



Environmental Product
Declaration

Program Operator: Smart EPD®
www.smartepd.com

IN ACCORDANCE WITH ISO 14025:2006 AND EN 15804+A2:2019/AC:2021



SmartEPD-2026-156-1087-01

Pitchmastic PmB Waterproofing System

Date of Issue

Sep 30, 2026

Expiration Date

Sep 30, 2031

Last Updated

Sep 30, 2026



Refer to the EPD Library at www.smartepd.com for the latest EPD listing information

General Information

FG Structures Limited

Kingston House, 3 Walton Road, Pattinson North, Washington, NE38 8QA

+44(0)191 416 1530

info@pitchmasticpmb.co.uk

pitchmasticpmb.co.uk



Product Name:	Pitchmastic PmB Waterproofing System
Declared Unit:	1 m2 of applied Pitchmastic PmB waterproofing system
Declaration Number:	SmartEPD-2026-156-1087-01
Date of Issue:	September 30, 2026
Expiration:	September 30, 2031
Last updated:	September 30, 2026
EPD Scope:	Cradle to gate with other options A1 - A3, A4, A5, C1 - C4, D
Market(s) of Applicability:	Europe

General Organization Information

FG Structures Ltd. is a UK manufacturer specializing in high-performance waterproofing systems for infrastructure and construction applications. The company develops and manufactures polyurethane-based membranes, primers, and tack coats designed to provide long-term waterproofing protection for concrete and steel structures. Its products are used in bridges, tunnels, car parks, podium decks, highways, rail infrastructure, and other civil engineering projects where durable waterproofing performance is required.

Manufacturing is carried out in a fully closed production system in which raw materials are transferred directly into the production process through dedicated transfer lines. The manufacturing process consists primarily of raw material transfer, mixing, heating, quality control, filling, and packaging, minimizing material losses and preventing the generation of production waste under normal operating conditions.

FG Structures Ltd. supplies products throughout the United Kingdom and international markets and is committed to delivering high-quality waterproofing systems through responsible manufacturing practices, continuous product development, and consistent product performance. The company supports sustainable construction by providing durable waterproofing solutions designed to extend the service life of infrastructure assets while reducing maintenance requirements over their operational life.

Further information can be found at: <https://www.pitchmasticpmb.co.uk/>

Limitations, Liability and Ownership

Environmental declarations from different programs (ISO 14025) may not be comparable. Comparison of the environmental performance of products using EPD information shall be based on the product's use and impacts at the building level, and therefore EPDs may not be used for comparability purposes when not considering the whole building life cycle. EPD comparability is only possible when all stages of a life cycle have been considered. However, variations and deviations are possible. Example of variations: Different LCA software and background LCI datasets may lead to differences results for upstream or downstream of the life cycle stages declared. The EPD owner has sole ownership, liability, and responsibility for the EPD.

Reference Standards

Standard(s):	ISO 14025:2006 and EN 15804+A2:2019/AC:2021
Core PCR:	EPD International PCR for Construction Products 2019:14 v2.0.1
	Date of issue: June 05, 2025
	Valid until: April 07, 2030
Sub-category PCR review panel:	 Contact Smart EPD for more information.
General Program Instructions:	 Smart EPD General Program Instructions v.2.0, March 2025

Verification Information

LCA Author/Creator:	 juan@parqhq.com
	 juan@parqhq.com
EPD Program Operator:	 Smart EPD
	 info@smartepd.com
	 www.smartepd.com
	 585 Grove St., Ste. 145, Herndon, VA 20170, USA
Verification:	Independent critical review of the LCA and data, according to ISO 14044 and ISO 14071:
	 Freddy Segundo Navarro Pineda  fnavarro@lccacheck.org
	Independent external verification of EPD, according to ISO 14025 and reference PCR(s):
	 Freddy Segundo Navarro Pineda  fnavarro@lccacheck.org

External

External

Product Information

Declared Unit:	1 m2 of applied Pitchmastic PmB waterproofing system
Mass:	2.58 kg
Product Specificity:	 Product Average
	 Product Specific

Product Description

A liquid-applied polyurethane bridge deck waterproofing system designed to protect concrete and steel bridge decks, tunnels, and other civil infrastructure from water ingress and chloride-induced corrosion. The system comprises a primer, spray-applied polyurethane waterproofing membrane, sanded key layer, tack coat, and asphalt overlay, providing seamless waterproofing, excellent adhesion, crack-bridging capability, chemical resistance, and long-term durability for transportation infrastructure.

Further information can be found at: <https://www.pitchmasticpmb.co.uk/>

Product Specifications

Product SKU(s):

Product Classification Codes:

The system consists of a primer, waterproofing membrane, and tack coat that work together to form a continuous waterproofing layer.

