ENVIRONMENTAL PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804+A1*

Owner of the Declaration	**Sika Deutschland GmbH**
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
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Sarnafil® TS 77-E

Sika Deutschland GmbH

Institut Bauen und Umwelt e.V.

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ECO PLATFORM EPD EN 15804 VERIFIED

1. General Information

Sika Deutschland GmbH

Programme holder
IBU – Institut Bauen und Umwelt e.V.
Panoramastr. 1
10178 Berlin
Germany

Declaration number
EPD-SIK-20190187-IBA1-EN

This declaration is based on the product category rules:
Plastic and elastomer roofing and sealing sheet systems, 07.2014
(PCR checked and approved by the SVR)

Issue date
24/04/2020

Valid to
23/04/2025

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

Dr. Alexander Röder
(Managing Director Institut Bauen und Umwelt e.V.))

Sarnafil® TS 77-E

Owner of the declaration
Sika Deutschland GmbH
Kornwestheimer Straße 103-107
70439 Stuttgart
Germany

Declared product / declared unit
1 m² Sarnafil® TS 77-E polymeric waterproofing membrane

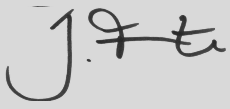
Scope:
This document applies to Sarnafil® TS 77-E polymeric waterproofing membrane in thicknesses of 1.5, 1.8, 2.0 and 2.5 mm manufactured by Sika Services AG in CH-6060 Sarnen (Switzerland).

The EPD covers the production of the waterproofing membrane, transport of the product to the construction site, installation of the waterproofing membrane, disposal, as well as benefits and loads outside the system limits. The model was calculated on the basis of production data for the thickness 2.0 mm provided by Sika Services AG from the year 2018.

The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.
The EPD was created according to the specifications of *EN 15804+A1*. 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 14025:2010*
☐ internally ☒ externally



Juliane Franze
(Independent verifier)

2. Product

2.1 Information about the enterprise
Sika's core competencies in sealing, gluing, damping, reinforcing and protecting supporting structures offer a wide range of possible uses in the construction sector.

2.2 Product description/Product definition
Sarnafil® TS 77-E polymeric waterproofing membrane is made of flexible polyolefin (FPO) and is treated with flame retardant and stabilizers against UV radiation. An inlay of glass non-woven and polyester reinforcement is encapsulated within the sheet.

Sarnafil® TS 77-E polymeric waterproofing membrane is available in the following thicknesses: 1.5 mm (TS 77-15 E), 1.8 mm (TS 77-18 E) and 2.0 mm (TS 77-20 E).

For the placing on the market of the product in the EU/EFTA (with the exception of Switzerland) is subject to *Regulation (EU) No. 305/2011* (CPR). The product requires a Declaration of Performance in accordance with *EN 13956:2012*, Flexible sheets for waterproofing, and the CE marking. Application is subject to the respective national provisions, in Germany the Application Standard *DIN SPEC 20000-201*.

2.3 Application
Sarnafil® TS 77-E polymeric waterproofing membrane is used exclusively to seal unballasted flat roofs. On roofs with a slope of ≥ 20°, the roofing sheets should be loose laid and mechanically fastened. Sarnafil® TS 77-E polymeric waterproofing membrane provides greater protection against fire than does Sarnafil® TS 77 polymeric waterproofing membrane.

2.4 Technical Data

Building material data

Name	Value	Unit
Waterproof as per EN 1928	passed	-
Tensile strain performance as per EN 12311-2	≥ 12	%
Peel resistance of the seam joint as per EN 12316-2	≥ 300	N/50mm
Shear resistance of the seam joint as per EN 12317-2	≥ 500	N/50mm
Shear resistance of joint as per EN 12317-2; DIN SPEC 20000-201	Tear outside joint	-
Tear propagation resistance as per EN 12310-2	≥ 300	N
Artificial ageing as per EN 1297	passed (>5,000 hrs.)	-
Dimensional stability as per EN 1107-2	≤ 0.2 to ≤ 0.1	%
Folding in the cold as per EN 495-5	≤ -20	°C
Bitumen compatibility as per EN 1548	passed	-
Resistance to root penetration (for green roofs) as per EN 13948 or FLL method	no requirement	-

Performance data of the product in accordance with the Declaration of Performance with respect to its essential characteristics in accordance with *EN 13956:2012*, Flexible sheets for waterproofing.

