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LAMINATE POLYURETHANE-MINERAL (PUM) UNDERLAYS

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ITB is the verified member of The European Platform for EPD program operators and LCA practitioner (Eco-Platform)

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, C1-C4 and D modules, in accordance with EN 15804

(Cradle to Gate with options)

The year of preparing the EPD: 2022

Product standard: EN 16354:2018

Service Life: 50 years, SL shall vary depending on a specific scenario of application

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

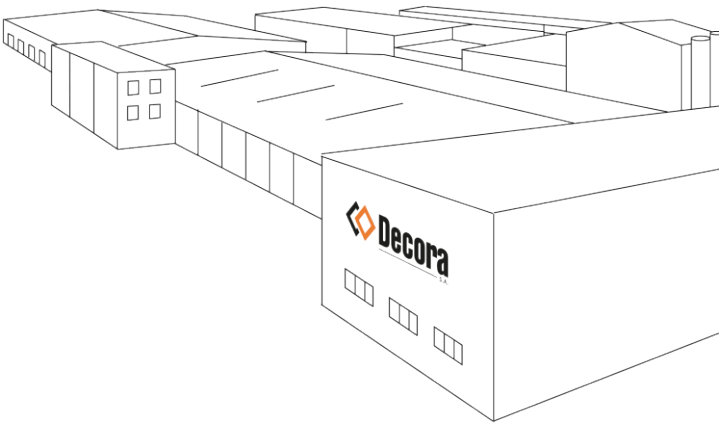
Declared unit: 1 m^2, PU laminated underlays, from 1.1 mm to3,0mm thickness

Reasons for performing LCA: B2B

Representativeness: manufactured in Poland, year 2021

BASIC INFORMATION

Decora S.A. is an international production company with a manufacturing plant located in Środa Polska (Poland). Company is the European leader in the production of floor underlays and the only company in Europe that produces floor underlays in 3 different technologies; PUM, XPS and PEHD Aquastop. The company sells its products on 5 continents, although it focuses on European Union markets. The company has implemented a zero-waste policy.



PRODUCTS DESCRIPTION

This environmental declaration type III covers products from the polyurethane-mineral (PUM) underlays group. The products are made of polyurethane foam with a mineral filling and laminated with PET. The underlay for floor panels is an important element of the new floor, which significantly affects its durability, improves the acoustic comfort by high level of noise reduction. Products (figure 1) are intended to be used for rooms with high traffic intensity and provide heavy load resistance. The products are manufactured in three basic thicknesses from 1.1 to 3.0 mm. The basic products are 1,1mm, 1,5mm, 2,0mm and 3,0mm. All products have a set of tests in accordance with the EN 16354 standard.

Thickness: 1,1 mm

Thickness: 1,5 mm

Thickness 2,0 mm

Thickness: 3,0 mm

Figure 1. Specific products covered by EPD.

All specific product technical data is available at manufacturer website. The products may be available under the Decora brands.

Arbiton FLOOR EXPERT

Leading european brand for floors and accessories, real FLOOR EXPERT, a synonym of high quality and technologically advanced products.

ewifoam® PROFESSIONAL FLOOR EXPERT

German brand of floor underlays for professionals

AFIRMAX

Mineral core floors and underlays for DIY

LIFE CYCLE ASSESSMENT (LCA) – GENERAL RULES APPLIED

Declared Unit

1 m^2, PU laminated underlays, from1.1 mm to– 3,0mm thickness

System boundary

The life cycle analysis of the declared product covers “Product Stage” A1-A3, C1-C4+D modules in accordance with EN 15804 and ITB PCR A (cradle to gate with options).

Allocation

The allocation rules used for this EPD are based on general ITB PCR A. The EPD is representative for all PUM underlay products (production impacts are allocated the same way, mass based). Allocation covers 100% of production, where production of PUM products is 25%. In collaborative processes (all products), e.g. energy consumption for a production hall or offices, impacts were allocated on the basis of total mass allocation.

System limits

Minimum 99.0% input materials and 100% energy consumption (electricity, gas) were inventoried in manufacturing plant and were included in the calculation. In the assessment, all significant parameters from gathered production data are considered, i.e. all material used per formulation, utilized thermal energy, and electric power consumption, direct production waste and available emission measurements. Tires consumption for transport was not taken into account. Limited number of substances with a percentage share of less than 0.1% of total mass might be excluded from the calculations. It is assumed that the total sum of omitted processes does not exceed 1% of all impact categories. Wooden packaging products are excluded in the analysis (considered as closed loop products). In accordance with EN 15804 machines and facilities required for and during production are excluded, as is transportation of employees.

