EN 15804+A2 EPD

# ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A2.
Owner of the Declaration – Partel

Declaration number: EPDIE-22-84
Issue date 18th July 2022
Valid to 18th July 2027

EPD Programme - EPD Ireland
Programme Operator - Irish Green Building Council
www.epdireland.org

## Breathable Monolithic Membranes

### EXOPERM MONO 150

### EXOPERM MONO SA 250

# 1. General information

| PROGRAMME OPERATOR | OWNER OF DECLARATION |
|---|---|
| Irish Green Building Council<br>19 Mountjoy Square, Dublin D01 E8P5<br>info@igbc.ie | Partel<br>17 Claregalway Corporate Park, Claregalway, Co. Galway<br>Ireland H91 R85P |
| **DECLARATION NUMBER** | **MANUFACTURER ADDRESS** |
| EPDIE-22-84 | Partel<br>17 Claregalway Corporate Park, Claregalway, Co. Galway<br>Ireland H91 R85P |
| **ECO PLATFORM EPD** | **DECLARED UNIT** |
| Yes | 1 m² of EXOPERM MONO 150 breathable Monolithic membrane<br>1 m² of EXOPERM MONO SA 250 breathable Monolithic membrane |
| **APPLICABLE PRODUCT CATEGORY RULES** | **DECLARED PRODUCT** |
| 1. EN 15804:2012+A2:2019<br>2. Product Category Rules : Part A Implementation and use of I.S. EN 15804:2012+A1 and + A2, and CEN TR 16970:2016 in Ireland for the development of Environmental Product Declarations (issued 05.03.2022), Version 2.1. | Partel Membranes<br>EXOPERM MONO 150 breathable Monolithic membrane<br>EXOPERM MONO SA 250 (self-adhesive) breathable Monolithic membrane |
| **DATE OF ISSUE** | **SCOPE OF EPD** |
| 18th July 2022 | Cradle to gate, with options including Modules C and D |
| **DATE OF EXPIRY** | **LCA CONSULTANT OR PERSON RESPONSIBLE FOR LCA** |
| 18th July 2027 | Ecoreview, Kilkenny, Ireland.<br>+353 (087) 258 9783<br>www.ecoreview.ie |
| **TYPE OF EPD: SINGLE OR MULTI PRODUCT** | **LCA SOFTWARE AND DEVELOPER IF APPLICABLE** |
| Multi product EPD | Ecochain LCA tool version 3.5.13 (2022) |
| **PRODUCT CLASSIFICATION OR NACE CODE** | **NAME AND VERSION OF INVENTORY USED** |
| Breathable membrane | Ecoinvent version 3.6 |
| **COMPARABILITY** | |
| Environmental Product Declarations from different programmes may not be directly comparable if not compliant with EN 15804:2012+A2:2019. Comparability is further dependent on the specific product category rules, system boundaries and allocations, and background data sources. See clause 5.3 of EN 15804:2012+A2:2019 | |
| The CEN Norm /EN 15804:2012+A2:2019 serves as the core PCR | |
| Independent verification of the declaration according to ISO 14025 | |

Internally ☐ Externally ✕

| SIGNATURE OF PROGRAMME OPERATOR | SIGNATURE VERIFIER |
|---|---|
| Pat Barry - CEO - Irish Green Building Council<br> <br>IGBC<br>IRISH GREEN BUILDING COUNCIL | Chris Foster - EuGeos SRL<br> <br>EuGeos |

## 2. Scope and Type of EPD

### Scope

This is a Cradle to Gate, with options EPD. The Modules that are declared are shown in the table below.

| PRODUCT STAGE | | | CONSTRUCTION ON PROCESS STAGE | | USE STAGE | | | | | | | END OF LIFE STAGE | | | | BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Raw material supply | Transport | Manufacturing | Transport from the gate to the site | Assembly | Use | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | De-construction 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 |
| X | X | X | X | X | ND | ND | ND | ND | ND | ND | ND | X | X | X | X | X |
| MDT | MDT | MDT | OP | OP | OP | OP | OP | OP | OP | OP | OP | MDT | MDT | MDT | MDT | MDT |

