Type III Environmental Product Declaration No. 886/2025

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ArmaComfort® Barrier

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Basic information

This declaration is the Type III Environmental Product Declaration (EPD) based on EN 15804+A2 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 and their aspects verified by the independent body according to ISO 14025. Basically, comparison or evaluation of EPD data is possible only if all the compared data were created according to EN 15804+A2.

Life cycle analysis (LCA): A1-A5, C1-C4 and D in accordance with EN 15804+A2 (Cradle-to-Gate)
The year of preparing the EPD: 2025
Product standard: EN 14304
Service Life: 20 years
PCR: ITB-PCR A
Declared unit: 1 m^2
Reasons for performing LCA: B2B
Representativeness: Italy, European, 2024

MANUFACTURER

Armacell Italia S.r.l. is the Italian subsidiary of Armacell International S.A., a global leader in flexible foam insulation and engineered foam solutions. As part of the Armacell Group, Armacell Italia contributes to the development and distribution of high-performance thermal and acoustic insulation materials for technical equipment. The company's product portfolio includes noise-control materials, which are integral to various industries such as construction, transportation (automotive, marine, rail, truck, ...) and light industry. In 2018, Armacell Italia expanded its capabilities by acquiring Guarto S.r.l., an Italian manufacturer specializing in non-flammable thermoplastic acoustic insulation products. This acquisition enhanced Armacell's presence in Italy and strengthened its position in the growing acoustic insulation market. Leini, Italy, is home to a key Armacell manufacturing plant, a leading global producer of flexible foam insulation and engineered foams for energy efficiency, with this specific facility recognized for sustainability achievements like receiving a silver medal in sustainability assessments. Armacell specializes in technical insulation for HVAC, plumbing, and industrial needs, offering solutions for energy savings, fire protection, and acoustic insulation, with their Leini site contributing to their overall mission of enhancing energy efficiency. Armacell's ArmaComfort Barrier range, including the P, B, B Alu, and Reflamex variants, was first introduced in 2020.

PRODUCTS DESCRIPTION

Products covered by this EPD are: ArmaComfort Barrier B, ArmaComfort Barrier B Alu, ArmaComfort Barrier P, Reflamex.

ArmaComfort Barrier B and B Alu
Flexible, mass-loaded sheet based on EVA-EPM that reduces airborne sound transmission for a quieter environment. Black color. Does not contain lead, bitumen and halogen. 100% recyclable material. B- Alu has an alu foil on top. ArmaComfort Barrier B and B-Alu are available with and without self-adhesive. Designed for the building market and light industry Avg grammage is 3,2 kg/m^2.

ArmaComfort Barrier P (Reflamex, Reflamex PRM)

High acoustic and fire performance mass loaded sound barrier based on EVA-IIR. White cream to light grey color. Flexible sheet to reduce airborne sound transmission. 100 % recyclable material. It´s available with and without self-adhesive tape. Used for transportation and building. Avg grammage 4,3 kg/m^2 and 8,7 kg/m^2.

ArmaComfort Barriers are designed for long-term durability inside normal buildings environments or on internal equipment. The expected service life is typically 20 years when installed and maintained properly. They cannot be exposed to extreme conditions like prolonged direct sunlight, high temperature or chemical exposure, therefore the real service life is project dependent and is specified individually for each application and use case scenario.

ArmaComfort Reflamex, being a high-performance fire-resistant material and high acoustic transmission noise reduction, is also designed for long-term use in industrial, transportation, building and commercial applications. The expected service life can be 20 years, depending on the installation environment and maintenance practices. The real service life is project dependent and is specified individually for each application and use case scenario.

Technical information of products can be found at:
https://www.armacell.com/en-NL/about-armacomfort

https://www.armacell.com/en-NL/armacomfort-barrier-b

LIFE CYCLE ASSESSMENT (LCA) – general rules applied

Unit

The declared unit is 1 m^2 of ArmaComfort Barrier products: B, B Alu, Barrier P/ Reflamex (1-3 mm) and Barrier P/ Reflamex (3.1-5 mm).

System boundary

The life cycle analysis (LCA) of the declared products covers: product stage – modules A1-A5, end of life – modules C1-C4 and benefits and loads beyond the system boundary – module D (cradle-to-gate with options) in accordance with EN 15804+A2 and ITB PCR A . Energy and water consumption, emissions as well as information on generated wastes were inventoried and were included in the calculations. It can be assumed that the total sum of omitted processes does not exceed 5% of all impact categories. In accordance with EN 15804+A2, machines and facilities (capital goods) required for the production as well as transportation of employees were not included in LCA.

Allocation

The allocation rules used for this EPD are based on general ITB's document PCR A (EN 15804+A2). Input and output data from the production is inventoried and allocated to the production on the mass basis. The declared product's recipes were used for the calculations, based on specific substances included in the production.

System limits

All materials and energy consumption inventoried in factory were included in calculation. Office impacts were not taken into consideration. In the assessment, all significant parameters from gathered production data are considered, i.e. all material used per formulation, utilised thermal energy, internal fuel and electric power consumption, direct production waste, and all available emission measurements.

Modules A1 and A2: *Raw materials supply and transport*

Typically, the products covered by this EPD contain the following base materials and auxiliaries: Polyolefin, Rubber EVA, Rubber IIR, Rubber SBR, ATH, Calcium carbonate, Barium sulphate, processing aids, technical layers – aluminium, interlayers – polyethylene, adhesive tape – polyamide, adhesive tape – polypropylene or polyester. Raw materials come from local and international suppliers. Data on transport of the different products to the manufacturing plant is collected and modelled for factory by assessor. Means of transport include trucks - European fuel averages are applied. More detailed information is available in the respective manufacturer's documentation (e.g. product data sheets). All transport distances inventoried for the reference year were used.