A1 and A2 Modules: Raw materials supply and transport

All resource products (used for a production) were inventoried. A vast majority of components necessary for chemical reactions are sourced from foreign chemical production suppliers (not providing specific impacts) so the general data for these product was used in LCA. The transport to the factory has been fully inventoried (LCI questionnaire) taking into account the number of deliveries: type of vehicles, the size of the delivery and the distance from the manufacturer to the factory for all input sources and raw materials. Packing (e.g. wooden pallets) circulates almost in a closed cycle (therefore it is not included in LCA). For A2 calculation purposes, manufactured inventory data is analysed and European averages for fuel data are applied.

A3: Production

Polyurethane underlays are formed as a product of a chemical reaction. The main ingredients are polyols, isocyanate, modifiers and mineral filler. To control reaction speed catalysts are being used. All components (including minerals) according to formulation are being dosed and mixed in a liquid form.

Then the mixture is laminated with a PET film, hardened and foamed under the influence of temperature.

The product is cooled down, cut and rolled into rolls. The products are packed in boxes.

Finally, the products are loaded on trucks and delivered to the customer.

End of life scenarios (C and D modules)

The end-of-life scenario for all products has been generalized based on actual state of the art. It is assumed that in the end of life stage (C1), some electric/mechanical energy is needed to remove products from installation place, the transport distance for waste to waste processing (C2) is 100 km on > 10t loaded lorry with 75% capacity utilization and fuel consumption of 20 l per 100 km. At the end of life, the underlays are dismantled and the materials recycled according to the national treatment practice of waste what is

presented in Table 1. It is assumed that 20% of the product can be recovered in the recycling process. The remaining 40% may be designated for incineration and the remaining 40% for landfill. The reuse, recovery and recycling stage are considered beyond the system boundaries (D) (reuse potential and incineration – gained heat). The end of life scenario for PUM underlays is provided in Table 1.

Table 1. End-of-life scenario (C modules) for PUM underlays

Parameter	Contribution
Collection rate	100%
Recycling	20%
Incineration	40%
Landfilling	40%

Electricity at end-of-life (module C) has been modelled using an average Polish electricity mix as the location where the product reaches end-of-life is unknown.

Data collection period

The data for manufacture of the declared products refer to period between 01.01.2021 – 31.12.2021 (1 year). The life cycle assessments were done for Poland as reference area.

Calculation rules

LCA was done in accordance with ITB PCR a document. Characterization factors are CML ver. 4.2 based.

ITB-LCA algorithms were used for impact calculations. A1 was calculated based on data from the database, A2 and A3 are calculated based on the LCI questionnaire provided by the manufacturer. Emission of greenhouse gases was calculated using the IPCC 2013 GWP method with a 100-year horizon. Emission of acidifying substances, Emission of substances to water contributing to oxygen depletion, Emission of gases that contribute to the creation of ground-level ozone, Abiotic depletion, and ozone depletion emissions where all calculated with the CML-IA baseline method.

Data quality - production

The values determined to calculate A1-A3 originate from verified process LCI inventory data form production plant. A1 values for inputs were prepared considering input products characteristics based on Eco invent data. The energy consumption of production and its impact on the production lines were separately inventoried and calculated. In accordance with Annex E of the EN 15804 + A2, a data quality assessment was performed with a quality level of " good".

Assumptions and estimates

According to the data adopted from the Ecoinvent 3.8 database, the post-consumer scrap is not burdened with the environmental impacts.

Databases

The background data for the processes come from the following databases: Ecoinvent v.3.8 (polyol, isocyanate, minerals, catalyst, pigment, modifiers, PET, transport, energy carriers, heat, diesel, gas, paper, foils, other, waste processing, incineration, landfill) and KOBiZE (Polish electricity mix and combustion factors for fuels). KOBIZE data is supplemented with Ecoinvent data on the Polish electricity mix impact where no specific indicator data is provided. Specific (LCI) data quality analysis was a part of the input data verification. The time related quality of the data used is valid (5 years).

Additional information

Polish electricity mix used is 0.698 kg CO2/kWh (KOBiZE, 2021). The product has the Blauer Engel ecolabel.

LIFE CYCLE ASSESSMENT (LCA) – RESULTS

Declared unit

The declaration refers to the declared unit DU – 1 m^2 of PUM underlays. The following life cycle modules are included in the declaration (Table 2). Tables 3-18 provides the environmental impacts of 1 m^2 of product with specific thickness (1.1, 1.5, 2 and 3 mm).

Table 2. System boundaries (life stage modules included) in a product environmental assessment

Environmental assessment information (MA – Module assessed, MNA – Module not assessed, 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**
MA	**MA**	**MA**	**MNA**	**MNA**	**MNA**	**MNA**	**MNA**	**MNA**	**MNA**	**MNA**	**MNA**	**MA**	**MA**	**MA**	**MA**	**MA**

The conversion coef. can be used for specific product densities and thicknesses. The impact values given in Table 3-6 should then be multiplied by the conversion coef. in the table below for each specific product.