*X = Module declared; ND = Module not declared; MDT = Mandatory; OP = Optional.*

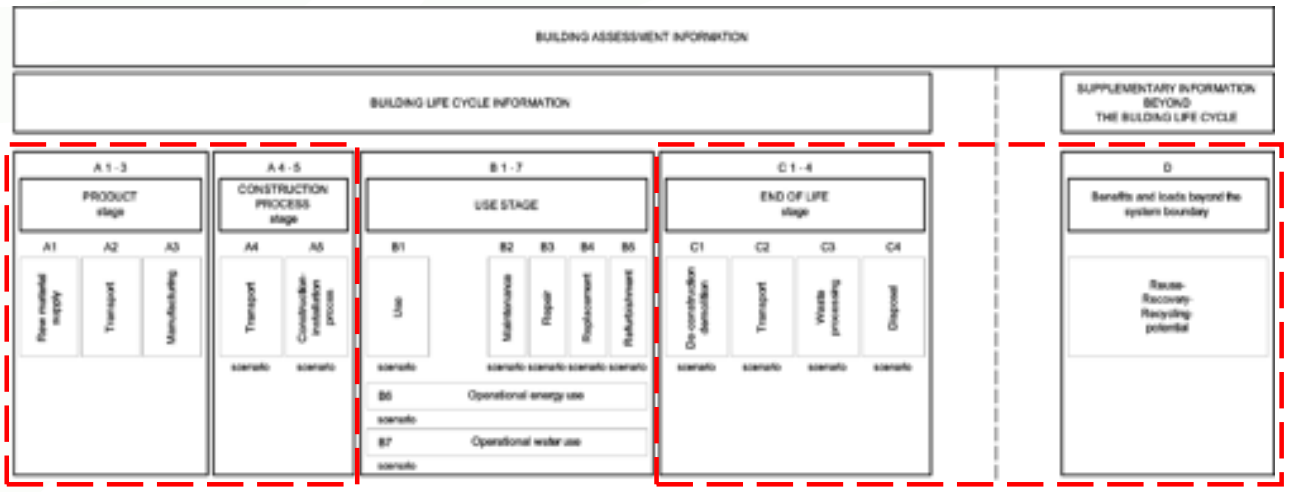
### Declared Functional Unit

1 m² of EXOPERM MONO 150 breathable Monolithic membrane

1 m² of EXOPERM MONO SA 250 (self-adhesive) breathable Monolithic membrane

### System Boundaries

This LCA covers the Product (A1 - A3), Construction Process (A4 - A5), end of Life (C1 - C4), and benefits and loads beyond the system boundary (D).



## 3. Detailed product description

This EPD is for Partel's EXOPERM MONO 150 breathable Monolithic membrane, and EXOPERM MONO SA 250 (self-adhesive) breathable Monolithic membrane. The raw materials are predominantly polyester elastomer bonded to a non-woven or scrim, with a small amount of ink printing on the surface, to ensure correct installation, and adhesive (in the case of the EXOPERM MONO SA 250 self-adhesive product).

EXOPERM MONO 150 provides the building structures with superb protection and yet providing high breathability with an SD value of 0.07m. It's Monolithic TPE layer creates a complete wind tight, waterproof, breathable membrane that actively expels any water or humidity.

EXOPERM MONO 150 technical data:
SD Value: 0.07m
Water Resistance: W1 (Before and after aging)
Tensile Strength MD/CD: 305 / 175N / 50mm
Nail Tear Resistance MD/CD: 155N / 190N

EXOPERM MONO SA 250 is an advanced vapour permeable self-adhesive membrane developed based on proven Monolithic Technology. It provides an air and vapour barrier with excellent adhesion for the roof, wall and floor applications. The integrated self-adhesive technology ensures membrane performance, without impacting its breathability function, facilitating primerless, continuous air and windtight connections that withstand damp conditions, without requiring fixings.

EXOPERM MONO SA 250 technical data:
SD Value : 0.26m
Nail Tear Resistance MD/CD: 180 / 200N
Tensile Strength MD/CD: 265 / 155N / 50mm
Vapour Resistance: 13 US PERMS
UV Resistance: 4 Months