Module A3: *Production*

The production takes place in stages. In the stages (mixing and compounding, granulation, extrusion and bonding, cut and packing) as presented in Figure 1. Afterwards ready-to-use product is prepared for transport to Customer. In the process electricity is used.

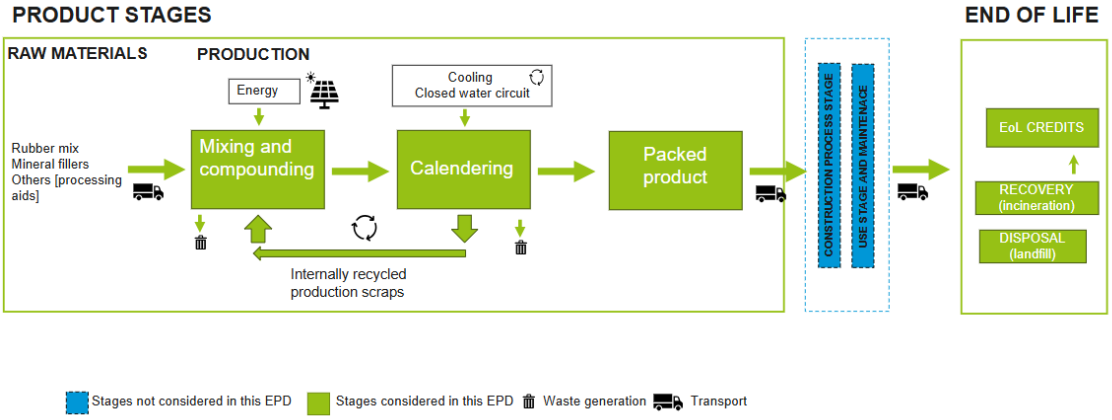

Figure 1. Manufacturing process scheme

A4: Transport

ArmaComfort Barrier products are delivered to European construction sites. An average distance of 750 km from the factory gate to a construction site was assumed. Means of transport include 24t loaded lorry with 100% capacity utilization and fuel consumption of 35 L per 100 km (EURO 6).

A5: Construction-installation process

Considered environmental burdens are associated with the use of ancillary materials such as a cleaning agent. an adhesive and hand tools recommended by Producer (see the producer's manual). Generation of off-cuts amounting to 0.5% of the product is assumed.

C1-C4: End of Life

At the end-of-life ArmaComfort Barrier products are deconstructed with the use of electrical tools C1. It is assumed that 98% of the product is recovered (Table 1), of which 30% undergo recycling. 30% is subjected to thermal utilization while the remaining material is forwarded to landfill in the form of mixed construction and demolition wastes. In module C2 transport distance of 75 km on 16 t loaded lorry with 100% capacity utilization and fuel consumption of 25 L per 100 km is considered (Euro 5). Environmental burdens declared in module C4 are associated with waste-specific emissions to air and groundwater via landfill gas incineration and landfill leachate. Benefits resulting from the recycling of the mechanical recycling and thermal energy production (alternative for fuel oil) are included in module D. The caloric value of 6 MJ/kg has been adopted.

Table 1. End-of-life scenario for the ArmaComfort Barrier products

Material	Material recovery	Recycling	Energy recovery	Landfilling
Waste materials	98%	30%	30%	40%

Data collection period

The data for manufacture of the declared products refer to period between 01.01.2024 – 31.12.2024 (1 year). The life cycle assessments were prepared for Italy and Europe as reference area.

Data quality

The data selected for LCA originate from ITB-LCI questionnaires completed by Armacell and verified during data audit. No data collected is older than five years and no generic datasets used are older than ten years. The representativeness, completeness, reliability, and consistency is judged as very

good. The background data for the processes come from the following resources database Ecoinvent v.3.11. Specific (LCI) data quality analysis was a part of the input data verification.

Assumptions and estimates

The impacts of the representative products were aggregated using weighted average. The compositions for the external products were averaged based on the recipes.

Calculation rules

LCA was performed using ITB-LCA tool developed in accordance with EN15804+A2. Emission of greenhouse gases was calculated using the IPCC 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 EF 3.1 method. No mass balance method used. No biogenic content in material.

Additional information

Italian electricity (Ecoinvent v 3.11) emission factor used is 0.385 kg CO_2/kWh and 0.1 kg CO_2/kWh for renewable electricity used local PV based. As a general rule, no particular environmental or health protection measures other than those specified by law are necessary. The time related quality of the data used is valid (5 years). No mass balance approach was used. Product doesn't contain biogenic carbon more than 5%. Products do not contain CFCs, HCFCs. The product does not contain any substances requiring registration under Regulation No. 1907/2006 (REACH), Annex II.

LIFE CYCLE ASSESSMENT (LCA) – Results

Declared unit

The declaration refers to declared unit (DU) – 1 m^2 of ArmaComfort Barrier products manufactured in Italy. The analysed products are described in the Table 2:

Table 2. Technical parameters of products covered by EPD (Tables 4-19)

ArmaComfort Product	Thickness [mm]	Weight per surface area [kg/m^2]	Density [kg/m^3] acc. DIN 53479
Barrier B	3 mm	3.2	1950 ±100
Barrier B Alu	3 mm	4.7	1950 ±100
Barrier P, Reflamex, 1-3 mm range	2 mm	4.3	2100 ±100
Barrier P, Reflamex, 4-5 mm range	5 mm	8.7	2100 ±100

In order to calculate the impacts for selected types of products with different thicknesses, scaling factors should be used. Scaling factors to the other thickness ranges of the same product are provided below:

ArmaComfort Product	Thickness [mm]	Scaling factor for the data in Tables 4-7
Barrier B	1 mm	resulted data /3
Barrier B	2 mm	resulted data /1.5
Barrier B	4 mm	resulted data x 1.33