No	Thickness [mm]:	Gęstość [kg/m^3]	Coef.
1.	1.1	1000	1.0
2.	1.1	1150	1.2
3.	1.4	1000	1.4
4.	1.5	1000	1.5
5.	1.5	600	0.9
6.	1.5	800	1.2
7.	1.6	1000	1.6
8.	1.8	800	1.4
8.	1.8	1000	1.8
9.	1.8	1150	2.1
10.	2	780	1.6
11.	2.1	900	1.9
12.	2.2	700	1.5
13.	2.4	800	1.9
14.	2.6	840	2.2
15.	3	600	1.9

Table 3. Life cycle assessment (LCA) results of PUM underlay– the environmental impacts (DU: 1 m^2; 1.1 mm; approx.1.1 kg)

Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
Global Warming Potential*	eq. kg CO_2	1.00E+00	4.60E-02	3.28E-01	7.68E-02	7.51E-04	7.55E-01	8.53E-02	-2.79E-01
Greenhouse gas potential - fossil	eq. kg CO_2	1.02E+00	4.55E-02	3.14E-01	7.53E-02	7.43E-04	7.34E-01	8.53E-02	-2.79E-01
Greenhouse gas potential - biogenic	eq. kg CO_2	-1.47E-02	1.42E-04	9.25E-03	2.20E-03	2.31E-06	2.04E-02	7.70E-04	-1.01E-03
Global warming potential - land use and land use change	eq. kg CO_2	5.11E-04	1.65E-05	1.10E-04	2.64E-05	2.69E-07	1.26E-05	6.22E-06	-1.28E-04
Stratospheric ozone depletion potential	eq. kg CFC 11	7.78E-08	1.10E-08	6.50E-09	1.54E-09	1.79E-10	2.57E-09	1.77E-09	-2.31E-08
Soil and water acidification potential	eq. mol H+	5.33E-03	1.87E-04	3.48E-03	8.36E-04	3.05E-06	1.57E-03	5.06E-05	-1.02E-03
Eutrophication potential - freshwater	eq. kg P	2.94E-04	2.97E-06	5.95E-04	1.43E-04	4.83E-08	6.19E-06	8.97E-07	-1.78E-04
Eutrophication potential - seawater	eq. kg N	1.70E-03	5.57E-05	5.12E-04	1.21E-04	9.08E-07	5.34E-04	3.85E-04	-3.34E-04
Eutrophication potential - terrestrial	eq. mol N	9.80E-03	6.07E-04	4.26E-03	1.02E-03	9.90E-06	1.35E-03	1.82E-04	-1.53E-03
Potential for photochemical ozone synthesis	eq. kg NMVOC	4.80E-03	2.02E-04	1.19E-03	2.86E-04	3.30E-06	3.55E-04	7.15E-05	-8.66E-04
Potential for depletion of abiotic resources - non-fossil resources	eq. kg Sb	1.80E-05	1.08E-07	1.53E-06	3.67E-07	1.76E-09	4.09E-07	2.02E-08	-3.93E-06
Abiotic depletion potential - fossil fuels	MJ	8.70E+00	7.03E-01	5.32E+00	1.28E+00	1.15E-02	9.52E-02	1.32E-01	-3.66E+00
Water deprivation potential	eq. m^3	1.15E+00	3.24E-03	1.12E-01	2.64E-02	5.28E-05	2.83E-02	7.70E-04	-2.34E-01

*The value of the carbon footprint of the product in the product stage A1-A3 is 1.38 kg CO_2/kg

Table 4. Life cycle assessment (LCA) results of PUM underlay – the environmental aspects (DU: 1 m^2; 1.1 mm; 1.1 kg)

Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
Consumption of renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	2.26E+00	9.11E-03	3.94E-01	9.46E-02	1.49E-04	1.60E-02	2.53E-03	-5.34E-01
Consumption of renewable primary energy resources used as raw materials	MJ	7.83E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.57E-01
Total consumption of renewable primary energy resources	MJ	3.04E+00	9.11E-03	3.94E-01	9.46E-02	1.49E-04	1.60E-02	2.53E-03	-6.91E-01
Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	1.60E+01	7.03E-01	5.33E+00	1.28E+00	1.15E-02	-8.33E+00	-2.11E+01	-5.13E+00
Consumption of non-renewable primary energy resources used as raw materials	MJ	4.46E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.51E+00	2.13E+01	-8.92E-01
Total consumption of non-renewable primary energy resources	MJ	2.05E+01	7.03E-01	5.33E+00	1.28E+00	1.15E-02	1.79E-01	1.36E-01	-6.02E+00
Consumption of secondary materials	kg	1.74E-03	1.97E-04	4.94E-04	1.17E-04	3.22E-06	2.42E-04	4.83E-05	-5.18E-04
Consumption of renewable secondary fuels	MJ	4.01E-04	1.75E-06	2.72E-06	6.50E-07	2.85E-08	1.37E-05	1.86E-06	-8.09E-05
Consumption of non-renewable secondary fuels	MJ	5.67E-11	0.00E+00	4.30E-03	1.03E-03	0.00E+00	0.00E+00	0.00E+00	-8.59E-04
Net consumption of freshwater resources	m^3	3.40E-02	9.11E-05	1.48E-03	3.47E-04	1.49E-06	3.51E-04	1.43E-04	-6.69E-03