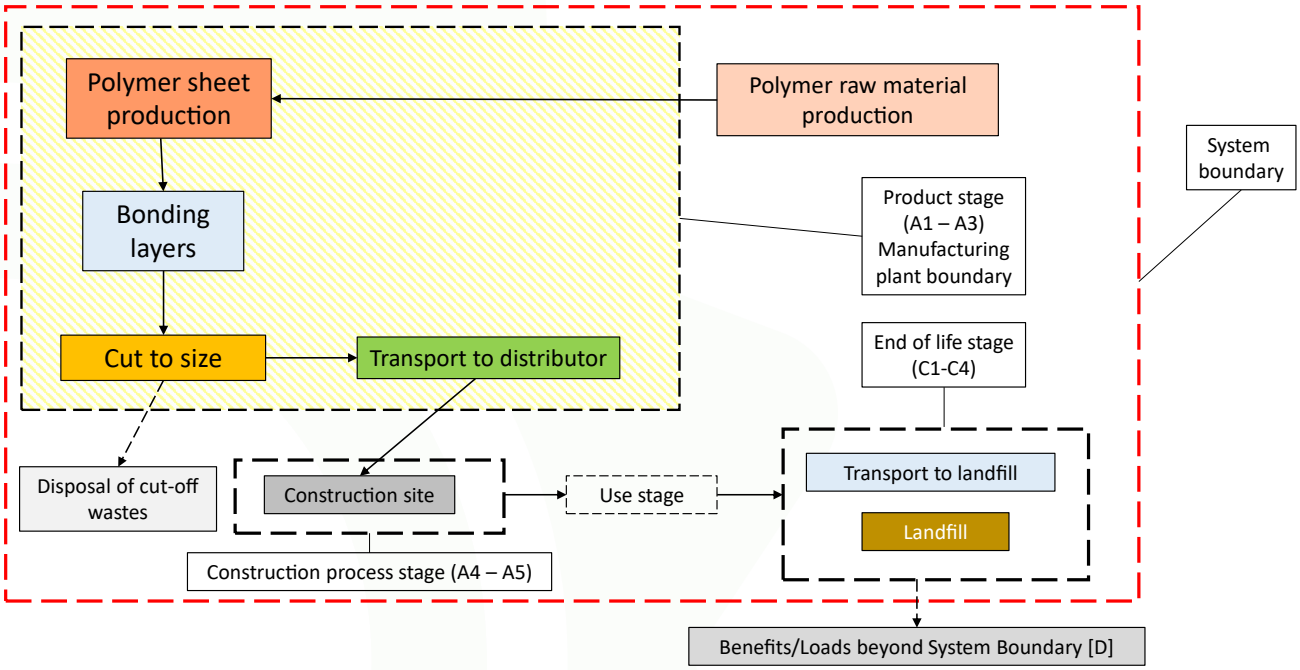
The function of both of these products is to act as an exterior breather membrane. Both membranes use Monolithic TPE technology to expel any water or humidity out from the buidling. They can be used for roofs and walls appplication, and are also suitable for ceiling and floor timber structures as temporary protection during the contruction phase. Ideal installation on timber structures, CLT elements, OSB, Steel or concrete, masonry-type substrates. They are an effective solution for all insulation types.

Full technical details on these products can be found at:
https://www.partel.ie/product/exoperm-mono-150-breathable-monolithic-membrane/
https://www.partel.ie/product/exoperm-mono-sa-250-selfadhesive-monolithic-windtight-membrane/

## 3.1 Manufacturing Process Description

The membranes are manufactured by applying a non-woven or scrim onto a polyethylene elastomer sheet substrate, to form a laminated sheet membrane. Adhesive is also added to the surface (for the SA product), and one surface is printed with ink.

The manufacturing process flowchart is shown below:



# EXOPERM MONO 150
# Breathable Monolithic Membrane

## 4.1.A. LCA results - EXOPERM MONO 150

### Core Environmental impact per 1 m²

| PARAMETER | UNIT | A1 | A2 | A3 | TOTAL A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GWP-total | [kg $CO_2$ eq.] | 4.93E-01 | 1.51E-02 | 2.04E-02 | 5.28E-01 | 4.26E-03 | 2.87E-02 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 1.14E-03 | 0.00E+00 | 3.61E-03 | 0.00E+00 |
| GWP-fossil | [kg $CO_2$ eq.] | 5.02E-01 | 1.50E-02 | 2.04E-02 | 5.37E-01 | 4.25E-03 | 2.92E-02 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 1.14E-03 | 0.00E+00 | 3.61E-03 | 0.00E+00 |
| GWP-biogenic | [kg $CO_2$ eq.] | -9.41E-03 | 1.16E-05 | -1.09E-05 | -9.41E-03 | 2.29E-06 | -5.53E-04 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 3.40E-07 | 0.00E+00 | 2.38E-06 | 0.00E+00 |
| GWP-luluc | [kg $CO_2$ eq.] | 5.99E-04 | 6.62E-06 | 7.06E-06 | 6.12E-04 | 1.51E-06 | 2.42E-05 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 3.39E-07 | 0.00E+00 | 1.87E-07 | 0.00E+00 |
| ODP | [kg CFC-11 eq.] | 2.88E-08 | 3.19E-09 | 3.39E-09 | 3.54E-08 | 9.68E-10 | 1.58E-09 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 2.62E-10 | 0.00E+00 | 1.02E-10 | 0.00E+00 |
| AP | [mol H+ eq.] | 2.10E-03 | 2.09E-04 | 2.01E-04 | 2.51E-03 | 1.22E-05 | 1.32E-04 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 3.28E-06 | 0.00E+00 | 3.00E-06 | 0.00E+00 |
| EP-freshwater[1] | [kg P eq.] | 1.34E-05 | 1.85E-07 | 1.76E-07 | 1.37E-05 | 3.40E-08 | 8.15E-07 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 1.72E-08 | 0.00E+00 | 6.54E-09 | 0.00E+00 |
| EP-marine | [kg N eq.] | 3.59E-04 | 4.09E-05 | 5.28E-05 | 4.53E-04 | 2.42E-06 | 2.34E-05 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 6.12E-07 | 0.00E+00 | 4.63E-06 | 0.00E+00 |
| EP-terrestrial | [mol N eq.] | 4.02E-03 | 4.60E-04 | 5.86E-04 | 5.07E-03 | 2.71E-05 | 2.63E-04 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 6.99E-06 | 0.00E+00 | 1.08E-05 | 0.00E+00 |
| POCP | [kg NMVOC eq.] | 1.56E-03 | 1.27E-04 | 2.11E-04 | 1.89E-03 | 1.04E-05 | 1.00E-04 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 2.66E-06 | 0.00E+00 | 3.85E-06 | 0.00E+00 |
| ADP-minerals&metals[2] | [kg Sb eq.] | 5.33E-06 | 2.14E-07 | 3.88E-07 | 5.93E-06 | 1.17E-07 | 3.45E-07 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 3.45E-09 | 0.00E+00 | 3.54E-09 | 0.00E+00 |
| ADP-fossils[2] | [MJ] ncv | 1.17E+01 | 2.21E-01 | 2.86E-01 | 1.22E+01 | 6.43E-02 | 7.38E-01 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 1.74E-02 | 0.00E+00 | 7.89E-03 | 0.00E+00 |
| WDP[2] | $m^3$ world eq. deprived | 2.91E-01 | 1.19E-03 | 9.88E-04 | 2.93E-01 | 1.82E-04 | 1.86E-02 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 1.33E-04 | 0.00E+00 | 3.33E-04 | 0.00E+00 |