EC3 - ThermalMoistureProtection -> DampproofingAndWaterproofing

Product Composition Diagram

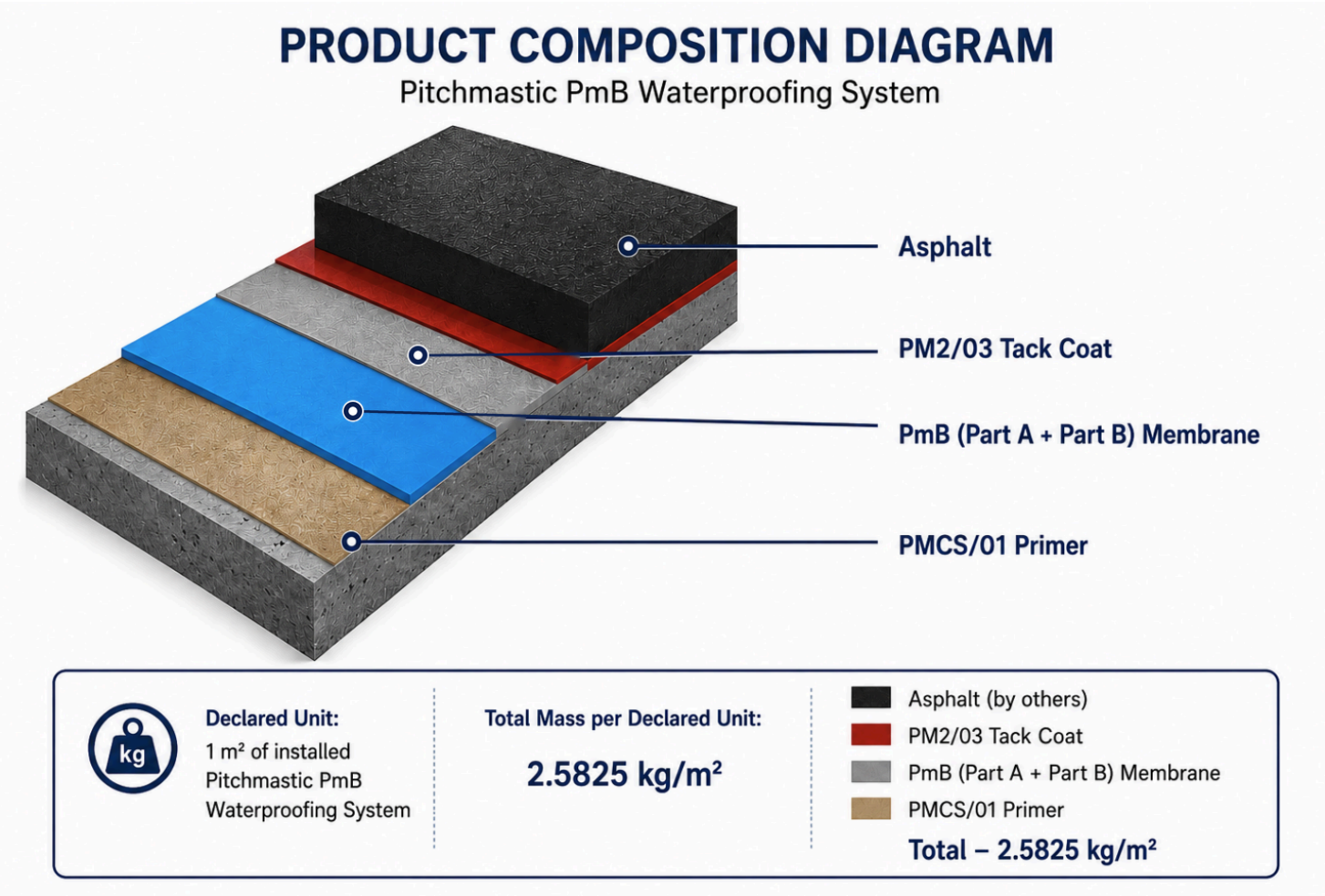


Table 1. Material Composition

Material/Component Category	Origin	% Mass
Membrane	UK, Belgium, Germany	82.09
Primer	UK	2.42
Tackcoat	UK	15.49

Packaging Material	Origin	kg Mass
Plastic hdpe	RER	0.01
Steel generic	RER	0.01

Biogenic Carbon Content	kg C per m2
Biogenic carbon content in product	0
Biogenic carbon content in accompanying packaging	0

Hazardous Materials
No regulated hazardous or dangerous substances are included in this product.