ArmaComfort Product	Thickness [mm]	Scaling factor for the data in Tables 8-11
Barrier B Alu	1 mm	resulted data /3
Barrier B Alu	2 mm	resulted data /1.5
Barrier B Alu	4 mm	resulted data x1.33

ArmaComfort Product	Thickness [mm]	Scaling factor for the data in Tables 12-15
Barrier P, Reflamex, 1-3 mm range	1 mm	resulted data /2
Barrier P, Reflamex, 1-3 mm range	3 mm	resulted data x1.5

ArmaComfort Product	Thickness [mm]	Scaling factor for the data in Tables 16-19
Barrier P, Reflamex, 4-5 mm range	4 mm	resulted data x0,8

The following life cycle modules (Table 3) were included in the analysis. The following Tables show the environmental impacts of the life cycle of selected modules (A1-A5, C1-C4, D) for specific product types.

Table 3. System boundaries for the environmental characteristic of the product.

Environmental assessment information (MD – Module Declared, MND – Module Not 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	MD	MD	MND	MND	MND	MND	MND	MND	MND	MD	MD	MD	MD	MD

Table 4. Life cycle assessment (LCA) results for specific product ArmaComfort Barrier B– environmental impacts (DU: 1 m^2)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Global Warming Potential	eq. kg CO_2	3.15E+00	1.70E-01	5.67E-01	3.89E+00	4.00E-01	2.19E-02	8.77E-03	2.67E-02	2.10E+00	1.27E-01	-1.08E+00
Greenhouse potential - fossil	eq. kg CO_2	3.30E+00	1.70E-01	5.39E-01	4.01E+00	3.99E-01	2.19E-02	8.77E-03	2.66E-02	1.87E+00	1.26E-01	-1.01E+00
Greenhouse potential - biogenic	eq. kg CO_2	-1.58E-01	1.12E-04	2.85E-02	-1.30E-01	1.36E-03	5.91E-05	2.36E-05	9.09E-05	2.21E-01	9.02E-05	-6.32E-02
Global warming potential - land use and land use change	eq. kg CO_2	1.85E-03	5.66E-05	7.92E-05	1.99E-03	1.57E-04	3.43E-06	1.37E-06	1.04E-05	6.08E-04	6.77E-06	-8.59E-04
Stratospheric ozone depletion potential	eq. kg CFC 11	6.23E-08	3.38E-09	1.35E-08	7.92E-08	9.23E-08	1.21E-10	4.82E-11	6.15E-09	2.50E+00	3.05E-10	-2.14E-08
Soil and water acidification potential	eq. mol H+	1.42E-02	3.55E-04	1.76E-03	1.63E-02	1.62E-03	2.32E-04	9.28E-05	1.08E-04	3.26E-02	8.41E-05	-3.15E-03
Eutrophication potential - freshwater	eq. kg P	7.11E-04	1.15E-05	1.25E-04	8.48E-04	2.68E-05	3.78E-05	1.51E-05	1.79E-06	1.80E-04	1.26E-06	-1.98E-04
Eutrophication potential - seawater	eq. kg N	2.77E-03	8.51E-05	3.31E-04	3.18E-03	4.89E-04	3.28E-05	1.31E-05	3.26E-05	2.16E-02	2.80E-04	-7.05E-04
Eutrophication potential - terrestrial	eq. mol N	2.95E-02	9.19E-04	3.45E-03	3.39E-02	5.33E-03	2.86E-04	1.15E-04	3.55E-04	1.83E-01	3.43E-04	-6.57E-03
Potential for photochemical ozone synthesis	eq. kg NMVOC	1.22E-02	5.89E-04	1.42E-03	1.42E-02	1.63E-03	8.24E-05	3.30E-05	1.09E-04	4.40E-02	1.49E-04	-1.78E-03
Potential for depletion of abiotic resources - non-fossil resources	eq. kg Sb	2.87E-05	5.66E-07	8.04E-07	3.00E-05	1.41E-06	8.26E-09	3.30E-09	9.43E-08	3.18E-06	2.66E-08	-3.41E-06
Abiotic depletion potential - fossil fuels	MJ	5.83E+01	2.39E+00	9.20E+00	6.99E+01	5.92E+00	3.46E-01	1.38E-01	3.95E-01	5.85E+00	2.63E-01	-1.48E+01
Water deprivation potential	eq. m^3	1.24E+00	1.17E-02	3.25E-01	1.57E+00	2.74E-02	6.62E-03	2.65E-03	1.83E-03	1.46E-01	1.25E-03	-1.57E-01

Table 5. Life cycle assessment (LCA) results for specific product ArmaComfort Barrier B – additional impacts indicators (DU: 1 m^2)

Indicator	Unit	A1-A3	A4-A5	C1-C4	D
Particulate matter	disease incidence	INA	INA	INA	INA
Potential human exposure efficiency relative to U235	eg. kBq U235	INA	INA	INA	INA
Potential comparative toxic unit for ecosystems	CTUe	INA	INA	INA	INA
Potential comparative toxic unit for humans (cancer effects)	CTUh	INA	INA	INA	INA
Potential comparative toxic unit for humans (non-cancer effects)	CTUh	INA	INA	INA	INA
Potential soil quality index	dimensionless	INA	INA	INA	INA

