ENVIRONMENTAL PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804+A2*

Owner of the Declaration	mfh systems GmbH
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-MFH-20250190-IBA1-EN
Issue date	12.01.2024
Valid to	11.01.2029

Insulation - System IDEAL PET

mfh systems GmbH

Institut Bauen und Umwelt e.V.

ECO PLATFORM EPD VERIFIED

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1. General Information

mfh systems GmbH

Programme holder

IBU – Institut Bauen und Umwelt e.V.
Hegelplatz 1
10117 Berlin
Germany

Declaration number

EPD-MFH-20250190-IBA1-EN

This declaration is based on the product category rules:

Insulating materials made of foam plastics, 01.08.2021
(PCR checked and approved by the SVR)

Issue date

12.01.2024

Valid to

11.01.2029

Dipl.-Ing. Hans Peters
(Chairman of Institut Bauen und Umwelt e.V.)

Florian Pronold
(Managing Director Institut Bauen und Umwelt e.V.)

Insulation - System IDEAL PET

Owner of the declaration

mfh systems GmbH
Hager Feld 8
49191 Belm
Germany

Declared product / declared unit

The declared product is *Insulation – System IDEAL PET*. The declared unit relates to 1 m³ of product, with an average density of 50 kg/m3. The packaging is also included in the calculation. The declared unit is given in [m³]

Scope:

This document relates to *Insulation – System IDEAL PET*. For the creation of the life cycle assessment, specific data was collected from the manufacturing plant in Belgium, whichcorresponds to the annual average and is based on data from 2022 (see 3.8 allocation). The owner of the declaration is liable for the information and evidence on which it is based; the IBU accepts no liability for manufacturer information, life cycle assessment data and evidence.The owner of the declaration shall be liable for the underlying informationand evidence; the IBU shall not be liable with respect to manufacturerinformation, life cycle assessment data and evidences.
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The EPD was created according to the specifications of EN 15804+A2. In the following, the standard will be simplified as *EN 15804*.

Verification

The standard EN 15804 serves as the core PCR
Independent verification of the declaration and data according to ISO 14025:2011
☐ internally ☒ externally

Dr. Matthew Fishwick,
(Independent verifier)

2. Product

2.1 Product description/Product definition

Insulation - System IDEAL PET is a low-density polyethylene terephthalate (PET) foam, based on 100% recycled plastic bottles. Its long-term stability of the insulation properties and the low thermal conductivity secure lifetime insulation performance. The water resistance and the closed-cell structure of the material ensurestable thermal conductivity even after many years of operation.These features also prevent moisture penetration, mildew androt and therefore offer long-term corrosion protection and minimal maintenance requirements. Additionally, the material can be thermoformed into curved shapes, welded in pre-fabrication or on site, and is versatile for use in almost any type of finishing options. Its thermoplastic nature also allows for full recyclability of the material after the use phase. For the placing of the product on the market in the European
Union/European Free Trade Association /EU/EFTA) (with the exception of Switzerland) the Regulation (EU) No. 305/2011(CPR) applies. The product needs a declaration of performance taking into consideration ETA No. 21/0623; 26.10.2022;"Factory-made products of extruded, foamed Polyethylene terephthalate (PET) for thermal and or acoustical insulation" and the CE-marking. For the application and use the respective national provisions apply.

2.2 Application

Insulation – System IDEAL PET offers a solution for the (semi-) structural insulation of building envelopes, roofs, floors and internal partitions, in new building construction and the renovation of older buildings. Intended use, as specified in ETA No. 21/0623, is thermal insulation in walls (including cellar walls), ceilings, floors, roofs, between rafters and timber work. The provisions made in the ETA are based on an assumed intended working life of 50years for the insulation product. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are to be regarded only as a means for choosing the right product in relation to the expected reasonable working life of the works

2.3 Technical Data

For further technical data consult the product datasheet available on the website. Acoustic properties are not relevant for *Insulation – System IDEAL PET*