Materials constituting the product do not contain any post- or pre-consumer recycled material.

EPD Data Specificity

Primary Data Year:01/06/2025 - 01/07/2026

Manufacturing Specificity:

✗ Industry Average

✗ Manufacturer Average

✓ Facility Specific

Averaging:
Averaging was not conducted for this EPD

Table 2. System Boundary

Production	A1	Raw material supply	✓
	A2	Transport	✓
	A3	Manufacturing	✓
Construction	A4	Transport to site	✓
	A5	Assembly / Install	✓

Use	B1	Use	ND
	B2	Maintenance	ND
	B3	Repair	ND
	B4	Replacement	ND
	B5	Refurbishment	ND
	B6	Operational Energy Use	ND
	B7	Operational Water Use	ND
End of Life	C1	Deconstruction	✓
	C2	Transport	✓
	C3	Waste Processing	✓
	C4	Disposal	✓
Benefits & Loads Beyond System Boundary	D	Recycling, Reuse Recovery Potential	✓

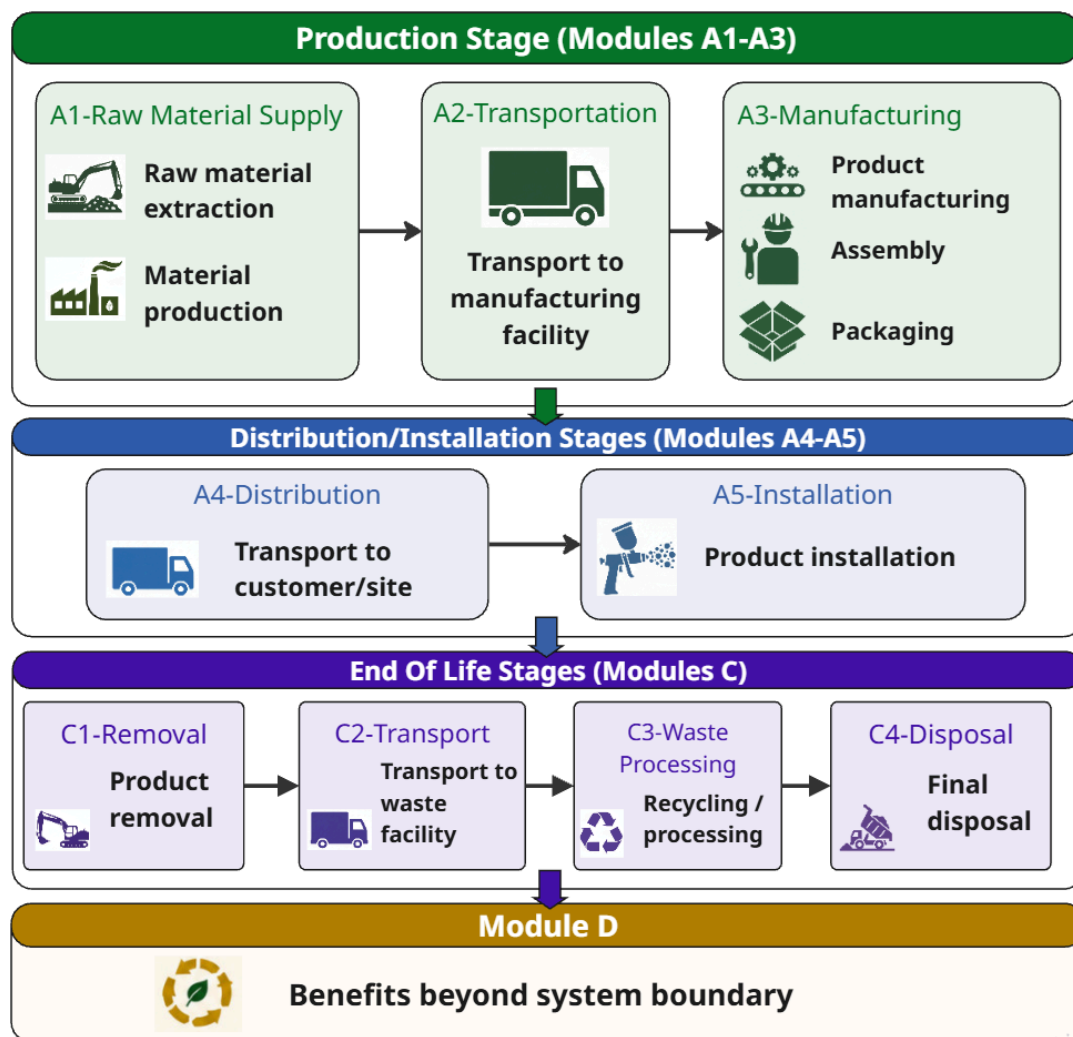
Note:

ND = Module not declared

Plants

 Pitchmastic PmB Manufacturing Walton Road, Washington NE38 8QA, UK

Product Flow Diagram



The geographical scope covers Europe for raw material acquisition and transportation, and the UK for manufacturing and end-of-life processes.

