.75E-05 |
| Acidification potential of soil and water | [kg SO ₂ eq.] | 3.01E+00 | 2.31E-02 | 4.50E-01 | 3.48E+00 |
| Eutrophication potential | [kg (PO ₄) ³⁻ eq.] | 1.00E+00 | 1.66E-03 | 6.81E-03 | 1.01E+00 |
| Formation potential of tropospheric ozone | [kg Ethene eq.] | 2.24E+00 | 4.07E-03 | 6.36E-02 | 2.30E+00 |
| Abiotic depletion potential (ADP-elements) for non-fossil resources | [kg Sb eq.] | 3.29E+00 | 0.00E+00 | 2.63E-05 | 3.29E+00 |
| Abiotic depletion potential (ADP-fossil fuels) for fossil resources | [MJ] | 1.08E+04 | 3.48E+01 | 5.44E+01 | 1.09E+04 |
| Environmental aspects on resource use: (1 m ³) | | | | | |
| Indicator | Unit | A1 | A2 | A3 | A1-A3 |
| Use of renewable primary energy excluding renewable primary energy resources used as raw materials | [MJ] | INA | INA | INA | INA |
| Use of renewable primary energy resources used as raw materials | [MJ] | INA | INA | INA | INA |
| Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials) | [MJ] | 8.96E+03 | 4.72E-02 | 5.94E+00 | 8.96E+03 |
| Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials | [MJ] | INA | INA | INA | INA |
| Use of non-renewable primary energy resources used as raw materials | [MJ] | INA | INA | INA | INA |
| Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) | [MJ] | 1.13E+04 | 3.83E+01 | 5.98E+01 | 1.14E+04 |
| Use of secondary material | [kg] | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Use of renewable secondary fuels | [MJ] | 0.00E+00 | 0.00E+00 | 5.80E+03 | 5.80E+03 |
| Use of non-renewable secondary fuels | [MJ] | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Net use of fresh water | [dm ³] | 4.09E+02 | 3.31E+00 | 7.76E+02 | 1.19E+03 |
| Other environmental information describing waste categories: (1 m ³) | | | | | |
| Indicator | Unit | A1 | A2 | A3 | A1-A3 |
| Hazardous waste disposed | [kg] | 5.28E-03 | 0.00E+00 | 1.52E+00 | 1.53E+00 |
| Non-hazardous waste disposed | [kg] | 5.00E+01 | 0.00E+00 | 1.17E+01 | 6.17E+01 |
| Radioactive waste disposed | [kg] | 1.34E-02 | 0.00E+00 | 0.00E+00 | 1.34E-02 |
| Components for re-use | [kg] | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Materials for recycling | [kg] | 0.00E+00 | 0.00E+00 | 1.52E+00 | 1.52E+00 |
| Materials for energy recover | [kg] | 0.00E+00 | 0.00E+00 | 3.06E+02 | 3.06E+02 |
| Exported energy | [MJ per energy carrier] | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |

Verification

The process of verification of this EPD is in accordance with ISO 14025, ISO 21930. After verification, this EPD is valid for a 5-year-period. EPD does not have to be recalculated after 5 years, if the underlying data have not changed significantly.

| |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| The basis for LCA analysis was EN 15804 and ITB PCR A |
| Independent verification corresponding to ISO 14025 (subclause 8.1.3) <input checked="" type="checkbox"/> external <input type="checkbox"/> internal |
| External verification of EPD: PhD. Eng. Halina Prejzner LCA. LCI audit and input data verification: M.Sc. Eng. Dominik Bekierski. d.bekierski@itb.pl Verification of LCA: PhD Eng. Michał Piasecki. m.piasecki@itb.pl |

References

- ITB PCR A- General Product Category Rules for Construction Products
- ISO 14025:2006 Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures
- ISO 21930:2017 Sustainability in buildings and civil engineering works -- Core rules for environmental product declarations of construction products and services
- ISO 14044:2006. Environmental management – Life cycle assessment – Requirements and guidelines
- ISO 15686-1:2011 Buildings and constructed assets -- Service life planning -- Part 1: General principles and framework
- ISO 15686-8:2008 Buildings and constructed assets -- Service-life planning -- Part 8: Reference service life and service-life estimation
- EN 15804:2012+A1:2013 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
- EN 15942:2011 Sustainability of construction works - Environmental product declarations - Communication format business-to-business



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CERTIFICATE No 206/2021 of TYPE III ENVIRONMENTAL DECLARATION

Product:

PAGED hardwood plywood produced in Pisz and Morąg

Manufacturer:

Paged Pisz Sp. z o.o.

Kwiatowa 1, 12-200 Pisz, Poland

confirms the correctness of the data included in the development of
Type III Environmental Declaration and accordance with the requirements of the standard

PN EN 15804+A1:2014-04

Sustainability of construction works.

Environmental product declarations.

Core rules for the product category of construction products.

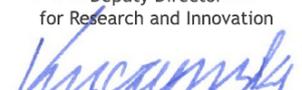
This certificate, issued for the first time on 22nd March 2021 is valid for 5 years
or until amendment of mentioned Environmental Declaration

Acting Head of the Thermal Physic, Acoustics
and Environment Department


Agnieszka Winkler-Skalna, PhD



Deputy Director
for Research and Innovation


Krzysztof Kuczyński, PhD

Warsaw, March 2021