Technical Data

Extract in accordance with the Declaration of Performance

Name	Value	Unit
Gross density nach EN1602	50	kg/m^3
Reaction to fire EN 13501-1	E	-
Compressive strength nach EN 826	CS(10\Y)150	N/mm^2
Calculation value for thermal conductivity nach EN 12667 and EN 13164 Anhang C	<0,035	W/(mK)
Water vapour diffusion resistance factor nach EN12086	>1000	-
Thermal conductivity acc. to EN12667	<0,030	W/(mK)
Long term water absorption by immersion acc. to EN12087, method 2A	WL(T)3	
Deformation under specified compressive load and temperature condition acc. to EN1605	DLT(2)5	

Performance data of the product in accordance with the declaration of performance with respect to its essential characteristics according to ETA No. 21/0623; 26.10.2022;"Factory-made products of extruded, foamed Polyethylene terephthalate (PET) for thermal and or acoustical insulation"

2.4 Delivery status

Insulation – System IDEAL PET is supplied in boards. A flexible thickness range from 20 to 30 mm is available, with standard widths of 500 or 750 mm and length options between 1000 and 1200 mm

2.5 Base materials/Ancillary materials

Name	Value	Unit
recycled PET	94,8	wt.-%
Fillers and modifiers	1,2	wt.-%
Blowing agent	4	wt.-%

Insulation – System IDEAL PET is a low density, closed-cell foam, produced based on 100% recycled PET. Mechanically recycled PET is mixed in a molten state with additives that ensure a stable foaming process. These include nucleating agents, viscosity modifiers, foam stabilisers and a physical blowing agent. The nucleating agent determines the foam's cell size distribution. The viscosity modifier ensures sufficient melt strength for foaming by increasing the molecular weight of the PET, broadening its molecular weight distribution and introducing long-chain branches. The physical blowing agent expands the foam to achieve the required density range. Eventually, the additional modifiers and stabilisers support the process stability and help to avoid cell coalescence.

This product contains substances listed in the candidate list(date: 14.06.2021) exceeding 0.1 percentage by mass: **no.**

This product contains other CMR substances in categories 1A or 1B which are not on the candidate list, exceeding 0.1 percentage by mass: **no.**

Biocide products were added to this construction product or it has been treated with biocide products (this then concerns a treated product as defined by the (EU) Ordinance on BiocideProducts No. 528/2012): **no.**

2.6 Manufacture

Insulation – System IDEAL PET foam boards are manufactured based on mechanically recycled PET. This method is based on reprocessing post-consumer PET waste to produce recycled flakes, after separation of the polymer from contaminants. It includes sorting and separating of waste, washing it to remove any dirt and contaminants, and further grinding, crushing and sorting carried out by the suppliers. The recycled product is compliant with the predefined specification and is supplied in the form of flakes and granules. The flakes are processed into granules by melt-extrusion. The granulation process includes pre-drying the flakes to avoid hydrolysis in the extrusion process. The pre-dryed flakes are fed into an extruder where the material ismolten and homogenized. A vacuum extraction section is used to remove volatile contaminants from the melt. After final filtration the material is granulated by underwater cutting followed by crystallization of the obtained rPET granules.

Obtained recycled PET granules are further processed into foam through foaming extrusion, in the presence of halogen-free supercritical fluid used as a physical blowing agent. Further components of the foam include additives for foam nucleation, cell stabilization and melt modification. Another component of the formulation is 'PET Agglomerate', which is obtained from reclaimed PET foam. The primary source of agglomerate is the

PET dust generated by the lateral and surface grinding operations in the downstream of the foam extrusion process (internal loop). Another source of agglomerate, is PET foam which is diverted from the waste stream of other PET foam products. All reclaimed foam cut-offs are crushed and compacted in a first step. In the second step, the pre-compacted particles are mixed with reclaimed PET dust and partially molten by shear forces and formed into agglomerate through a template. The extruded foamed PET boards with homogeneous and closed-cell structure are calibrated, edge cutand surface grinded to obtain the final product with the required dimensions and surface planarity

2.7 Environment and health during manufacturing

All our plants employ environmental monitoring systems, and we exchange ideas and best practices via the internal communications network. We collect key performance indicators on energy use, CO_2 emissions, water consumption and waste management in order to evaluate and improve our sustainability performance.