The product stage (Modules A1–A3) includes raw material extraction, material production, transportation to the manufacturing facility, and the closed-system manufacturing process consisting of raw material transfer, mixing, heating, quality control, filling, and packaging. The distribution and installation stage (Modules A4–A5) includes transportation to the construction site and spray application of the waterproofing system, with surface preparation excluded from the scope of the assessment. The end-of-life stage (Modules C1–C4) covers product removal, transportation, waste processing, and final disposal, while Module D reports the potential environmental benefits associated with material recovery and recycling beyond the system boundary.

Software And Database

LCA Software:

Simapro v. 10.2

LCI Foreground Database(s):

Ecoinvent v. 3.11

Cut-off by Classification

LCI Background Database(s):

Ecoinvent v. 3.11

Cut-off by Classification

A foreground LCI database is the database used to model the primary, site-specific data collected for this EPD. A background LCI database is the database used to model generic or non-specific data.

Data Quality

The quality of the data has been assessed according to EN 15804:2012+A2:2019, Annex E, and EN 15941. Using the semi-quantitative evaluation criteria for data quality (DQR) proposed by the European Commission in its Environmental Footprint Guide, the following results were obtained:

- Temporal representativeness (TiR): very good.
- Geographical representativeness (GeR): fair.
- Technological representativeness (TeR): very good.
- Overall, the data quality is rated "good". No datasets assessed were rated "very poor."

The assessed datasets together represent the totality of the results of each declared environmental impact indicator, ensuring that the EPD is based on sufficiently robust and reliable data

The share of primary data is calculated based on GWP-GHG results. It is a simplified indicator for data quality that supports the use of more primary data, to increase the representativeness of and comparability between EPDs. Note that the indicator does not capture all relevant aspects of data quality and is not comparable across product categories

Table 3. Data Sources

Process	Source type	Source	Reference year	Data category	Share of primary data, of GWP-GHG results for A1-A3
Methylene diphenyl diisocyanate (MDI) Production	LCI Database	Ecoinvent v3.11	2019-2026	Secondary data	0%
Generation of Electricity used	LCI Database	Ecoinvent v3.11	2019-2026	Primary Data	0.58%
Natural gas used	LCI Database	Ecoinvent v3.11	2019-2026	Primary Data	0.67%
Total Primary Data Share	ND	ND	ND	ND	1.26%

Life Cycle Module Description

Modules A1–A3: The LCA model covers the manufacture of raw materials and packaging materials for the products (A1), followed by transport to the FG Structures Ltd. manufacturing facility using primary transportation data provided by the manufacturer (A2). The manufacturing stage (A3) begins with receipt of these materials and includes operations such as raw material transfer, mixing, heating, quality control, filling, and packaging of the finished products. The EPD owner has no direct control of packaging production.

Modules A4–A5: Once manufacture is completed, products are shipped to customers using primary transportation data provided by FG Structures Ltd. (A4). For installation (A5), no product installation loss was assumed. This module includes the energy required for spray application and the disposal of product packaging. Surface preparation and other project-specific substrate preparation requirements are excluded from the scope of the study.

Modules C1–C4 and D: At end of life (C1–C4), the product is assumed to be collected and managed according to the applicable UK end-of-life scenario for polymer-based construction products. Loads and benefits beyond the system boundary are considered in Module D (e.g., displacement of virgin materials from packaging waste recycling).



LCA Discussion

Allocation Procedure

Allocation of co-products was avoided, to the extent possible, based on the guidance given in ISO 14044:2006, 4.3, and EN 15804+A2. Utilities used at the facility level were allocated by mass. The manufacturing process for the Pitchmastic PmB Waterproofing System is carried out in a fully closed system and does not generate production waste under normal operating conditions. Raw materials are transferred directly into the production process through dedicated transfer lines, and the small quantity of material used for quality control is considered negligible and was excluded from the assessment. The manufacturing process does not generate wastewater or significant direct air emissions other than those associated with energy consumption and material processing. Packaging waste generated during manufacturing was included within the product system and allocated following the polluter pays principle.