Table 6. Life cycle assessment (LCA) results for specific product ArmaComfort Barrier B - the resource use (DU: 1 m²)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Consumption of renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	4.49E+00	4.11E-02	3.26E+00	7.79E+00	8.49E-02	2.85E-02	1.14E-02	5.66E-03	1.15E+00	3.94E-03	-1.25E+00
Consumption of renewable primary energy resources used as raw materials	MJ	1.56E+00	0.00E+00	0.00E+00	1.56E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total consumption of renewable primary energy resources	MJ	6.05E+00	4.11E-02	3.26E+00	9.35E+00	8.49E-02	2.85E-02	1.14E-02	5.66E-03	1.15E+00	3.94E-03	-1.25E+00
Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	4.57E+01	2.39E+00	9.13E+00	5.72E+01	5.92E+00	3.46E-01	1.38E-01	3.95E-01	3.81E+01	-4.11E+01	-5.40E+01
Consumption of non-renewable primary energy resources used as raw materials	MJ	1.47E+01	0.00E+00	7.52E-02	1.47E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.50E+01	4.14E+01	-3.92E+01
Total consumption of non-renewable primary energy resources	MJ	6.04E+01	2.39E+00	9.20E+00	7.19E+01	5.92E+00	3.46E-01	1.38E-01	3.95E-01	5.86E+00	2.63E-01	-1.48E+01
Consumption of secondary materials	kg	8.14E-02	1.11E-03	1.47E-03	8.40E-02	1.99E-03	3.01E-05	1.20E-05	1.32E-04	1.12E+00	9.50E-05	-1.12E+00
Consumption of renew. secondary fuels	MJ	5.13E-02	1.40E-05	8.63E-06	5.13E-02	2.19E-05	1.52E-07	6.08E-08	1.46E-06	1.19E-06	1.78E-06	-3.57E-06
Consumption of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.87E-05	0.00E+00	-5.55E-05
Net consumption of freshwater	m^3	3.13E-02	3.22E-04	7.50E-03	3.91E-02	7.45E-04	9.94E-04	3.98E-04	4.97E-05	3.96E-03	3.91E-03	-4.47E-03

Table 7. Life cycle assessment (LCA) results for specific product ArmaComfort Barrier B – waste categories and output flows (DU: 1 m²)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste	kg	6.58E-01	3.49E-03	1.53E-02	6.76E-01	6.64E-03	2.68E-03	1.07E-03	4.43E-04	1.67E-02	4.65E-04	2.19E-02
Non-hazardous waste	kg	3.75E+00	7.38E-02	6.51E-01	4.48E+00	1.18E-01	1.81E-01	7.23E-02	7.86E-03	1.46E+00	5.25E+00	1.47E+00
Radioactive waste	kg	3.25E-05	7.72E-07	1.60E-05	4.93E-05	4.42E-07	5.20E-08	2.08E-08	2.95E-08	2.35E-05	6.49E-08	2.69E-05
Components for re-use	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	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	1.13E-03	1.82E-05	9.46E-04	2.09E-03	1.83E-05	2.32E-06	9.29E-07	1.22E-06	8.84E-04	4.44E-06	9.07E-04
Materials for energy recovery	kg	2.03E-06	1.54E-07	1.22E-07	2.30E-06	1.48E-07	3.73E-09	1.49E-09	9.88E-09	2.00E-07	1.82E-08	2.54E-07
Exported Energy	MJ	3.48E-02	1.01E-03	1.57E-03	3.74E-02	0.00E+00	1.11E-03	4.43E-04	0.00E+00	2.15E-01	5.54E-05	1.87E-02

Table 8. Life cycle assessment (LCA) results for specific product ArmaComfort Barrier B Alu – environmental impacts (DU: 1 m^2)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Global Warming Potential	eq. kg CO_2	6.32E+00	2.70E-01	5.67E-01	7.16E+00	4.00E-01	2.19E-02	8.77E-03	2.67E-02	2.07E+00	1.27E-01	-1.07E+00
Greenhouse potential - fossil	eq. kg CO_2	6.42E+00	2.70E-01	5.39E-01	7.23E+00	3.99E-01	2.19E-02	8.77E-03	2.66E-02	1.87E+00	1.26E-01	-1.01E+00
Greenhouse potential - biogenic	eq. kg CO_2	-1.31E-01	1.78E-04	2.85E-02	-1.02E-01	1.36E-03	5.91E-05	2.36E-05	9.09E-05	1.94E-01	9.02E-05	-6.32E-02
Global warming potential - land use and land use change	eq. kg CO_2	2.76E-02	8.98E-05	7.92E-05	2.78E-02	1.57E-04	3.43E-06	1.37E-06	1.04E-05	6.08E-04	6.77E-06	-8.12E-04
Stratospheric ozone depletion potential	eq. kg CFC 11	8.78E-08	5.37E-09	1.35E-08	1.07E-07	9.23E-08	1.21E-10	4.82E-11	6.15E-09	2.50E+00	3.05E-10	-2.12E-08
Soil and water acidification potential	eq. mol H+	2.44E-02	5.62E-04	1.76E-03	2.67E-02	1.62E-03	2.32E-04	9.28E-05	1.08E-04	3.26E-02	8.41E-05	-3.12E-03
Eutrophication potential - freshwater	eq. kg P	1.21E-03	1.83E-05	1.25E-04	1.35E-03	2.68E-05	3.78E-05	1.51E-05	1.79E-06	1.80E-04	1.26E-06	-1.96E-04
Eutrophication potential - seawater	eq. kg N	4.71E-03	1.35E-04	3.31E-04	5.18E-03	4.89E-04	3.28E-05	1.31E-05	3.26E-05	2.16E-02	2.80E-04	-7.01E-04
Eutrophication potential - terrestrial	eq. mol N	4.80E-02	1.46E-03	3.45E-03	5.29E-02	5.33E-03	2.86E-04	1.15E-04	3.55E-04	1.83E-01	3.43E-04	-6.54E-03
Potential for photochemical ozone synthesis	eq. kg NMVOC	1.93E-02	9.34E-04	1.42E-03	2.17E-02	1.63E-03	8.24E-05	3.30E-05	1.09E-04	4.40E-02	1.49E-04	-1.77E-03
Potential for depletion of abiotic resources - non-fossil resources	eq. kg Sb	2.52E-05	8.98E-07	8.04E-07	2.69E-05	1.41E-06	8.26E-09	3.30E-09	9.43E-08	3.18E-06	2.66E-08	-3.39E-06
Abiotic depletion potential - fossil fuels	MJ	1.15E+02	3.80E+00	9.20E+00	1.28E+02	5.92E+00	3.46E-01	1.38E-01	3.95E-01	5.85E+00	2.63E-01	-1.47E+01
Water deprivation potential	eq. m^3	1.14E+00	1.86E-02	3.25E-01	1.49E+00	2.74E-02	6.62E-03	2.65E-03	1.83E-03	1.46E-01	1.25E-03	-1.53E-01