2.8 Product processing/Installation

Insulation – System IDEAL PET can be used on its own and/or as part of a system, depending on the application. It can be handled and installed without any special precautions for personal and environmental protection. Further advice on handling and installation can be found in the related product literature provided by the manufacturer.

2.9 Packaging

Insulation – System IDEAL PET boards are stacked on reusable wooden pallets for transport and storage. These pallets comply with the ISPM15 regulation. All pallets are protected in a way that prevents damage at the corners of the boards, and plastic wrapping ensures protection from moisture and dirt. The polyethylene- and carton-based packaging elements are recyclable and (actually) recycled in the countries having a return system.

2.10 Condition of use

When the products are used for the purpose for which they are intended, there are no changes in the material composition during use, except in the event of extraordinary impacts (see2.14).

2.11 Environment and health during use

Insulation – System IDEAL PET does not contain any Substances of Very High Concern (SVHC) or any compounds that are persistent, bioaccumulative and/or toxic (PBT). No environmental damage or health risks are to be expected during normal conditions of use. *Insulation – System IDEAL PET* has been assessed in terms of the emission of regulated dangerous substances from construction products into indoor air (according to EN16516) and the results confirm that no substances are emitted in quantities above the European limits.

2.12 Reference service life

Insulation – System IDEAL PET materials are long-lasting products with a designed lifetime of 25 to 50 years. The service life is practically only restricted by the lifetime in the application. The insulation performance is maintained throughout the entire service life, thanks to the low water absorption, closed-cell cellular structure and the high solubility of a foaming agent in the PET matrix.The insulation performance can only be compromised by extraordinary impacts and damage during construction. Description of the influences on the ageing of the product when applied in accordance with the rules of technology.
Description of the influences on the ageing of the product when applied in accordance with the rules of technology.

2.13 Extraordinary effects

Fire

According to the European fire classification system, *Insulation – System IDEAL PET* is classified as combustible insulation material of Euroclass E, tested as per EN ISO 11 925-2 by means of the ignitability test. For classes A2 to D, additional classification using the SBI test procedure (Single Burning Itemtest) in accordance with EN 13823 is required.

Reaction to Fire

Name	Value
Building material class acc. to EN 13501-1	E

Water

Insulation – System IDEAL PET is chemically neutral, not water soluble, and if used for the intended purpose does not release any water-soluble substances that might pollute groundwater, rivers or oceans. Water or water vapour has virtually no impact on the thermal conductivity. For water exposure tests please revise the Table of point 2.3 and for water leakages - point 7.2.

Mechanical destruction

Insulation – System IDEAL PET is designed for load bearing and non-load bearing (semi-) structural insulation applications and has a compression strength of >150 kPa when used as a standalone material. It can withstand certain mechanical impacts during handling and storage without significant damage.

2.14 Re-use phase

In the non-contaminated form, the product is fully recyclable by a mechanical recycling scheme for PET. It could be shredded into smaller pieces and reprocessed to granules using extrusion and reused as tertiary recycled pellets in the non-food contact applications (e.g. for foaming processes, fibresspinning, injection moulding, etc.).In case of severe contamination and problems with separation, the product could be recycled via chemical recycling with bis(2-hydroxyethyl) terephthalate (BHET) or dimethyl terephthalate (DMT) or monomers purified therephthalic acid and mono-ethylene glycol (PTA and MEG, respectively) recovery,depending on the recycling method (glycolysis or hydrolysis).

2.15 Disposal

Dispose of the materials according to local regulations. Regulated by the European Waste Catalogue: Waste code 07420 (other non-hazardous plastic waste). Note: Please observe Commission Decision 2001/118/EC.

2.16 Further information

Possible sources of additional information, e.g. website, a reference source for safety data sheet.

3. LCA: Calculation rules

3.1 Declared Unit

The declared product is *Insulation – System IDEAL PET*. The declared unit relates to 1 m³ of product. The packaging with 3,039 kg is also included in the calculation. The following table shows the data of the declared unit.