Cut-off Procedure

For the processes within the system boundary, all available energy and material flow data have been included in the model. Cut-off criteria, however, were applied to exclude capital goods and infrastructure, personnel impacts, R&D activities, business travel, office operations, and surface preparation activities, as these are assumed to not significantly affect the LCA results or conclusions. The manufacturing process for the Pitchmastic PmB Waterproofing System is carried out in a fully closed system and does not generate production waste under normal operating conditions. Packaging waste generated during manufacturing was included within the assessment in accordance with EN 15804+A2 requirements.

Renewable Electricity

Energy Attribute Certificates (EACs) such as
Renewable Energy Certificates (RECs) or Power
Purchase Agreements (PPAs) are included in the
baseline reported results: ✗ No

Scenarios

Transport to the building/construction site (A4)

A4 Module

Fuel Type:	Diesel
Vehicle Type:	Truck and Trailer
Transport Distance:	193.8 km
Capacity Utilization:	33 %
Packaging Mass:	0.01 kg
Weight of products transported:	2.595 kg
Capacity utilization volume factor:	1
Assumptions for scenario development:	Transport distance includes finished product to distribution center and distribution center to point of sale.



Installation in to the building/construction site (A5)

A5 Module

Installation Scrap Rate Assumed:	0 %
Mass of Packaging Waste Specified by Type:	0.01 kg
Assumptions for scenario development:	No installation scrap was assumed during the application stage (Module A5). The Pitchmastic waterproofing system is a liquid-applied, spray-applied polyurethane membrane that is mixed and applied directly onto the prepared substrate at the point of installation. A 100% recycling rate is assumed throughout, as is likely the case for industrial plastic packaging.

End of Life (C1 - C4)

C1 - C4 Modules

Collection Process

Collected with Mixed Construction Waste:	2.58 kg
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Recovery

Landfill:	2.58 kg
Incineration:	0 kg

Assumptions for scenario development:
The membrane is bonded to its substrate and cannot be separated at end of life; it is removed within the substrate (usually concrete), so the membrane is modelled in C4 as disposal to C&D landfill. Conservatively, we used the default diesel consumption from PCR 2019:14 for C1 (10 kWh/tonne). For C2, we assumed truck transport over 150 km (lorry 32 metric ton, EURO 5) to end-of-life treatment sites.

Reuse, Recovery and / or Recycling Potentials & Relevant Scenario Information (D)

D Module

Process and Conversion Efficiencies:	Module D benefits come from recycling the Intermediate Bulk Container (IBC) packaging that leaves the system in A5: 7.74 g/m ² of HDPE and 5.16 g/m ² of metal, with quality adjustment factors of 0.6 for HDPE and 0.9 for metal. IBCs are large and easy to collect separately, with steel and plastic components that can be separated for recycling. The established UK collection network for used IBCs and the recoverable value of their steel and HDPE components support the assumption that all IBCs are sent for recycling.
Further assumptions for scenario development:	The membrane is bonded to its substrate and cannot be separated at end of life. No reuse or material recycling is assumed due to the cured thermoset nature of the polyurethane membrane.

Results

Table 4. Environmental Impact Assessment Results

EF 3.1

per 1 m2 of product of applied Pitchmastic PmB waterproofing system.

LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

Impact Category	Unit	Method	A1 - A3	A4	A5	C1	C2	C3	C4	D
GWP-total	kg CO2 eq	EF 3.1	1.14e+1	5.30e-2	1.88e-2	9.35e-3	4.08e-2	0	2.52e-2	-1.80e-2
GWP-biogenic	kg CO2 eq	EF 3.1	1.08e-2	1.21e-5	2.11e-6	1.04e-6	9.35e-6	0	4.07e-5	-2.00e-4
GWP-fossil	kg CO2 eq	EF 3.1	1.14e+1	5.30e-2	1.88e-2	9.35e-3	4.08e-2	0	2.51e-2	-1.78e-2
GWP-luluc	kg CO2 eq	EF 3.1	5.61e-3	1.92e-5	2.01e-6	9.72e-7	1.48e-5	0	6.40e-6	-3.18e-6
ODP	kg CFC11 eq	EF 3.1	4.48e-7	1.16e-9	2.81e-10	1.39e-10	8.93e-10	0	8.48e-10	-3.63e-10
AP	mol H+ eq	EF 3.1	4.60e-2	1.75e-4	1.67e-4	8.36e-5	1.35e-4	0	2.83e-4	-5.30e-5
EP-freshwater	kg P eq	EF 3.1	2.59e-3	3.74e-6	6.15e-7	3.01e-7	2.88e-6	0	4.33e-5	-3.53e-6
EP-marine	kg N eq	EF 3.1	1.78e-2	5.96e-5	7.77e-5	3.89e-5	4.59e-5	0	7.06e-5	-9.68e-6
EP-terrestrial	mol N eq	EF 3.1	1.18e-1	6.48e-4	8.51e-4	4.26e-4	4.99e-4	0	7.60e-4	-1.14e-4
POCP	kg NMVOC eq	EF 3.1	3.83e-2	2.78e-4	2.55e-4	1.27e-4	2.14e-4	0	2.76e-4	-7.14e-5
ADP-minerals&metals	kg Sb eq	EF 3.1	1.01e-4	1.49e-7	7.22e-9	3.34e-9	1.15e-7	0	4.24e-8	-4.47e-8
ADP-fossil	MJ	EF 3.1	2.35e+2	7.75e-1	2.45e-1	1.22e-1	5.97e-1	0	5.94e-1	-4.02e-1
WDP	m3 depriv.	EF 3.1	3.54e+0	3.52e-3	5.32e-4	2.60e-4	2.71e-3	0	-3.30e-1	-2.78e-3