Table 5. Life cycle assessment (LCA) results of PUM underlay – the environmental impacts relate to waste management (DU: 1 m^2; 1.1 mm; 1.1 kg)

Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
Hazardous waste, neutralized	kg	5.21E-02	7.59E-04	6.37E-04	1.32E-05	1.24E-05	3.85E-03	2.75E-04	-9.76E-03
Non-hazardous waste, neutralised	kg	7.75E-01	1.32E-02	5.39E-02	6.86E-04	2.15E-04	2.66E-01	5.54E-01	-1.68E-01
Radioactive waste	kg	3.69E-06	4.79E-04	3.98E-06	9.57E-07	7.81E-06	5.18E-07	8.03E-09	-9.74E-05
Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	kg	8.61E-05	2.28E-06	5.51E-03	1.32E-06	3.71E-08	5.28E-01	3.49E-07	-1.12E-03
Exported energy	MJ	5.90E-07	1.61E-08	4.84E-08	1.16E-08	2.63E-10	2.63E-08	4.58E-09	-1.23E-07

Table 6. Life cycle assessment (LCA) results of PUM underlay – the environmental additional information (DU: 1 m^2; 1.1 mm; approx.1.1 kg)

Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
Particulate matter	disease incidence	INA	INA	INA	INA	INA	INA	INA	INA
Potential human exposure efficiency relative to U235	eg. kBq U235	INA	INA	INA	INA	INA	INA	INA	INA
Potential comparative toxic unit for ecosystems	CTUe	INA	INA	INA	INA	INA	INA	INA	INA
Potential comparative toxic unit for humans (cancer effects)	CTUh	INA	INA	INA	INA	INA	INA	INA	INA
Potential comparative toxic unit for humans (non-cancer effects)	CTUh	INA	INA	INA	INA	INA	INA	INA	INA
Potential soil quality index	dimensionless	INA	INA	INA	INA	INA	INA	INA	INA

Table 7. Life cycle assessment (LCA) results of PUM underlay– the environmental impacts (DU: 1 m^2; 1.5 mm; approx.1.5 kg)

Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
Global Warming Potential	eq. kg CO_2	1,37E+00	6,28E-02	4,47E-01	1,05E-01	1,02E-03	1,03E+00	1,16E-01	-3,81E-01
Greenhouse gas potential - fossil	eq. kg CO_2	1,38E+00	6,21E-02	4,28E-01	1,03E-01	1,01E-03	1,00E+00	1,16E-01	-3,81E-01
Greenhouse gas potential - biogenic	eq. kg CO_2	-2,00E-02	1,93E-04	1,26E-02	3,00E-03	3,15E-06	2,78E-02	1,05E-03	-1,38E-03
Global warming potential - land use and land use change	eq. kg CO_2	6,96E-04	2,25E-05	1,50E-04	3,60E-05	3,67E-07	1,72E-05	8,48E-06	-1,75E-04
Stratospheric ozone depletion potential	eq. kg CFC 11	1,06E-07	1,50E-08	8,87E-09	2,10E-09	2,44E-10	3,50E-09	2,41E-09	-3,15E-08
Soil and water acidification potential	eq. mol H+	7,26E-03	2,55E-04	4,75E-03	1,14E-03	4,16E-06	2,14E-03	6,90E-05	-1,39E-03
Eutrophication potential - freshwater	eq. kg P	4,01E-04	4,04E-06	8,12E-04	1,95E-04	6,59E-08	8,45E-06	1,22E-06	-2,43E-04
Eutrophication potential - seawater	eq. kg N	2,32E-03	7,59E-05	6,99E-04	1,65E-04	1,24E-06	7,28E-04	5,25E-04	-4,56E-04
Eutrophication potential - terrestrial	eq. mol N	1,34E-02	8,28E-04	5,81E-03	1,40E-03	1,35E-05	1,85E-03	2,48E-04	-2,08E-03
Potential for photochemical ozone synthesis	eq. kg NMVOC	6,54E-03	2,76E-04	1,62E-03	3,90E-04	4,50E-06	4,84E-04	9,75E-05	-1,18E-03
Potential for depletion of abiotic resources - non-fossil resources	eq. kg Sb	2,46E-05	1,47E-07	2,09E-06	5,01E-07	2,40E-09	5,58E-07	2,75E-08	-5,36E-06
Abiotic depletion potential - fossil fuels	MJ	1,19E+01	9,59E-01	7,25E+00	1,74E+00	1,56E-02	1,30E-01	1,80E-01	-4,99E+00
Water deprivation potential	eq. m^3	1,56E+00	4,42E-03	1,52E-01	3,60E-02	7,20E-05	3,86E-02	1,05E-03	-3,18E-01