Declared Unit

Name	Value	Unit
Declared unit	1	m^3
Average Density	50	kg/m³
Weight	50	kg

3.2 System boundary

The type of the EPD is from the cradle to the factory gate with options, modules C1-C4 and module D. The following information modules are defined as system limits in this study:

A1–A5 Product development:
A1 – Production of raw materials
A2 – Transport to the manufacturer
A3 – Production
A4 – Transport from the factory gate to the construction site
A5 – Installation of the products in the building

End of life stage (C1- C4):
C1, deconstruction/demolition,
C2, transport,
C3, waste treatment ,
C4, disposal.

Reuse, recovery and recycling potential (D)

In order to precisely record the indicators and environmental impacts of the declared unit, a total of 8 information modules are considered. The information modules A1 to A3 describe the provision of materials, the transport to the production site, as well as the production processes of the product itself.

3.3 Estimates and assumptions

For the rPET flakes, no specific data could be provided by the supplier. In the background databases only rPET granulate is available. For this reason, the background data for rPET pellets without the influence of the electrical energy of the granulation, were used for the calculation of the rPET flakes in module A1. This assumption is important for the calculation of the EPD as a whole, in order to avoid double counting, because in module A3 a specific granulation at the manufacturing plant is calculated for this material.

3.4 Cut-off criteria

The cut-off criterion according to EN 15804+A2 is applied. All energy and mass inputs were taken into account.

3.5 Background data

The background data b ase of the LCA for Experts and ecoinvent 3.9.1 databases, to which this study also refers, isdocumented under the following link. (Sphera)

3.6 Data quality

For the preparation of the life cycle assessment, specific data was collected in the manufacturing plant in Belgium, for the year 2022. The background data from the LCA for Experts and ecoinvent 3.9.1 databases are from the year 2023 and therefore of high relevance.The masses of the different components of the insulation boards are from the composition data.The data quality is rated as adequate.

3.7 Period under review

The life cycle inventory analysis data provided by the manufacturer is from 2022 and corresponds to the annual average.

3.8 Geographic Representativeness

Land or region, in which the declared product system is manufactured, used or handled at the end of the product´s lifespan: Europe

3.9 Allocation

The data presented in this EPD for *Insulation – System IDEAL PET* are collected based on the yearly manufacturing output the manufacturing plant in Belgium. The data linked to energy and water consumptions are collected collectively at the plant level and are allocated to the processes used in the production based on individual allocation factors for the processes. The energy consumption data are collected separately for the extrusion, granulation, and warehousing operations and are allocated to the production of *Insulation – System IDEAL PET* based on those allocation factors. The total waste, measured separately on a yearly basis for all the produced items is allocated. Based on the total allocation factor for *Insulation – System IDEAL PET*.

3.10 Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to *EN 15804* and the building context, respectively the product-specific characteristics of performance, are taken into account. The database referred to in this study is LCA for Experts by Sphera and ecoinvent 3.9.1.

4. LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

No renewable raw materials are used in the product. Therefore, the biogenic carbon is shown as zero. The following raw materials contain biogenic carbon in the packaging.

Information on describing the biogenic Carbon Content at factory gate

Name	Value	Unit
Biogenic carbon content in accompanying packaging	1.27	kg C

Note: 1 kg of biogenic carbon is equivalent to 44/12 kg of CO_2

Note: 1 kg of biogenic carbon is equivalent to 44/12 kg of CO_2.

Transport to the building site (A4)

The transport model considers a construction site in Western Europe (Germany, Benelux). The scenario for the distribution phase assumes a standard distance of 500 km. The transported quantity corresponds to the transport of the products and their packaging to the construction site.

Name	Value	Unit
Transport distance	500	km
Gross density of products transported	53.009	kg/m^3

Installation into the building (A5)

The application phase considers:
-Product losses
-Waste treatment (product losses, product packaging).

Products are installed on the floor or on the wall manually. There are different ways to install the product, it could be fixed with adhesive, mechanical fixing, etc. The most representative application is just laid out on the floor and kept in place by the weight of the floor. Due to the different methods, auxiliary parts

(screws, adhesive) are not included in the model.