Note:

Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

Abbreviations:

GWP = Global Warming Potential, 100 years (may also be denoted as GWP-total, GWP-fossil (fossil fuels), GWP-biogenic (biogenic sources), GWP-luluc (land use and land use change)), ODP = Ozone Depletion Potential, AP = Acidification Potential, EP = Eutrophication Potential, SFP = Smog Formation Potential, POCP = Photochemical oxidant creation potential, ADP-Fossil = Abiotic depletion potential for fossil resources, ADP-Minerals&Metals = Abiotic depletion potential for non-fossil resources, WDP = Water deprivation potential, PM = Particular Matter Emissions, IRP = Ionizing radiation, human health, ETP-fw = Eco-toxicity (freshwater), HTP-c = Human toxicity (cancer), HTP-nc = Human toxicity (non-cancer), SQP = Soil quality index.

The effect of the infrastructure involved in the production of raw material, transport means, and energy was included as it was not possible to exclude them. Characterization factors of EN15804 are based on EF 3.1.

The results of ADP-minerals&metals and the ADP-fossil environmental impact indicators shall be used with care as the uncertainties of these results are high.

The results of the end-of-life stage (modules C1-C4) should be considered when using the results of the product stage (modules A1-A3).

Table 5. Resource Use Indicator

per 1 m2 of product of applied Pitchmastic PmB waterproofing system.

Indicator	Unit	A1 - A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	8.86e+0	1.16e-2	1.53e-3	7.46e-4	8.94e-3	0	1.11e-2	-3.62e-3
PERM	MJ	0	0	0	0	0	0	0	0
PERT	MJ	8.86e+0	1.16e-2	1.53e-3	7.46e-4	8.94e-3	0	1.11e-2	-3.62e-3
PENRE	MJ	1.64e+2	7.75e-1	2.45e-1	1.22e-1	5.97e-1	0	5.94e-1	-4.02e-1
PENRM	MJ	7.09e+1	0	-3.25e-1	0	0	0	0	0
PENRT	MJ	2.35e+2	7.75e-1	-7.96e-2	1.22e-1	5.97e-1	0	5.94e-1	-4.02e-1
SM	kg	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0
FW	m3	3.43e+0	3.53e-3	5.39e-4	2.64e-4	2.72e-3	0	-3.15e-1	-2.80e-3

Note:

Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

Abbreviations:

RPRE or PERE = Renewable primary resources used as energy carrier (fuel), RPRM or PERM = Renewable primary resources with energy content used as material, RPRT or PERT = Total use of renewable primary resources with energy content, NRPRE or PENRE = Non-renewable primary resources used as an energy carrier (fuel), NRPRM or PENRM = Non-renewable primary resources with energy content used as material, NRPRRT or PENRT = Total non-renewable primary resources with energy content, SM = Secondary materials, RSF = Renewable secondary fuels, NRSF = Non-renewable secondary fuels, RE = Recovered energy, ADPF = Abiotic depletion potential, FW = Use of net freshwater resources, VOCs = Volatile Organic Compounds.

Option B, Annex 3, was used to estimate the primary energy indicators.

Table 6. Waste and Output Flow Indicators

per 1 m2 of product of applied Pitchmastic PmB waterproofing system.

Indicator	Unit	A1 - A3	A4	A5	C1	C2	C3	C4	D
HWD	kg	0	0	0	0	0	0	0	0
NHWD	kg	0	0	0	0	0	0	2.58e+0	0
RWD	kg	2.14e-4	2.13e-7	2.62e-8	1.27e-8	1.64e-7	0	1.81e-7	-4.97e-8
CRU	kg	0	0	0	0	0	0	0	0
MFR	kg	0	0	1.29e-2	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0	0
EE	MJ	0	0	0	0	0	0	0	0

Note:

Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

Abbreviations:

HWD = Hazardous waste disposed, NHWD = Non-hazardous waste disposed, RWD = Radioactive waste disposed, HLRW = High-level radioactive waste, ILLRW = Intermediate- and low-level radioactive waste, CRU = Components for re-use, MFR or MR = Materials for recycling, MER = Materials for energy recovery, MNER = Materials for incineration, no energy recovery, EE or EEE = Recovered energy exported from the product system, EET = Exported thermal energy.