*GWP-total = Global Warming Potential total; GWP-fossil= Global Warming Potential fossil fuels (GWP-fossil; GWP-biogenic= Global Warming Potential biogenic; GWP-luluc= Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP =Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&fossils = Abiotic depletion potential for non-fossil resources; ADP-fossils= Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential, deprivation-weighted water consumption.*

*The measurement of environmental impacts uses the recommended default LCIA methods for the PEF 3.0 method. These methods include amongst others: USEtox® 2.0, ReCiPe (2016), CML-2001, EDIP 2003, IPCC.*

*[1]To express EP freshwater as kg of PO43- eq, multiply the value for kg P eq. by 3.067*

*[2]The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.*

*ND = Module not declared; INA = Indicator not assessed.*

## 4.1.B. LCA results - EXOPERM MONO 150

### Resource use per 1 m²

| PARAMETER | UNIT | A1 | A2 | A3 | TOTAL A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PERE | [MJ] | 4.56E-01 | 4.07E-03 | 2.35E-01 | 6.95E-01 | 9.21E-04 | 3.24E-02 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 1.85E-04 | 0.00E+00 | 1.56E-04 | 0.00E+00 |
| PERM | [MJ] | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| PERT | [MJ] | 4.56E-01 | 4.07E-03 | 2.35E-01 | 6.95E-01 | 9.21E-04 | 3.24E-02 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 1.85E-04 | 0.00E+00 | 1.56E-04 | 0.00E+00 |
| PENRE | [MJ] | 6.18E+00 | 2.35E-01 | 3.10E-01 | 6.73E+00 | 6.83E-02 | 7.91E-01 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 1.85E-02 | 0.00E+00 | 8.39E-03 | 0.00E+00 |
| PENRM | [MJ] | 6.37E+00 | 0.00E+00 | 0.00E+00 | 6.37E+00 | 0.00E+00 | 0.00E+00 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| PENRT | [MJ] | 1.26E+01 | 2.35E-01 | 3.10E-01 | 1.31E+01 | 6.83E-02 | 7.91E-01 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 1.85E-02 | 0.00E+00 | 8.39E-03 | 0.00E+00 |
| SM | [kg] | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| RSF | [MJ] | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| NRSF | [MJ] | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| FW | [m³] | 7.17E-03 | 3.20E-05 | 3.13E-05 | 7.23E-03 | 6.88E-06 | 4.51E-04 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 2.84E-06 | 0.00E+00 | 8.16E-06 | 0.00E+00 |

*PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water.*

*ND = Module not declared; INA = Indicator not assessed.*

## 4.1.C. LCA results - EXOPERM MONO 150

### Output flows and waste categories per 1 $m^2$

| PARAMETER | UNIT | A1 | A2 | A3 | TOTAL A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HWD | [kg] | 3.17E-06 | 3.66E-07 | 4.48E-07 | 3.99E-06 | 1.68E-07 | 2.15E-07 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 1.11E-08 | 0.00E+00 | 1.18E-08 | 0.00E+00 |
| NHWD | [kg] | 3.46E-02 | 5.82E-03 | 6.43E-03 | 4.68E-02 | 3.13E-03 | 2.44E-03 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 8.33E-04 | 0.00E+00 | 3.09E-02 | 0.00E+00 |
| RWD | [kg] | 9.80E-06 | 1.48E-06 | 1.11E-06 | 1.24E-05 | 4.38E-07 | 7.55E-07 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 1.18E-07 | 0.00E+00 | 4.64E-08 | 0.00E+00 |
| CRU | [kg] | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| MFR | [kg] | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| MER | [kg] | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| EEE | [MJ] | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| EET | [MJ] | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |

*HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy.*

*CRU, MFR, MER, EEE, EET are not calculated by the EcoChain software.*

*ND = Module not declared; INA = Indicator not assessed.*

## 4.1.D. LCA results - EXOPERM MONO 150

### Additonal Environmental impact per 1 m²

| PARAMETER | UNIT | A1 | A2 | A3 | TOTAL A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PM | Disease incidence | 1.89E-08 | 7.10E-10 | 9.54E-10 | 2.06E-08 | 2.70E-10 | 1.08E-09 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 7.28E-11 | 0.00E+00 | 5.40E-11 | 0.00E+00 |
| IRP[1] | kBq U235 eq | 1.13E-02 | 9.80E-04 | 7.14E-04 | 1.30E-02 | 2.81E-04 | 7.95E-04 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 7.44E-05 | 0.00E+00 | 3.10E-05 | 0.00E+00 |
| ETP-fw[2] | CTUe | 9.40E+00 | 1.64E-01 | 2.64E-01 | 9.82E+00 | 5.18E-02 | 4.48E-01 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 1.23E-02 | 0.00E+00 | 1.67E-02 | 0.00E+00 |
| HTP-c[2] | CTUe | 2.31E-10 | 4.96E-12 | 1.20E-11 | 2.48E-10 | 1.44E-12 | 1.15E-11 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 3.62E-13 | 0.00E+00 | 2.31E-13 | 0.00E+00 |
| HTP-nc[2] | CTUe | 7.34E-09 | 1.51E-10 | 2.97E-10 | 7.79E-09 | 5.46E-11 | 3.27E-10 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 1.38E-11 | 0.00E+00 | 7.52E-12 | 0.00E+00 |
| SQP[2] | dimensionless | 1.85E+00 | 9.77E-02 | 1.18E-01 | 2.07E+00 | 4.50E-02 | 1.17E-01 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 1.19E-02 | 0.00E+00 | 1.83E-02 | 0.00E+00 |

*PM = Potential incidence of disease due to PM emissions, IRP = Potential Human exposure efficiency relative to U235, ETP-fw = Potential Comparative Toxic Unit for ecosystems; HTP-c:Potential Comparative Toxic Unit for humans, HTP-nc = Potential Comparative Toxic Unit for humans, SQP = Potential soil quality index.*

*[1] This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuelcycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.*