Name	Value	Unit
Material loss	1.5	kg
Plastic Packaging Waste	0,075	kg
Cardboard Waste	0,510	kg
Wood Waste	2,42	kg

End of life (C1-C4)

The product is demolished with an electric saw.
The electrical energy consumption for the tool is a value of 0.6MJ is assumed for the declared unit. The electricity consumption is calculated with one euro electricity mix. The rubble is transported per truck 50 km to the waste treatment plant.

Name	Value	Unit
Collected separately waste type	50	kg
Recycling	24.2	kg
Energy recovery	2.6	kg

Reuse, recovery and/or recycling potentials (D), relevant scenario information

Module D shows the utilization of the waste from the specified unit. It is assumed that 90 % is recycled and 10 % is thermally utilized. Module D does not take into account the 23,067 kg of PET foam recovered from the other lines.

Name	Value	Unit
Insulation - System IDEAL PET	24,2	kg

The recycling potential of *Insulation - System IDEAL PET* (45kg) is credited in this module. A collection rate of 90% is assumed.

5. LCA: Results

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)

Product stage			Construction 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	MND	MND	MNR	MNR	MNR	MND	MND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 m³ Insulation – System IDEAL PET

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	kg CO_2 eq	3.48E+01	1.98E+00	6.22E+00	5.44E-02	1.88E-01	1.63E+00	5.96E+00	-2.76E+01
GWP-fossil	kg CO_2 eq	3.97E+01	1.96E+00	8.41E-01	5.44E-02	1.86E-01	1.63E+00	5.96E+00	-2.76E+01
GWP-biogenic	kg CO_2 eq	-5.38E+00	0	5.38E+00	0	0	0	0	0
GWP-luluc	kg CO_2 eq	5.2E-01	1.8E-02	-1.54E-04	5.84E-06	1.7E-03	1.15E-03	7.48E-06	-3.2E-02
ODP	kg CFC11 eq	1.06E-06	1.7E-13	-1.32E-11	9.92E-13	1.6E-14	2.75E-11	3.81E-13	-9.3E-07
AP	mol H^+ eq	1.28E-01	2.13E-03	-1.84E-03	1.15E-04	2.2E-04	3.85E-03	5.69E-04	-1.03E-01
EP-freshwater	kg P eq	1.17E-02	7.07E-06	-1.29E-06	2.01E-07	6.68E-07	5.97E-06	9.02E-08	-1.04E-02
EP-marine	kg N eq	4.94E-02	7.19E-04	-6.34E-04	2.75E-05	7.48E-05	1.07E-03	1.61E-04	-3.13E-02
EP-terrestrial	mol N eq	3.58E-01	8.51E-03	-5.39E-03	2.87E-04	9.04E-04	1.14E-02	2.74E-03	-2.53E-01
POCP	kg NMVOC eq	7.32E-01	1.86E-03	-1.84E-03	7.33E-05	1.89E-04	2.87E-03	4.5E-04	-9.2E-02
ADPE	kg Sb eq	1.93E-04	1.25E-07	-7.74E-08	8.34E-09	1.18E-08	3.71E-07	3.56E-09	-1.64E-04
ADPF	MJ	1.03E+03	2.64E+01	-5.38E+01	1.13E+00	2.49E+00	3.37E+01	9.64E-01	-4.73E+02
WDP	m^3 world eq deprived	8.99E+00	2.23E-02	7.3E-01	1.2E-02	2.11E-03	3.55E-01	5.3E-01	-9.66E+00

GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential)

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 m³ Insulation – System IDEAL PET

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	3.75E+02	1.87E+00	-3.85E+00	6.76E-01	1.76E-01	1.89E+01	2.45E-01	-5.86E+01
PERM	MJ	7.64E+00	0	0	0	0	0	0	0
PERT	MJ	3.75E+02	1.87E+00	-3.85E+00	6.76E-01	1.76E-01	1.89E+01	2.45E-01	-5.86E+01
PENRE	MJ	1.03E+03	2.64E+01	-5.38E+01	1.13E+00	2.5E+00	3.37E+01	9.64E-01	-4.73E+02
PENRM	MJ	4.4E+00	0	0	0	0	0	0	0
PENRT	MJ	1.03E+03	2.64E+01	-5.38E+01	1.13E+00	2.5E+00	3.37E+01	9.64E-01	-4.73E+02
SM	kg	2.31E+01	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	m^3	3.12E-01	2.06E-03	1.28E-02	5.46E-04	1.94E-04	1.58E-02	1.25E-02	-2.29E-01