Table 8. Life cycle assessment (LCA) results of PUM underlay – the environmental aspects (DU: 1 m^2; 1.5 mm; 1.5 kg)

Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
Consumption of renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	3.08E+00	1.24E-02	5.37E-01	1.29E-01	2.03E-04	2.19E-02	3.45E-03	-7.28E-01
Consumption of renewable primary energy resources used as raw materials	MJ	1.07E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-2.14E-01
Total consumption of renewable primary energy resources	MJ	4.15E+00	1.24E-02	5.37E-01	1.29E-01	2.03E-04	2.19E-02	3.45E-03	-9.42E-01
Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	2.19E+01	9.59E-01	7.27E+00	1.75E+00	1.56E-02	-1.14E+01	-2.88E+01	-6.99E+00
Consumption of non-renewable primary energy resources used as raw materials	MJ	6.08E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.16E+01	2.90E+01	-1.22E+00
Total consumption of non-renewable primary energy resources	MJ	2.79E+01	9.59E-01	7.27E+00	1.75E+00	1.56E-02	2.44E-01	1.85E-01	-8.21E+00
Consumption of secondary materials	kg	2.37E-03	2.69E-04	6.73E-04	1.59E-04	4.39E-06	3.30E-04	6.59E-05	-7.06E-04
Consumption of renewable secondary fuels	MJ	5.46E-04	2.38E-06	3.71E-06	8.86E-07	3.88E-08	1.87E-05	2.54E-06	-1.10E-04
Consumption of non-renewable secondary fuels	MJ	7.73E-11	0.00E+00	5.86E-03	1.41E-03	0.00E+00	0.00E+00	0.00E+00	-1.17E-03
Net consumption of freshwater resources	m^3	4.63E-02	1.24E-04	2.01E-03	4.73E-04	2.03E-06	4.79E-04	1.95E-04	-9.13E-03

Table 9. Life cycle assessment (LCA) results of PUM underlay – the environmental impacts relate to waste management (DU: 1 m^2; 1.5 mm; 1.5 kg)

Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
Hazardous waste, neutralized	kg	7.11E-02	1.04E-03	8.69E-04	1.80E-05	1.69E-05	5.25E-03	3.75E-04	-1.33E-02
Non-hazardous waste, neutralised	kg	1.06E+00	1.79E-02	7.35E-02	9.36E-04	2.93E-04	3.63E-01	7.55E-01	-2.29E-01
Radioactive waste	kg	5.03E-06	6.53E-04	5.43E-06	1.31E-06	1.07E-05	7.07E-07	1.10E-08	-1.33E-04
Materials for recycling	kg	1.17E-04	3.11E-06	7.51E-03	1.80E-06	5.06E-08	7.20E-01	4.76E-07	-1.53E-03
Materials for energy recovery	kg	8.05E-07	2.20E-08	6.60E-08	1.58E-08	3.59E-10	3.59E-08	6.24E-09	-1.67E-07
Exported energy	MJ	1.30E+00	1.19E-03	2.17E-02	5.19E-03	1.95E-05	4.46E+00	3.75E-04	-2.64E-01

Table 10. Life cycle assessment (LCA) results of PUM underlay – the environmental additional information (DU: 1 m^2; 1.5 mm; approx.1.5 kg)

Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
Particulate matter	disease incidence	INA	INA	INA	INA	INA	INA	INA	INA
Potential human exposure efficiency relative to U235	eg. kBq U235	INA	INA	INA	INA	INA	INA	INA	INA
Potential comparative toxic unit for ecosystems	CTUe	INA	INA	INA	INA	INA	INA	INA	INA
Potential comparative toxic unit for humans (cancer effects)	CTUh	INA	INA	INA	INA	INA	INA	INA	INA
Potential comparative toxic unit for humans (non-cancer effects)	CTUh	INA	INA	INA	INA	INA	INA	INA	INA
Potential soil quality index	dimensionless	INA	INA	INA	INA	INA	INA	INA	INA

Table 11. Life cycle assessment (LCA) results of PUM underlay – the environmental impacts (DU: 1 m^2; 2.0 mm; approx.1.6 kg)

Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
Global Warming Potential	eq. kg CO_2	1.46E+00	6.70E-02	4.77E-01	1.12E-01	1.09E-03	1.10E+00	1.24E-01	-4.06E-01
Greenhouse gas potential - fossil	eq. kg CO_2	1.48E+00	6.62E-02	4.57E-01	1.10E-01	1.08E-03	1.07E+00	1.24E-01	-4.06E-01
Greenhouse gas potential - biogenic	eq. kg CO_2	-2.13E-02	2.06E-04	1.35E-02	3.20E-03	3.36E-06	2.96E-02	1.12E-03	-1.47E-03
Global warming potential - land use and land use change	eq. kg CO_2	7.43E-04	2.40E-05	1.60E-04	3.84E-05	3.91E-07	1.83E-05	9.04E-06	-1.87E-04
Stratospheric ozone depletion potential	eq. kg CFC 11	1.13E-07	1.60E-08	9.46E-09	2.24E-09	2.60E-10	3.74E-09	2.57E-09	-3.36E-08
Soil and water acidification potential	eq. mol H+	7.75E-03	2.72E-04	5.06E-03	1.22E-03	4.44E-06	2.28E-03	7.36E-05	-1.48E-03
Eutrophication potential - freshwater	eq. kg P	4.27E-04	4.31E-06	8.66E-04	2.08E-04	7.03E-08	9.01E-06	1.30E-06	-2.59E-04
Eutrophication potential - seawater	eq. kg N	2.47E-03	8.10E-05	7.45E-04	1.76E-04	1.32E-06	7.77E-04	5.60E-04	-4.86E-04
Eutrophication potential - terrestrial	eq. mol N	1.42E-02	8.83E-04	6.20E-03	1.49E-03	1.44E-05	1.97E-03	2.64E-04	-2.22E-03
Potential for photochemical ozone synthesis	eq. kg NMVOC	6.98E-03	2.94E-04	1.73E-03	4.16E-04	4.80E-06	5.16E-04	1.04E-04	-1.26E-03
Potential for depletion of abiotic resources - non-fossil resources	eq. kg Sb	2.62E-05	1.57E-07	2.23E-06	5.34E-07	2.56E-09	5.96E-07	2.94E-08	-5.72E-06
Abiotic depletion potential - fossil fuels	MJ	1.27E+01	1.02E+00	7.74E+00	1.86E+00	1.67E-02	1.38E-01	1.92E-01	-5.32E+00
Water deprivation potential	eq. m^3	1.67E+00	4.71E-03	1.63E-01	3.84E-02	7.68E-05	4.11E-02	1.12E-03	-3.40E-01

Table 12. Life cycle assessment (LCA) results of PUM underlay – the environmental aspects (DU: 1 m^2; 2.0 mm; approx.1.6 kg)

Indicator	Unit	**A1**	**A2**	**A3**	**C1**	**C2**	**C3**	**C4**	**D**
Consumption of renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	3.29E+00	1.32E-02	5.73E-01	1.38E-01	2.16E-04	2.33E-02	3.68E-03	-7.77E-01
Consumption of renewable primary energy resources used as raw materials	MJ	1.14E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-2.28E-01
Total consumption of renewable primary energy resources	MJ	4.43E+00	1.32E-02	5.73E-01	1.38E-01	2.16E-04	2.33E-02	3.68E-03	-1.00E+00
Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	2.33E+01	1.02E+00	7.76E+00	1.86E+00	1.67E-02	-1.21E+01	-3.07E+01	-7.46E+00
Consumption of non-renewable primary energy resources used as raw materials	MJ	6.49E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.24E+01	3.09E+01	-1.30E+00
Total consumption of non-renewable primary energy resources	MJ	2.98E+01	1.02E+00	7.76E+00	1.86E+00	1.67E-02	2.60E-01	1.98E-01	-8.76E+00
Consumption of secondary materials	kg	2.53E-03	2.87E-04	7.18E-04	1.70E-04	4.68E-06	3.52E-04	7.03E-05	-7.53E-04
Consumption of renewable secondary fuels	MJ	5.83E-04	2.54E-06	3.96E-06	9.45E-07	4.14E-08	1.99E-05	2.70E-06	-1.18E-04
Consumption of non-renewable secondary fuels	MJ	8.24E-11	0.00E+00	6.25E-03	1.50E-03	0.00E+00	0.00E+00	0.00E+00	-1.25E-03
Net consumption of freshwater resources	m^3	4.94E-02	1.32E-04	2.15E-03	5.04E-04	2.16E-06	5.10E-04	2.08E-04	-9.74E-03

Table 13. Life cycle assessment (LCA) results of PUM underlay – (DU: 1 m^2; 2.0 mm; approx.1.6 kg)- environmental information describing waste categories

Indicator	Unit	A1	A2	A3	A1-A3	C2	C3	C4	D
Hazardous waste, neutralized	kg	7.58E-02	1.10E-03	9.27E-04	1.92E-05	1.80E-05	5.60E-03	4.00E-04	-1.42E-02
Non-hazardous waste, neutralised	kg	1.13E+00	1.91E-02	7.84E-02	9.98E-04	3.12E-04	3.87E-01	8.06E-01	-2.44E-01
Radioactive waste	kg	5.36E-06	6.97E-04	5.79E-06	1.39E-06	1.14E-05	7.54E-07	1.17E-08	-1.42E-04
Materials for recycling	kg	1.25E-04	3.31E-06	8.01E-03	1.92E-06	5.40E-08	7.68E-01	5.08E-07	-1.63E-03
Materials for energy recovery	kg	8.58E-07	2.35E-08	7.04E-08	1.68E-08	3.83E-10	3.82E-08	6.66E-09	-1.79E-07
Exported energy	MJ	1.38E+00	1.27E-03	2.32E-02	5.54E-03	2.08E-05	4.76E+00	4.00E-04	-2.82E-01