*[2] The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.*

*ND = Module not declared; INA = Indicator not assessed.*

# EXOPERM MONO SA 250
# Self-adhesive Breathable Monolithic Membrane

## 4.2.A. LCA results - EXOPERM MONO SA 250 (self-adhesive)

### Core Environmental impact per 1 m²

| PARAMETER | UNIT | A1 | A2 | A3 | TOTAL A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GWP-total | [kg $CO_2$ eq.] | 6.24E-01 | 2.11E-02 | 1.54E-01 | 7.99E-01 | 7.20E-03 | 3.32E-02 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 1.79E-03 | 0.00E+00 | 1.44E-02 | 0.00E+00 |
| GWP-fossil | [kg $CO_2$ eq.] | 6.36E-01 | 2.11E-02 | 1.53E-01 | 8.11E-01 | 7.19E-03 | 3.37E-02 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 1.79E-03 | 0.00E+00 | 1.44E-02 | 0.00E+00 |
| GWP-biogenic | [kg $CO_2$ eq.] | -1.28E-02 | 1.48E-05 | 3.75E-04 | -1.24E-02 | 3.87E-06 | -5.48E-04 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 5.34E-07 | 0.00E+00 | 9.47E-06 | 0.00E+00 |
| GWP-luluc | [kg $CO_2$ eq.] | 7.03E-04 | 8.77E-06 | 1.69E-04 | 8.81E-04 | 2.56E-06 | 2.69E-05 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 5.32E-07 | 0.00E+00 | 7.44E-07 | 0.00E+00 |
| ODP | [kg CFC-11 eq.] | 4.35E-08 | 4.56E-09 | 4.01E-08 | 8.81E-08 | 1.64E-09 | 2.26E-09 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 4.12E-10 | 0.00E+00 | 4.04E-10 | 0.00E+00 |
| AP | [mol H+ eq.] | 2.81E-03 | 2.26E-04 | 1.05E-03 | 4.09E-03 | 2.07E-05 | 1.56E-04 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 5.15E-06 | 0.00E+00 | 1.19E-05 | 0.00E+00 |
| EP-freshwater[1] | [kg P eq.] | 1.86E-05 | 2.33E-07 | 1.67E-06 | 2.05E-05 | 5.75E-08 | 9.35E-07 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 2.70E-08 | 0.00E+00 | 2.60E-08 | 0.00E+00 |
| EP-marine | [kg N eq.] | 4.67E-04 | 4.43E-05 | 2.74E-04 | 7.86E-04 | 4.09E-06 | 2.89E-05 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 9.61E-07 | 0.00E+00 | 1.84E-05 | 0.00E+00 |
| EP-terrestrial | [mol N eq.] | 5.26E-03 | 4.99E-04 | 3.02E-03 | 8.78E-03 | 4.58E-05 | 3.24E-04 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 1.10E-05 | 0.00E+00 | 4.29E-05 | 0.00E+00 |
| POCP | [kg NMVOC eq.] | 2.03E-03 | 1.42E-04 | 9.38E-04 | 3.11E-03 | 1.75E-05 | 1.21E-04 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 4.17E-06 | 0.00E+00 | 1.53E-05 | 0.00E+00 |
| ADP-minerals&metals[2] | [kg Sb eq.] | 8.52E-06 | 3.80E-07 | 2.79E-06 | 1.17E-05 | 1.99E-07 | 4.54E-07 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 5.42E-09 | 0.00E+00 | 1.41E-08 | 0.00E+00 |
| ADP-fossils[2] | [MJ] ncv | 1.49E+01 | 3.12E-01 | 4.84E+00 | 2.00E+01 | 1.09E-01 | 8.29E-01 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 2.74E-02 | 0.00E+00 | 3.14E-02 | 0.00E+00 |
| WDP[2] | $m^3$ world eq. deprived | 4.09E-01 | 1.45E-03 | 2.86E-02 | 4.40E-01 | 3.08E-04 | 2.10E-02 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 2.09E-04 | 0.00E+00 | 1.33E-03 | 0.00E+00 |

*GWP-total = Global Warming Potential total; GWP-fossil= Global Warming Potential fossil fuels (GWP-fossil; GWP-biogenic= Global Warming Potential biogenic; GWP-luluc= Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP =Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&fossils = Abiotic depletion potential for non-fossil resources; ADP-fossils= Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential, deprivation-weighted water consumption.*

*The measurement of environmental impacts uses the recommended default LCIA methods for the PEF 3.0 method. These methods include amongst others: USEtox® 2.0, ReCiPe (2016), CML-2001, EDIP 2003, IPCC.*

*[1]To express EP freshwater as kg of PO43- eq, multiply the value for kg P eq. by 3.067*

*[2]The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.*

*ND = Module not declared; INA = Indicator not assessed.*

## 4.2.B. LCA results - EXOPERM MONO SA 250 (self-adhesive)

### Resource use per 1 m²

| PARAMETER | UNIT | A1 | A2 | A3 | TOTAL A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PERE | [MJ] | 6.50E-01 | 5.38E-03 | 2.45E-01 | 9.01E-01 | 1.56E-03 | 3.90E-02 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 2.91E-04 | 0.00E+00 | 6.22E-04 | 0.00E+00 |
| PERM | [MJ] | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| PERT | [MJ] | 6.50E-01 | 5.38E-03 | 2.45E-01 | 9.01E-01 | 1.56E-03 | 3.90E-02 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 2.91E-04 | 0.00E+00 | 6.22E-04 | 0.00E+00 |
| PENRE | [MJ] | 5.18E+00 | 3.32E-01 | 4.98E+00 | 1.05E+01 | 1.15E-01 | 8.88E-01 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 2.91E-02 | 0.00E+00 | 3.34E-02 | 0.00E+00 |
| PENRM | [MJ] | 1.08E+01 | 0.00E+00 | 0.00E+00 | 1.08E+01 | 0.00E+00 | 0.00E+00 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| PENRT | [MJ] | 1.60E+01 | 3.32E-01 | 4.98E+00 | 2.13E+01 | 1.15E-01 | 8.88E-01 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 2.91E-02 | 0.00E+00 | 3.34E-02 | 0.00E+00 |
| SM | [kg] | 1.66E+01 | 3.37E-01 | 0.00E+00 | 1.69E+01 | 0.00E+00 | 0.00E+00 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| RSF | [MJ] | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| NRSF | [MJ] | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| FW | [m³] | 1.02E-02 | 4.18E-05 | 1.38E-03 | 1.16E-02 | 1.16E-05 | 5.14E-04 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 4.47E-06 | 0.00E+00 | 3.25E-05 | 0.00E+00 |

*PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water.*

*ND = Module not declared; INA = Indicator not assessed.*

## 4.2.C. LCA results - EXOPERM MONO SA 250 (self-adhesive)

### Output flows and waste categories per 1 $m^2$

| PARAMETER | UNIT | A1 | A2 | A3 | TOTAL A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HWD | [kg] | 5.11E-06 | 6.05E-07 | 4.18E-06 | 9.89E-06 | 2.85E-07 | 3.20E-07 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 1.74E-08 | 0.00E+00 | 4.71E-08 | 0.00E+00 |
| NHWD | [kg] | 5.04E-02 | 1.03E-02 | 8.47E-02 | 1.45E-01 | 5.29E-03 | 4.35E-03 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 1.31E-03 | 0.00E+00 | 1.23E-01 | 0.00E+00 |
| RWD | [kg] | 1.75E-05 | 2.10E-06 | 3.78E-05 | 5.73E-05 | 7.41E-07 | 1.08E-06 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 1.85E-07 | 0.00E+00 | 1.85E-07 | 0.00E+00 |
| CRU | [kg] | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| MFR | [kg] | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| MER | [kg] | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| EEE | [MJ] | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| EET | [MJ] | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |

*HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy.*

*CRU, MFR, MER, EEE, EET are not calculated by the EcoChain software.*

*ND = Module not declared; INA = Indicator not assessed.*

## 4.2.D. LCA results - EXOPERM MONO SA 250 (self-adhesive)

### Additonal Environmental impact per 1 m²

| PARAMETER | UNIT | A1 | A2 | A3 | TOTAL A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PM | Disease incidence | 2.41E-08 | 1.09E-09 | 1.07E-08 | 3.59E-08 | 4.57E-10 | 1.34E-09 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 1.14E-10 | 0.00E+00 | 2.15E-10 | 0.00E+00 |
| IRP[1] | kBq U235 eq | 1.85E-02 | 1.38E-03 | 3.63E-02 | 5.61E-02 | 4.75E-04 | 1.04E-03 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 1.17E-04 | 0.00E+00 | 1.23E-04 | 0.00E+00 |
| ETP-fw[2] | CTUe | 1.20E+01 | 2.38E-01 | 2.18E+00 | 1.44E+01 | 8.76E-02 | 5.23E-01 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 1.94E-02 | 0.00E+00 | 6.64E-02 | 0.00E+00 |
| HTP-c[2] | CTUe | 2.98E-10 | 7.01E-12 | 7.45E-11 | 3.80E-10 | 2.44E-12 | 1.36E-11 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 5.69E-13 | 0.00E+00 | 9.18E-13 | 0.00E+00 |
| HTP-nc[2] | CTUe | 9.50E-09 | 2.29E-10 | 1.94E-09 | 1.17E-08 | 9.23E-11 | 3.97E-10 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 2.17E-11 | 0.00E+00 | 2.99E-11 | 0.00E+00 |
| SQP[2] | dimensionless | 2.67E+00 | 1.61E-01 | 1.29E+00 | 4.12E+00 | 7.61E-02 | 1.50E-01 | ND | ND | ND | ND | ND | ND | ND | 0.00E+00 | 1.87E-02 | 0.00E+00 | 7.29E-02 | 0.00E+00 |

*PM = Potential incidence of disease due to PM emissions, IRP = Potential Human exposure efficiency relative to U235, ETP-fw = Potential Comparative Toxic Unit for ecosystems; HTP-c:Potential Comparative Toxic Unit for humans, HTP-nc = Potential Comparative Toxic Unit for humans, SQP = Potential soil quality index.*

*[1]This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuelcycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.*

*[2] The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.*

*ND = Module not declared; INA = Indicator not assessed.*

# 5. Calculation rules

The measurement of environmental impacts in this EPD uses the LCIA methodologies recommended for PEF3.0.

The process descriptions and input quantities detailed and used in this study are a true representation of the actual processes and quantities used in the manufacturing and use of the products. The references of all sources, both primary and public sources and literature, have been documented in the LCA report. The 'polluter pays' and 'modularity' principles have been followed.

In addition, to facilitate the reproducibility of this LCA, a full set of data records has been generated which can be accessed via the LCA tool. This data portfolio contains a summary of all the data used in this LCA.