Table 9. Life cycle assessment (LCA) results for specific product ArmaComfort Barrier B Alu – additional impacts indicators (DU: 1 m^2)

Indicator	Unit	A1-A3	A4-A5	C1-C4	D
Particulate matter	disease incidence	INA	INA	INA	INA
Potential human exposure efficiency relative to U235	eg. kBq U235	INA	INA	INA	INA
Potential comparative toxic unit for ecosystems	CTUe	INA	INA	INA	INA
Potential comparative toxic unit for humans (cancer effects)	CTUh	INA	INA	INA	INA
Potential comparative toxic unit for humans (non-cancer effects)	CTUh	INA	INA	INA	INA
Potential soil quality index	dimensionless	INA	INA	INA	INA

Table 10. Life cycle assessment (LCA) results for specific product ArmaComfort Barrier B Alu - the resource use (DU: 1 m^2)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Consumption of renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	1.47E+01	6.52E-02	3.26E+00	1.80E+01	8.49E-02	2.85E-02	1.14E-02	5.66E-03	1.15E+00	3.94E-03	-1.24E+00
Consumption of renewable primary energy resources used as raw materials	MJ	1.56E+00	0.00E+00	0.00E+00	1.56E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total consumption of renewable primary energy resources	MJ	1.63E+01	6.52E-02	3.26E+00	1.96E+01	8.49E-02	2.85E-02	1.14E-02	5.66E-03	1.15E+00	3.94E-03	-1.24E+00
Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	9.61E+01	3.80E+00	9.13E+00	1.09E+02	5.92E+00	3.46E-01	1.38E-01	3.95E-01	3.81E+01	-4.11E+01	-5.39E+01
Consumption of non-renewable primary energy resources used as raw materials	MJ	2.83E+01	0.00E+00	7.52E-02	2.83E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.50E+01	4.14E+01	-3.92E+01
Total consumption of non-renewable primary energy resources	MJ	1.24E+02	3.80E+00	9.20E+00	1.37E+02	5.92E+00	3.46E-01	1.38E-01	3.95E-01	5.86E+00	2.63E-01	-1.47E+01
Consumption of secondary materials	kg	2.36E-01	1.76E-03	1.47E-03	2.40E-01	1.99E-03	3.01E-05	1.20E-05	1.32E-04	1.12E+00	9.50E-05	-1.12E+00
Consumption of renew. secondary fuels	MJ	5.10E-02	2.23E-05	8.63E-06	5.11E-02	2.19E-05	1.52E-07	6.08E-08	1.46E-06	1.19E-06	1.78E-06	-3.47E-06
Consumption of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.87E-05	0.00E+00	-5.22E-05
Net consumption of freshwater	m^3	6.89E-02	5.10E-04	7.50E-03	7.69E-02	7.45E-04	9.94E-04	3.98E-04	4.97E-05	3.96E-03	3.91E-03	-4.39E-03

Table 11. Life cycle assessment (LCA) results for specific product ArmaComfort Barrier B Alu – waste categories and output flows (DU: 1 m^2)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste	kg	6.10E-01	5.54E-03	1.53E-02	6.31E-01	6.64E-03	2.68E-03	1.07E-03	4.43E-04	1.67E-02	4.65E-04	-2.11E-02
Non-hazardous waste	kg	7.31E+00	1.17E-01	6.51E-01	8.08E+00	1.18E-01	1.81E-01	7.23E-02	7.86E-03	1.46E+00	5.25E+00	-1.47E+00
Radioactive waste	kg	6.17E-01	1.22E-06	1.60E-05	6.17E-01	4.42E-07	5.20E-08	2.08E-08	2.95E-08	2.35E-05	6.49E-08	-2.63E-05
Components for re-use	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	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	1.68E-03	2.89E-05	9.46E-04	2.65E-03	1.83E-05	2.32E-06	9.29E-07	1.22E-06	8.84E-04	4.44E-06	-9.07E-04
Materials for energy recovery	kg	2.28E-06	2.44E-07	1.22E-07	2.65E-06	1.48E-07	3.73E-09	1.49E-09	9.88E-09	2.00E-07	1.82E-08	-2.53E-07
Exported Energy	MJ	3.25E-02	1.60E-03	1.57E-03	3.56E-02	0.00E+00	1.11E-03	4.43E-04	0.00E+00	2.15E-01	5.54E-05	-1.87E-02