Due to potential inconsistencies in LCI data sources for HWD and NHWD, those indicators were calculated from primary data on the foreground manufacturing process.

Table 7. Carbon Emissions and Removals

per 1 m2 of product of applied Pitchmastic PmB waterproofing system.

Indicator	Unit	A1 - A3	A4	A5	C1	C2	C3	C4	D
Bio Carbon Removal from Product	kg CO2	0	0	0	0	0	0	0	0
Bio Carbon Emission from Product	kg CO2	0	0	0	0	0	0	0	0
Bio Carbon Removal from Packaging	kg CO2	0	0	0	0	0	0	0	0
Bio Carbon Emission from Packaging	kg CO2	0	0	0	0	0	0	0	0
Bio Carbon Emission from Waste during Manufacturing (renewable source)	kg CO2	0	0	0	0	0	0	0	0
Calcination Carbon Removal	kg CO2	0	0	0	0	0	0	0	0
Carbonation Carbon Emission	kg CO2	0	0	0	0	0	0	0	0
Carbon Emission from Waste during Manufacturing (non-renewable source)	kg CO2	0	0	0	0	0	0	0	0

Note:

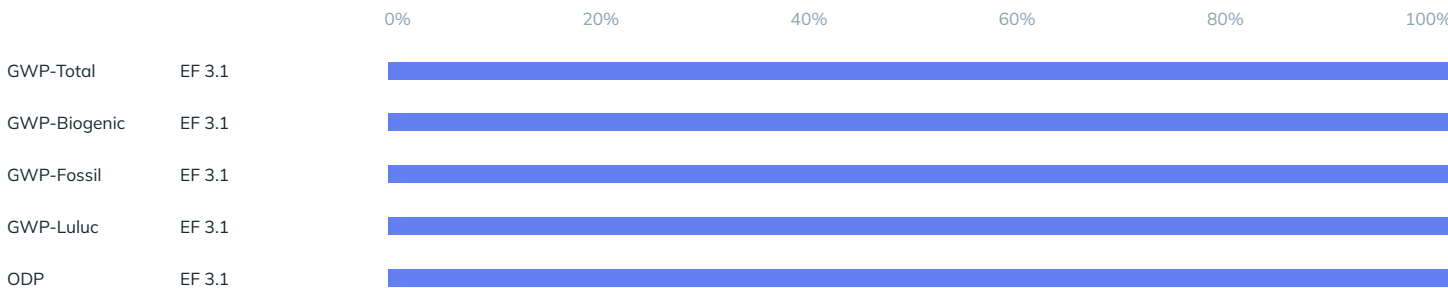
Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

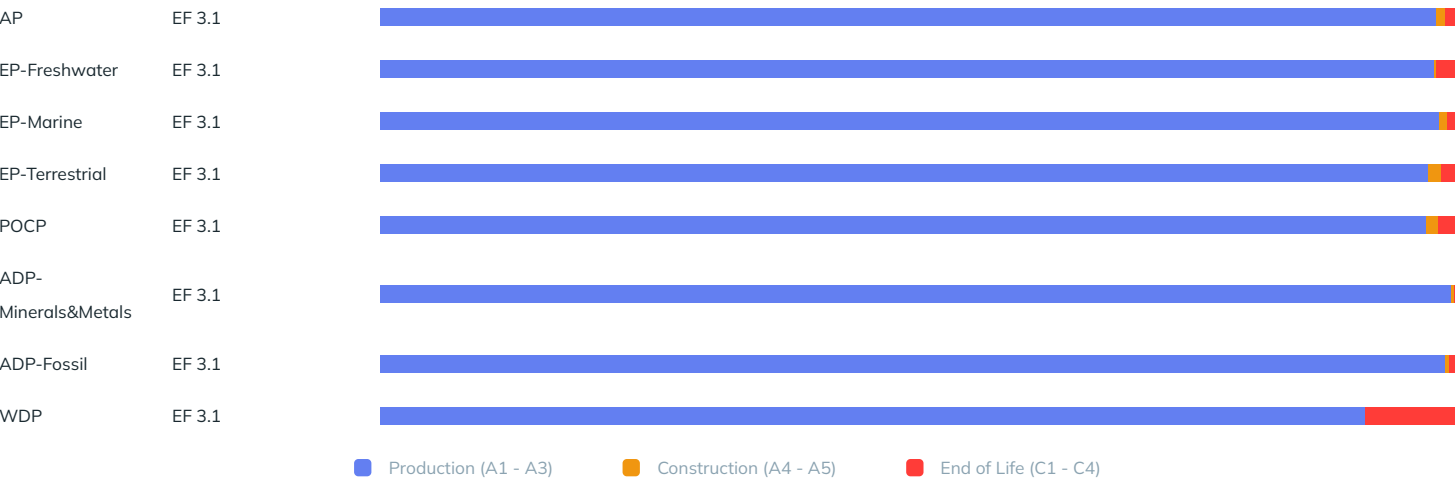
Abbreviations:

BCRP = Biogenic Carbon Removal from Product, BCEP = Biogenic Carbon Emission from Product, BCRK = Biogenic Carbon Removal from Packaging, BCEK = Biogenic Carbon Emission from Packaging, BCEW = Biogenic Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes, CCE = Calcination Carbon Emissions, CCR = Carbonation Carbon Removals, CWNRR = Carbon Emissions from Combustion of Waste from Non-Renewable Sources used in Production Processes, GWP-luc = Carbon Emissions from Land-use Change.

Interpretation

The manufacturing of the products in this analysis involves the procurement of raw materials from suppliers, followed by transportation to the Pitchmastic PMB Ltd. manufacturing facility where materials are transferred into a fully closed production system, mixed, heated, quality checked, filled, and packaged into finished products. The product stage (A1–A3) represents the largest contribution to environmental impacts, primarily due to the production of polyurethane raw materials, pigments, additives, and the energy consumed during manufacturing. For products with significant manufacturing energy impacts, continued efforts to improve energy efficiency and increase the use of renewable electricity sources are recommended. *Given the significant contribution of raw materials to the overall environmental profile, opportunities should be explored to optimize material formulations, evaluate lower-impact raw material alternatives, and increase the use of recycled or bio-based content where technically feasible without compromising product performance. Additionally, collaboration with suppliers to improve environmental performance, adopt sustainable manufacturing practices, and increase the use of renewable energy can further reduce the environmental impacts of the products assessed in this analysis.





Additional Environmental Information

None

Table 8. Other Environmental Impacts

Impact Category	Unit	Method	A1 - A3	A4	A5	C1	C2	C3	C4	D
GWP-GHG	kg CO2 eq	EF 3.1	1.14e+1	5.30e-2	1.88e-2	9.35e-3	4.08e-2	0	2.52e-2	-1.80e-2

Note:

Abbreviations:

GWP-IOBC/GWP-GHG = Climate change indicator with instantaneous oxidation of biogenic carbon. The GWP-IOBC indicator has zero contribution to GWP from biogenic carbon temporary stored in products and packaging. The GWP-IOBC indicator, also called GWP-GHG, is identical to GWP-total except that the characterization factor (CF) for biogenic CO2 is set to zero.

Further Information

Electricity from the grid

Proxy	Database	Comment
Electricity, medium voltage {GB} electricity, medium voltage, residual mix Cut-off, S	Ecoinvent v3.11	Manufacturing electricity was modelled using the Great Britain residual fuel mix, in the absence of a contractual instrument evidencing a specific supply.

References

[1] International Organization for Standardization (ISO). (2006). *ISO 14040:2006 – Environmental management – Life cycle assessment – Principles and framework*. Geneva: ISO. (Amendment 1:2020; confirmed current 2022)

[2] International Organization for Standardization (ISO). (2006). *ISO 14044:2006 – Environmental management – Life cycle assessment – Requirements and guidelines*. Geneva: ISO. (Amendments 1:2017 and 2:2020 included; confirmed current 2022)

[3] Smart EPD. (2025). *General program instructions* (Version 2.0). <https://smartepd.com/wp-content/uploads/2026/02/SmartEPD-GPIs-v2.0-03-11-2025.pdf>

- [4] European Committee for Standardization (CEN). (2019). *EN 15804:2012+A2:2019 – Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products*. Brussels: CEN. (Including AC:2021)
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- [7] PRé Sustainability. (2025). *SimaPro LCA Software* [Computer software]. Amersfoort, The Netherlands: PRé Sustainability B.V. (Software platform used for LCA modeling)
- [8] Ecoinvent Association. (2025). *Ecoinvent data v3.11* [Life Cycle Inventory database]. Zurich, Switzerland: Ecoinvent. (Database version used for background LCI data)
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