Table 14. Life cycle assessment (LCA) results of PUM underlay additional indicators (DU: 1 m^2; 2.0 mm; approx.1.6 kg)

Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
Particulate matter	disease incidence	INA	INA	INA	INA	INA	INA	INA	INA
Potential human exposure efficiency relative to U235	eg. kBq U235	INA	INA	INA	INA	INA	INA	INA	INA
Potential comparative toxic unit for ecosystems	CTUe	INA	INA	INA	INA	INA	INA	INA	INA
Potential comparative toxic unit for humans (cancer effects)	CTUh	INA	INA	INA	INA	INA	INA	INA	INA
Potential comparative toxic unit for humans (non-cancer effects)	CTUh	INA	INA	INA	INA	INA	INA	INA	INA
Potential soil quality index	dimensionless	INA	INA	INA	INA	INA	INA	INA	INA

Table 15. Life cycle assessment (LCA) results of PUM underlay– the environmental impacts (DU: 1 m²; 3.0 mm; approx.1.9 kg)

Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
Global Warming Potential	eq. kg CO_2	1.73E+00	7.95E-02	5.66E-01	1.33E-01	1.30E-03	1.30E+00	1.47E-01	-4.82E-01
Greenhouse gas potential - fossil	eq. kg CO_2	1.75E+00	7.87E-02	5.43E-01	1.30E-01	1.28E-03	1.27E+00	1.47E-01	-4.82E-01
Greenhouse gas potential - biogenic	eq. kg CO_2	-2.53E-02	2.45E-04	1.60E-02	3.80E-03	3.99E-06	3.52E-02	1.33E-03	-1.75E-03
Global warming potential - land use and land use change	eq. kg CO_2	8.82E-04	2.85E-05	1.90E-04	4.56E-05	4.65E-07	2.18E-05	1.07E-05	-2.22E-04
Stratospheric ozone depletion potential	eq. kg CFC 11	1.34E-07	1.90E-08	1.12E-08	2.66E-09	3.09E-10	4.44E-09	3.05E-09	-3.99E-08
Soil and water acidification potential	eq. mol H+	9.20E-03	3.23E-04	6.01E-03	1.44E-03	5.27E-06	2.71E-03	8.74E-05	-1.76E-03
Eutrophication potential - freshwater	eq. kg P	5.07E-04	5.12E-06	1.03E-03	2.47E-04	8.35E-08	1.07E-05	1.55E-06	-3.08E-04
Eutrophication potential - seawater	eq. kg N	2.94E-03	9.61E-05	8.85E-04	2.09E-04	1.57E-06	9.22E-04	6.65E-04	-5.77E-04
Eutrophication potential - terrestrial	eq. mol N	1.69E-02	1.05E-03	7.36E-03	1.77E-03	1.71E-05	2.34E-03	3.14E-04	-2.63E-03
Potential for photochemical ozone synthesis	eq. kg NMVOC	8.28E-03	3.50E-04	2.06E-03	4.94E-04	5.70E-06	6.13E-04	1.24E-04	-1.50E-03
Potential for depletion of abiotic resources - non-fossil resources	eq. kg Sb	3.11E-05	1.86E-07	2.65E-06	6.35E-07	3.04E-09	7.07E-07	3.49E-08	-6.79E-06
Abiotic depletion potential - fossil fuels	MJ	1.50E+01	1.21E+00	9.19E+00	2.20E+00	1.98E-02	1.64E-01	2.28E-01	-6.31E+00
Water deprivation potential	eq. m^3	1.98E+00	5.59E-03	1.93E-01	4.56E-02	9.12E-05	4.88E-02	1.33E-03	-4.03E-01

Table 16. Life cycle assessment (LCA) results of PUM underlay – the environmental aspects (DU: 1 m²; 3.0 mm; approx.1.9 kg)

Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
Consumption of renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	3.91E+00	1.57E-02	6.80E-01	1.63E-01	2.57E-04	2.77E-02	4.37E-03	-9.22E-01
Consumption of renewable primary energy resources used as raw materials	MJ	1.35E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-2.71E-01
Total consumption of renewable primary energy resources	MJ	5.26E+00	1.57E-02	6.80E-01	1.63E-01	2.57E-04	2.77E-02	4.37E-03	-1.19E+00
Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	2.77E+01	1.21E+00	9.21E+00	2.21E+00	1.98E-02	-1.44E+01	-3.65E+01	-8.86E+00
Consumption of non-renewable primary energy resources used as raw materials	MJ	7.70E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.47E+01	3.67E+01	-1.54E+00
Total consumption of non-renewable primary energy resources	MJ	3.54E+01	1.21E+00	9.21E+00	2.21E+00	1.98E-02	3.09E-01	2.35E-01	-1.04E+01
Consumption of secondary materials	kg	3.01E-03	3.41E-04	8.53E-04	2.01E-04	5.56E-06	4.18E-04	8.35E-05	-8.94E-04
Consumption of renewable secondary fuels	MJ	6.92E-04	3.02E-06	4.70E-06	1.12E-06	4.92E-08	2.37E-05	3.21E-06	-1.40E-04
Consumption of non-renewable secondary fuels	MJ	9.79E-11	0.00E+00	7.42E-03	1.78E-03	0.00E+00	0.00E+00	0.00E+00	-1.48E-03
Net consumption of freshwater resources	m³	5.87E-02	1.57E-04	2.55E-03	5.99E-04	2.57E-06	6.06E-04	2.47E-04	-1.16E-02

Table 17. Life cycle assessment (LCA) results of PUM underlay – the environmental impacts relate to waste management (DU: 1 m²; 3.0 mm; approx.1.9 kg)

Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
Hazardous waste, neutralized	kg	9.00E-02	1.31E-03	1.10E-03	2.28E-05	2.14E-05	6.65E-03	4.75E-04	-1.69E-02
Non-hazardous waste, neutralised	kg	1.34E+00	2.27E-02	9.30E-02	1.19E-03	3.71E-04	4.60E-01	9.57E-01	-2.90E-01
Radioactive waste	kg	6.37E-06	8.28E-04	6.88E-06	1.65E-06	1.35E-05	8.95E-07	1.39E-08	-1.68E-04
Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	kg	1.49E-04	3.93E-06	9.51E-03	2.28E-06	6.41E-08	9.12E-01	6.03E-07	-1.93E-03
Exported energy	MJ	1.02E-06	2.79E-08	8.36E-08	2.00E-08	4.55E-10	4.54E-08	7.90E-09	-2.12E-07

Table 18. Life cycle assessment (LCA) results of PUM underlay – the environmental additional information (DU: 1 m^2; 3.0 mm; approx.1.9 kg)

Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
Particulate matter	disease incidence	INA	INA	INA	INA	INA	INA	INA	INA
Potential human exposure efficiency relative to U235	eg. kBq U235	INA	INA	INA	INA	INA	INA	INA	INA
Potential comparative toxic unit for ecosystems	CTUe	INA	INA	INA	INA	INA	INA	INA	INA
Potential comparative toxic unit for humans (cancer effects)	CTUh	INA	INA	INA	INA	INA	INA	INA	INA
Potential comparative toxic unit for humans (non-cancer effects)	CTUh	INA	INA	INA	INA	INA	INA	INA	INA
Potential soil quality index	dimensionless	INA	INA	INA	INA	INA	INA	INA	INA

VERIFICATION

The process of verification of this EPD was in accordance with ISO 14025 and 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 (sub clause 8.1.3.) ☒ EXTERNAL ☐ INTERNAL External verification of EPD: Ph.D. Eng. Halina Prejzner LCA. LCI audit and input data verification: Ph.D, D.Sc.Eng. Michał Piasecki. m.piasecki@itb.pl

The declaration owner has the sole ownership, liability, and responsibility for the declaration. Declarations within the same product category but from different programmes may not be comparable. Declarations of construction products may not be comparable if they do not comply with EN 15804. For further information about comparability, see EN 15804 and ISO 14025

Normative references

- ITB PCR A General Product Category Rules for Construction Products
- EN 16354:2018 Laminate floor coverings - Underlays - Specification, requirements and test methods
- 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
- EN 15804+A2 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
- CRU Group. Carbon footprint by cold metal by country - https://www.crugroup.com/about-cru/
- European Life Cycle Database. ELCD 3.2. http://eplca.jrc.ec.europa.eu/ELCD3/index.xhtml?stock=default
- Ecoinvent Database. http://www.ecoinvent.org/database/.
- KOBiZE Wskaźniki emisyjności CO_2, SO2, NOx, CO i pyłu całkowitego dla energii elektrycznej, 2021

Signature valid

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CERTIFICATE № 364/2022
of TYPE III ENVIRONMENTAL DECLARATION

Product:

Polyurethane-mineral (PUM) underlays

Manufacturer:

Decora S.A.

ul. Prądzyńskiego 24, 63-000 Środa Wielkopolska, Poland

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

EN 15804

Sustainability of construction works.
Environmental product declarations.
Core rules for the product category of construction products.

This certificate, issued for the first time on 2nd September 2022 is valid for 5 years
or until amendment of mentioned Environmental Declaration

Head of the Thermal Physic, Acoustics and Environment Department
Agnieszka Winkler-Skalna, PhD

INSTYTUT TECHNIKI BUDOWLANEJ

Deputy Director for Research and Innovation
Krzysztof Kuczyński, PhD

Warsaw, September 2022