Table 12. Life cycle assessment (LCA) results for specific product ArmaComfort Barrier P/REFLAMEX (1-3 mm) – environmental impacts (DU: 1 m^2)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Global Warming Potential	eq. kg CO_2	9.21E+00	1.53E-01	7.62E-01	1.01E+01	5.38E-01	2.95E-02	1.18E-02	3.59E-02	2.89E+00	1.70E-01	-1.44E+00
Greenhouse potential - fossil	eq. kg CO_2	9.47E+00	1.53E-01	7.25E-01	1.03E+01	5.36E-01	2.95E-02	1.18E-02	3.57E-02	2.52E+00	1.70E-01	-1.36E+00
Greenhouse potential - biogenic	eq. kg CO_2	-2.89E-01	1.01E-04	3.83E-02	-2.51E-01	1.83E-03	7.94E-05	3.18E-05	1.22E-04	3.74E-01	1.21E-04	-8.49E-02
Global warming potential - land use and land use change	eq. kg CO_2	7.18E-03	5.08E-05	1.06E-04	7.33E-03	2.10E-04	4.61E-06	1.84E-06	1.40E-05	8.17E-04	9.10E-06	-1.09E-03
Stratospheric ozone depletion potential	eq. kg CFC 11	2.73E-07	3.04E-09	1.81E-08	2.94E-07	1.24E-07	1.62E-10	6.48E-11	8.27E-09	3.35E+00	4.10E-10	-2.84E-08
Soil and water acidification potential	eq. mol H+	4.42E-02	3.18E-04	2.36E-03	4.68E-02	2.18E-03	3.12E-04	1.25E-04	1.45E-04	4.38E-02	1.13E-04	-4.19E-03
Eutrophication potential - freshwater	eq. kg P	2.67E-03	1.03E-05	1.68E-04	2.85E-03	3.60E-05	5.08E-05	2.03E-05	2.40E-06	2.42E-04	1.69E-06	-2.64E-04
Eutrophication potential - seawater	eq. kg N	7.99E-03	7.64E-05	4.45E-04	8.51E-03	6.57E-04	4.41E-05	1.76E-05	4.38E-05	2.90E-02	3.76E-04	-9.43E-04
Eutrophication potential - terrestrial	eq. mol N	8.43E-02	8.24E-04	4.63E-03	8.98E-02	7.16E-03	3.85E-04	1.54E-04	4.78E-04	2.46E-01	4.61E-04	-8.79E-03
Potential for photochemical ozone synthesis	eq. kg NMVOC	5.10E-02	5.29E-04	1.91E-03	5.35E-02	2.19E-03	1.11E-04	4.43E-05	1.46E-04	5.92E-02	2.00E-04	-2.38E-03
Potential for depletion of abiotic resources - non-fossil resources	eq. kg Sb	1.11E-04	5.08E-07	1.08E-06	1.13E-04	1.90E-06	1.11E-08	4.44E-09	1.27E-07	4.27E-06	3.58E-08	-4.56E-06
Abiotic depletion potential - fossil fuels	MJ	2.27E+02	2.15E+00	1.24E+01	2.42E+02	7.96E+00	4.65E-01	1.86E-01	5.30E-01	7.87E+00	3.53E-01	-1.98E+01
Water deprivation potential	eq. m^3	4.74E+00	1.05E-02	4.36E-01	5.19E+00	3.68E-02	8.89E-03	3.56E-03	2.45E-03	1.96E-01	1.68E-03	-2.06E-01

Table 13. Life cycle assessment (LCA) results for specific product ArmaComfort Barrier P/REFLAMEX (1-3 mm) – additional impacts indicators (DU: 1 m^2)

Indicator	Unit	A1-A3	A4-A5	C1-C4	D
Particulate matter	disease incidence	INA	INA	INA	INA
Potential human exposure efficiency relative to U235	eg. kBq U235	INA	INA	INA	INA
Potential comparative toxic unit for ecosystems	CTUe	INA	INA	INA	INA
Potential comparative toxic unit for humans (cancer effects)	CTUh	INA	INA	INA	INA
Potential comparative toxic unit for humans (non-cancer effects)	CTUh	INA	INA	INA	INA
Potential soil quality index	dimensionless	INA	INA	INA	INA

Table 14. Life cycle assessment (LCA) results for specific product ArmaComfort Barrier P/REFLAMEX (1-3 mm) - the resource use (DU: 1 m²)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Consumption of renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	1.12E+01	3.69E-02	4.38E+00	1.56E+01	1.14E-01	3.83E-02	1.53E-02	7.61E-03	1.54E+00	5.29E-03	-1.66E+00
Consumption of renewable primary energy resources used as raw materials	MJ	2.09E+00	0.00E+00	0.00E+00	2.09E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total consumption of renewable primary energy resources	MJ	1.33E+01	3.69E-02	4.38E+00	1.77E+01	1.14E-01	3.83E-02	1.53E-02	7.61E-03	1.54E+00	5.29E-03	-1.66E+00
Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	1.51E+02	2.15E+00	1.23E+01	1.65E+02	7.96E+00	4.65E-01	1.86E-01	5.30E-01	5.12E+01	-5.52E+01	-7.25E+01
Consumption of non-renewable primary energy resources used as raw materials	MJ	7.63E+01	0.00E+00	1.01E-01	7.64E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.73E+01	5.56E+01	-5.27E+01
Total consumption of non-renewable primary energy resources	MJ	2.27E+02	2.15E+00	1.24E+01	2.42E+02	7.96E+00	4.65E-01	1.86E-01	5.30E-01	7.87E+00	3.53E-01	-1.98E+01
Consumption of secondary materials	kg	5.40E-02	9.97E-04	1.98E-03	5.70E-02	2.67E-03	4.04E-05	1.62E-05	1.78E-04	1.50E+00	1.28E-04	-1.51E+00
Consumption of renew. secondary fuels	MJ	9.37E-02	1.26E-05	1.16E-05	9.37E-02	2.94E-05	2.04E-07	8.17E-08	1.96E-06	1.60E-06	2.39E-06	-4.67E-06
Consumption of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.20E-05	0.00E+00	-7.01E-05
Net consumption of freshwater	m^3	1.17E-01	2.89E-04	1.01E-02	1.27E-01	1.00E-03	1.34E-03	5.34E-04	6.67E-05	5.32E-03	-5.25E-03	-5.90E-03