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

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 m³ Insulation – System IDEAL PET

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	kg	1.01E-06	9.78E-11	-6.12E-09	-8.86E-11	9.24E-12	-2.44E-09	2.21E-11	-1.75E-09
NHWD	kg	2.51E-01	3.81E-03	1.04E-01	8.29E-04	3.6E-04	2.35E-02	2.82E-02	-1.64E-02
RWD	kg	9.39E-02	3.42E-05	-4.72E-03	1.8E-04	3.23E-06	4.99E-03	5.81E-05	-2.57E-03
CRU	kg	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0	0
EEE	MJ	0	0	0	0	0	0	0	0
EET	MJ	0	0	0	0	0	0	0	0

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

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional:
1 m³ Insulation – System IDEAL PET

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	Disease incidence	ND	ND	ND	ND	ND	ND	ND	ND
IR	kBq U235 eq	ND	ND	ND	ND	ND	ND	ND	ND
ETP-fw	CTUe	ND	ND	ND	ND	ND	ND	ND	ND
HTP-c	CTUh	ND	ND	ND	ND	ND	ND	ND	ND
HTP-nc	CTUh	ND	ND	ND	ND	ND	ND	ND	ND
SQP	SQP	ND	ND	ND	ND	ND	ND	ND	ND

PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index

Disclaimer 2 – for the indicators 'abiotic depletion potential for non-fossil resources', 'abiotic depletion potential for fossil resources', 'water (user) deprivation potential, deprivation-weighted water consumption', 'potentialcomparative toxic unit for ecosystems', 'potential comparative toxic unit for humans – cancerogenic', 'Potentialcomparative toxic unit for humans - not cancerogenic', 'potential soil quality index'. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high as there is limited experience with the indicator

6. LCA: Interpretation

The dominance analysis shows that the main causes of environmental impacts and indicators are to be found in information module A1. This can be seen in the total global warming potential for material supply with approx. 27%, related to all information modules and a saving of 35% from information module D.

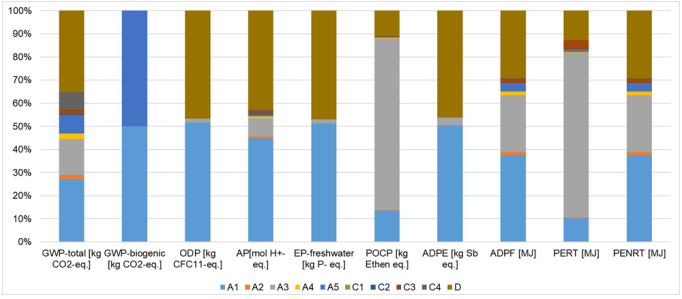

Diagram: Dominance analysis - Modules A1 to D

If we look at the material supply for the product and the packaging in detail, it becomes clear that two raw materials contribute decisively to the respective environmental impacts and indicators. The material supply of the *Insulation - System IDEAL PET* generates approx. 84% of the total global warming potential and approx. 95% of the total non-renewable primary energy in the information module A1. For wood, it is approx. 13% of the total global warming potential and approx. 3% of the total non-renewable primary energy in the information module A1.

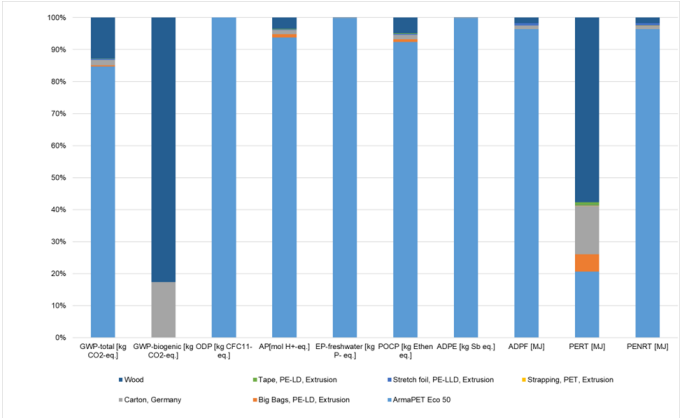

Diagram: Dominance analysis A1 –Raw material acquisition

If we look at the exact composition of *Insulation - System IDEAL PET*, it becomes clear that the main contributor to the global warming potential is the rPET flakes with approximately 78%.