## Cut-off criteria

The cut-off criteria of section 6.3.6 of EN15804:2012+A2:2019 have been followed, where 99% of the total energy and materials are included, and the total neglected input flows for the modules reported on in the LCA are less than 5% of the energy usage and mass.

## Data Quality

The dataset is representative for the production processes used in 2019, in the countries of production: Finland and France. The data Quality Level, according to Table E.1 of EN 15804 +A2, Annex E, is as follows:
Geographical representativeness: Very Good.
Technical representativeness: Good.
Time representativeness: Very Good.

## Allocations

Allocation of energy and electricity types and amounts to the various manufacturing processes has been provided by the manufacturers along with production waste. Allocation of impacts to the products is based on the product composition mass.

Flows related to human activities such as employee transport are excluded. The construction of capital assets such as buildings, manufacture of machines and transportation systems are also excluded since the related flows are assumed to be negligible compared to the manufacture of the building material when compared to these systems over a full lifetime of operation.

# 6. Scenarios and additional technical information

## A4. Transport to site

The transport to market is based on the transport from the Partel depot in Galway, by a distance of 200km to the construction site, which is the default value in the PCR for EPD Ireland [5].

| Parameter | Value / Description |
|---|---|
| Road transport | Transport, freight, lorry 16-32 metric ton, EURO6 engine |
| Distance, road | 200 km |
| Capacity utilisation road freight | 46% (% assuemd in the Ecoinvent V 3.6 database) |

## A5. Installation on site

Partel estimates the use of approx. 0.6m of adhesive plastic tape per m2 of installed membrane (i.e. a recommended 50m of tape per 75m2 roll membrane). Use of this amount of tape is included in the installation stage.

On-site construction losses have been confirmed from Partel as being approximately 2%. This value is used rather than the default value in the PCR for EPD Ireland [5].

## C1. De-construction demolition

In the deconstruction/demolition phase C1 it is assumed that the membranes are removed manually from the building, thus no energy or materials are required for module C1, and the impacts are assumed to be zero in C1.

## C2. Transport

In the transport phase C2, it is assumed that the removed materials travel 50km to landfill.

## C3. Waste processing

N/A.

## C4. Disposal

The end of life processing scenario is assumed to be landfill, C4. This is the default scenario for mixed materials in the Product Category Rules PCR for EPD Ireland [5], where 100% of mixed materials are assumed to go to landfill. This scenario is confirmed by Partel.

## D. Reuse – Recovery – Recycling potential

N/A.

## Declaration of biogenic carbon content at the production gate

The biogenic carbon (C) for product raw materials (A1) is given in the table below:

| BIOGENIC CARBON PER DELCARED UNIT | EXOPERM MONO 150 | EXOPERM MONO SA 250 (self-adhesive) |
|---|---|---|
| Biogenic carbon content in product (kg C per $m^2$) | 2.16E-03 | 2.09E-03 |
| Biogenic carbon content in packaging (kg C per $m^2$) | ND | ND |

*The weight of packaging is << than 5% of the mas of the products, and is not declared.*

## Additional Technical Information

N/A.

## 7. Mandatory additional information on release of dangerous substances to indoor air, soil and water

None of the substances contained in the product are listed in the “Candidate List of Substances of Very High Concern for authorisation”, or they do not exceed the limit for registration with the European Chemicals Agency.

## 8. Other optional additional environmental information

N/A.

## 9. References


[1] ISO 14040: Environmental management - Life cycle assessment – Principles and Framework', International Organization for Standardization, ISO 14040:2006.

[2] ISO 14044: Environmental management - Life cycle assessment - Requirements and guidelines', International Organization for Standardization, ISO 14044:2006.

[3] ISO 14025: Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures', International Organization for Standardization, ISO 14025:2006.

[4] I.S. EN 15804:2012+A2:2019,: Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products', EN 15804:2012+A2:2019.

[5] Ecochain, Version 3.5.13 (2022), web: http://app.ecochain.com.

[6] Product Category Rules : Part A Implementation and use of I.S. EN 15804:2012+A1 and + A2, and CEN TR 16970:2016 in Ireland for the development of Environmental Product Declarations (issued 05.03.2022), version 2.1.

[7] CML - Department of Industrial Ecology, CML-IA Characterisation Factors, Dated August 2016, Leiden University, Leiden, Netherlands Available at: https://www.universiteitleiden.nl/en/research/research-output/science/cml-ia-characterisation-factors

[8] Ministerie van Verkeer en Waterstaat, 8 maart 2004, Toxiciteit heeft z'n prijs, Schaduwprijzen voor (eco-) toxiciteit en uitputting van abiotische grondstoffen binnen DuboCalc.

[9] PEF methodology final draft.pdf (europa.eu)


## 10. Annex

N/A.