Table 15. Life cycle assessment (LCA) results for specific product ArmaComfort Barrier P/REFLAMEX (1-3 mm) – waste categories and output flows (DU: 1 m²)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste	kg	1.66E+00	3.13E-03	2.06E-02	1.68E+00	8.93E-03	3.61E-03	1.44E-03	5.95E-04	2.24E-02	6.24E-04	-2.84E-02
Non-hazardous waste	kg	3.01E+01	6.62E-02	8.75E-01	3.11E+01	1.59E-01	2.43E-01	9.71E-02	1.06E-02	1.96E+00	7.05E+00	-1.97E+00
Radioactive waste	kg	1.72E-04	6.93E-07	2.15E-05	1.94E-04	5.94E-07	6.98E-08	2.79E-08	3.96E-08	3.16E-05	8.72E-08	-3.53E-05
Components for re-use	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	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	3.34E-03	1.63E-05	1.27E-03	4.63E-03	2.46E-05	3.12E-06	1.25E-06	1.64E-06	1.19E-03	5.97E-06	-1.22E-03
Materials for energy recovery	kg	1.60E-05	1.38E-07	1.64E-07	1.63E-05	1.99E-07	5.02E-09	2.01E-09	1.33E-08	2.69E-07	2.44E-08	-3.40E-07
Exported Energy	MJ	2.29E-01	9.05E-04	2.11E-03	2.32E-01	0.00E+00	1.49E-03	5.95E-04	0.00E+00	2.89E-01	7.44E-05	-2.51E-02

Table 16. Life cycle assessment (LCA) results for specific product ArmaComfort Barrier P/REFLAMEX (3.1-5 mm) – environmental impacts (DU: 1 m^2)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Global Warming Potential	eq. kg CO_2	1.48E+01	3.64E-01	1.54E+00	1.67E+01	1.09E+00	5.96E-02	2.38E-02	7.26E-02	5.81E+00	3.44E-01	-2.92E+00
Greenhouse potential - fossil	eq. kg CO_2	1.53E+01	3.64E-01	1.47E+00	1.72E+01	1.08E+00	5.96E-02	2.38E-02	7.23E-02	5.09E+00	3.44E-01	-2.74E+00
Greenhouse potential - biogenic	eq. kg CO_2	-5.40E-01	2.39E-04	7.74E-02	-4.62E-01	3.71E-03	1.61E-04	6.43E-05	2.47E-04	7.11E-01	2.45E-04	-1.72E-01
Global warming potential - land use and land use change	eq. kg CO_2	1.15E-02	1.21E-04	2.15E-04	1.18E-02	4.26E-04	9.32E-06	3.73E-06	2.84E-05	1.65E-03	1.84E-05	-2.21E-03
Stratospheric ozone depletion potential	eq. kg CFC 11	4.46E-07	7.23E-09	3.67E-08	4.90E-07	2.51E-07	3.28E-10	1.31E-10	1.67E-08	6.79E+00	8.30E-10	-5.75E-08
Soil and water acidification potential	eq. mol H+	7.32E-02	7.57E-04	4.78E-03	7.87E-02	4.40E-03	6.31E-04	2.52E-04	2.93E-04	8.87E-02	2.29E-04	-8.48E-03
Eutrophication potential - freshwater	eq. kg P	4.45E-03	2.46E-05	3.41E-04	4.81E-03	7.29E-05	1.03E-04	4.11E-05	4.86E-06	4.89E-04	3.43E-06	-5.34E-04
Eutrophication potential - seawater	eq. kg N	1.32E-02	1.82E-04	9.00E-04	1.43E-02	1.33E-03	8.93E-05	3.57E-05	8.86E-05	5.87E-02	7.60E-04	-1.91E-03
Eutrophication potential - terrestrial	eq. mol N	1.40E-01	1.96E-03	9.37E-03	1.51E-01	1.45E-02	7.78E-04	3.11E-04	9.66E-04	4.98E-01	9.32E-04	-1.78E-02
Potential for photochemical ozone synthesis	eq. kg NMVOC	8.17E-02	1.26E-03	3.86E-03	8.68E-02	4.44E-03	2.24E-04	8.96E-05	2.96E-04	1.20E-01	4.05E-04	-4.82E-03
Potential for depletion of abiotic resources - non-fossil resources	eq. kg Sb	1.77E-04	1.21E-06	2.19E-06	1.80E-04	3.84E-06	2.25E-08	8.98E-09	2.56E-07	8.64E-06	7.24E-08	-9.22E-06
Abiotic depletion potential - fossil fuels	MJ	3.58E+02	5.11E+00	2.50E+01	3.88E+02	1.61E+01	9.41E-01	3.76E-01	1.07E+00	1.59E+01	7.14E-01	-4.01E+01
Water deprivation potential	eq. m^3	7.44E+00	2.50E-02	8.82E-01	8.35E+00	7.44E-02	1.80E-02	7.20E-03	4.96E-03	3.97E-01	3.39E-03	-4.16E-01

Table 17. Life cycle assessment (LCA) results for specific product ArmaComfort Barrier P/REFLAMEX (3.1-5 mm) – additional impacts indicators (DU: 1 m^2)

Indicator	Unit	A1-A3	A4-A5	C1-C4	D
Particulate matter	disease incidence	INA	INA	INA	INA
Potential human exposure efficiency relative to U235	eg. kBq U235	INA	INA	INA	INA
Potential comparative toxic unit for ecosystems	CTUe	INA	INA	INA	INA
Potential comparative toxic unit for humans (cancer effects)	CTUh	INA	INA	INA	INA
Potential comparative toxic unit for humans (non-cancer effects)	CTUh	INA	INA	INA	INA
Potential soil quality index	dimensionless	INA	INA	INA	INA