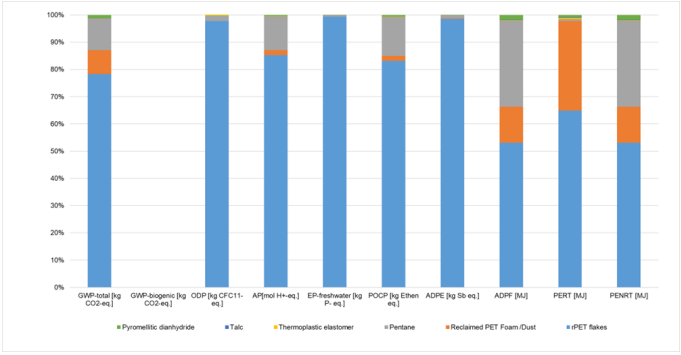

Diagram: Dominance analysis A1 -Raw material acquisition of *Insulation - System IDEAL PET*

In the information module A3 it is clear that the main cause of environmental impact and indicators is in the production of *Insulation - System IDEAL PET*, with a global warming potential of 98%.

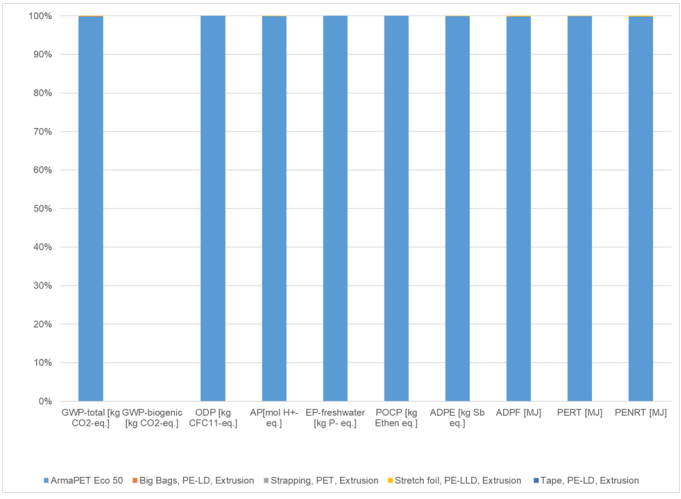

Diagram: Dominance analysis A3 – Production

7. Requisite evidence

7.1 VOC emissions

The product has been tested for determination of the volatile organic compound emissions according to EN16516:2017 'Construction products: Assessment of release of dangerous substances -Determination of emissions into indoor air'. The test has been performed by Servaco/ Normec Product Testing (Wetteren, Belgium) on June 11th, 2021,and the results are covered by the test report SPT2021-R084.The data are expressed for Floor and Wall application.

AgBB overview of results (28 days [µg/m³])

Name	Value	Unit
TVOC (C6 - C16) Floor application	27	µg/m^3
Sum SVOC (C16 - C22) Floor application	<5	µg/m^3
R (dimensionless) Floor application	3	-
VOC without NIK Floor application	27	µg/m^3
Carcinogenic Substances Floor application	<1	µg/m^3

7.2 Leaching performance

Measurement of leaching performance has been indicatively tested based on DIN EN 13468: 'Thermal insulating products for building equipment and industrial installations - Determination of trace quantities of water soluble chloride, fluoride, silicate, and sodium ions and pH'. Test temperature was 100 °C, with aleaching time of 0,5 h. The results on water leachable ions specified in mg/kg are summarized in the table

Chloride (Cl^-)	Fluoride (F^-)	Silicate (SiO_3^{2-})	pH value
54 mg/kg	10 mg/kg	27 mg/kg	8,4

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