Table 18. Life cycle assessment (LCA) results for specific product ArmaComfort Barrier P/REFLAMEX (3.1-5 mm) - the resource use (DU: 1 m^2)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Consumption of renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	1.83E+01	8.78E-02	8.87E+00	2.72E+01	2.31E-01	7.74E-02	3.10E-02	1.54E-02	3.12E+00	1.07E-02	-3.37E+00
Consumption of renewable primary energy resources used as raw materials	MJ	4.24E+00	0.00E+00	0.00E+00	4.24E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total consumption of renewable primary energy resources	MJ	2.25E+01	8.78E-02	8.87E+00	3.14E+01	2.31E-01	7.74E-02	3.10E-02	1.54E-02	3.12E+00	1.07E-02	-3.37E+00
Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	2.38E+02	5.12E+00	2.48E+01	2.68E+02	1.61E+01	9.41E-01	3.76E-01	1.07E+00	1.04E+02	-1.12E+02	-1.47E+02
Consumption of non-renewable primary energy resources used as raw materials	MJ	1.20E+02	0.00E+00	2.05E-01	1.21E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.77E+02	1.12E+02	-1.07E+02
Total consumption of non-renewable primary energy resources	MJ	3.58E+02	5.12E+00	2.50E+01	3.88E+02	1.61E+01	9.41E-01	3.76E-01	1.07E+00	1.59E+01	7.14E-01	-4.01E+01
Consumption of secondary materials	kg	9.02E-02	2.37E-03	4.00E-03	9.65E-02	5.40E-03	8.18E-05	3.27E-05	3.60E-04	3.04E+00	2.58E-04	-3.05E+00
Consumption of renew. secondary fuels	MJ	1.73E-01	3.00E-05	2.35E-05	1.73E-01	5.95E-05	4.13E-07	1.65E-07	3.96E-06	3.24E-06	4.84E-06	-9.44E-06
Consumption of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.05E-04	0.00E+00	-1.42E-04
Net consumption of freshwater	m^3	1.83E-01	6.87E-04	2.04E-02	2.04E-01	2.03E-03	2.70E-03	1.08E-03	1.35E-04	1.08E-02	-1.06E-02	-1.19E-02

Table 19. Life cycle assessment (LCA) results for specific product ArmaComfort Barrier P/REFLAMEX (3.1-5 mm) – waste categories and output flows (DU: 1 m^2)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste	kg	3.20E+00	7.46E-03	4.17E-02	3.25E+00	1.81E-02	7.29E-03	2.92E-03	1.20E-03	4.54E-02	1.26E-03	-5.75E-02
Non-hazardous waste	kg	5.26E+01	1.58E-01	1.77E+00	5.45E+01	3.21E-01	4.91E-01	1.97E-01	2.14E-02	3.96E+00	1.43E+01	-3.99E+00
Radioactive waste	kg	2.76E-04	1.65E-06	4.34E-05	3.21E-04	1.20E-06	1.41E-07	5.65E-08	8.01E-08	6.40E-05	1.76E-07	-7.15E-05
Components for re-use	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	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	5.72E-03	3.89E-05	2.57E-03	8.34E-03	4.98E-05	6.32E-06	2.53E-06	3.32E-06	2.40E-03	1.21E-05	-2.46E-03
Materials for energy recovery	kg	2.45E-05	3.29E-07	3.33E-07	2.51E-05	4.03E-07	1.01E-08	4.06E-09	2.69E-08	5.45E-07	4.94E-08	-6.89E-07
Exported Energy	MJ	3.53E-01	2.15E-03	4.27E-03	3.60E-01	0.00E+00	3.01E-03	1.20E-03	0.00E+00	5.86E-01	1.51E-04	-5.07E-02

Verification

The process of verification of this EPD is in accordance with ISO 14025. 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+A2 and ITB PCR A
Independent verification corresponding to ISO 14025 (subclause 8.1.3.) [x] external [ ] internal
External verification of EPD: Halina Prejzner, PhD. Eng. LCI audit and verification: Filip Poznański, M.Sc. Eng. LCA, LCI audit and input data verification: Michał Piasecki, PhD., D.Sc., Eng.

Note 1: The declaration owner has the sole ownership, liability, and responsibility for the information provided and contained in EPD. Declarations of construction products may not be comparable if they do not comply with EN 15804+A2. For further information about comparability, see EN 15804+A2 and ISO 14025.

Note 2: ITB is a public Research Organization and Notified Body (EC Reg. no 1488) to the European Commission and to other Member States of the European Union designated for the tasks concerning the assessment of building products' performance. ITB acts as the independent, third-party verification organization (ISO 17025/17065/17029). ITB-EPD program is recognized and registered member of The European Platform - Association of EPD program operators and ITB-EPD declarations are registered and stored in the international ECO-PORTAL.

Normative references

- ITB PCR A General Product Category Rules for Construction Products
- EN 14304:2015 Thermal insulation products for building equipment and industrial installations - Factory made flexible elastomeric foam (FEF) products - Specification
- 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+A2:2019 Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products
- ISO 14067:2018 Greenhouse gases — Carbon footprint of products — Requirements and guidelines for quantification
- https://ecoinvent.org/

LCA, LCI audit and input data verification
Michał Piasecki, PhD. D.Sc. C.E. Eng.
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Head of Thermal Physic, Acoustic and Environment Department
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CERTIFICATE № 886/2025
of TYPE III ENVIRONMENTAL DECLARATION

Products:

ArmaComfort® Barrier

Manufacturer:

Armacell Poland Sp. z o.o.
Targowa 2, 55-300 Środa Śląska, 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+A2

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

This certificate, issued on 18th December 2025 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, December 2025