2.5 Delivery status

The product is delivered in various sizes, depending on the material thickness, on pallets with 21 rolls:

- Sarnafil® TS 77-15 E: 20 m x 2 m or 20 m x 1 m
- Sarnafil® TS 77-18 E: 15 m x 2 m or 15 m x 1 m
- Sarnafil® TS 77-20 E: 15 m x 2 m or 15 m x 1 m

2.6 Base materials/Ancillary materials

The raw materials and additives of Sarnafil® TS 77-E polymeric waterproofing membrane can be given as follows:

- Thermoplastic polyolefins: 40 – 60 %
- Stabilizers (UV/heat): 0 – 1 %
- Flame retardant (inorganic): 30 – 45 %
- Carrier material (glass nonwoven/polyester): 3 – 6 %
- Pigment: 0 – 5 %

The product/material/at least one sub-product contains substances on the *Candidate List* (date 03.12.2018) exceeding 0.1 mass-%: no

The product/material/at least one sub-product contains further CMR substances (cancerogenic mutagenic reprotoxic) of Category 1A or 1B that do not appear on the *Candidate List* in excess of 0.1 mass-% in at least one sub-product: no

Biocidal products have been added to the presented construction product or the product has been treated with biocidal products (the product is a treated product as defined by *Biocidal Products Regulation (EU) No. 528/2012*): no

2.7 Manufacture

Sarnafil® TS 77-E polymeric waterproofing sheets are manufactured on production lines developed in-house in the following stages:

- Melting of the polymeric components and additives in extruders
- Dispersing of the molten materials
- Coating of the carrier or the reinforcing in layers, producing homogenous encapsulation
- Cooling of the polymeric waterproofing sheet
- Winding of the sheets onto cardboard spools made of recycled paper
- Individually wrapping each roll

The quality management system of the Sarnen plant has been *ISO 9001* certified since 1993.

2.8 Environment and health during manufacturing

The environmental management system of the Sarnen plant is *ISO 14001* certified.

2.9 Product processing/Installation

Sarnafil® TS 77-E polymeric waterproofing membrane is loose laid and mechanically fastened to unballasted roofs preferably with a slope ≥ 20°. It provides elevated fire resistance. The individual sheets are joined by means of hot-air welding. The Sika fastening systems Sarnabar or Sarnafast are recommended for fastening.

As a rule, the latest product data sheet for each product (available at **www.sika.com**) is to be observed.

2.10 Packaging

The rolls of polymeric waterproofing membrane are individually wrapped in polyethylene (PE) foil and shipped on pallets. The spools are cardboard made from recycled paper. The packaging materials can be sorted and collected for recycling.

2.11 Condition of use

Based on the external study *Durability of Sarnafil® T Polymeric Waterproofing Membranes* from 2014, one can reasonably expect the condition and material composition of Sarnafil® TS 77-E polymeric waterproofing membrane to remain unchanged throughout the service life, given professional installation and proper use and maintenance.

2.12 Environment and health during use

The product contains no substances that are released during normal use. Neither the environment nor the health of users is negatively influenced during the service life. No environmental emissions are known to occur.

2.13 Reference service life

The reference service life of Sarnafil® TS 77-E polymeric waterproofing membrane is at least 50 years.

According to the study *Durability of Sarnafil® T Polymeric Waterproofing Membranes* from 2014, experience to date with Sarnafil® polymeric waterproofing membranes indicates that a service life of over 50 years can be expected, provided the standard requirements and the application and maintenance recommendations are observed.

This conclusion reflects the high resistance to weathering and ageing of the product when properly used.

2.14 Extraordinary effects

Fire

Sarnafil® TS 77-E polymeric waterproofing membrane is classified in Construction Material Class E, as defined by *EN 13501-1*.

Fire resistance

Name	Value
Building material class	E
Burning droplets	-
Smoke gas development	-

Water

No environmental impact is known due to water exposure of installed Sarnafil® TS 77-E polymeric waterproofing membrane.

Mechanical destruction

Sarnafil® TS 77-E polymeric waterproofing membrane possesses good mechanical strength and is highly robust. No environmental impact is known to result from unexpected mechanical damage.

Based on the study *Durability of Sarnafil® T Polymeric Waterproofing Membranes* from 2014, no significant change in the mechanical properties of the roofing membrane is to be expected even after 25 years.

2.15 Re-use phase

At the end of the service life or when roofing sheets must be replaced, Sarnafil® TS 77-E waterproofing sheets can be selectively removed and recycled. This allows a closed-loop material cycle and increasingly greater material recovery from used polymeric waterproofing membranes.

Sika Deutschland GmbH is affiliated with Roofcollect, the recycling system for polymeric roofing and waterproofing membranes.

2.16 Disposal

Sarnafil® TS 77 polymeric waterproofing sheets should be recycled in order to keep the material cycle intact. The used waterproofing sheets can be removed, cleaned and ground in a shredding plant. The reclaimed material thus obtained can be kept within the material cycle e.g. by incorporating it into the manufacture of protective membranes. If the product cannot be recycled, the waterproofing sheets are to be used for their calorific value.

Sarnafil® TS 77-E polymeric waterproofing membrane can be classified under Waste Code 170213 of the *European Waste Catalogue*.

2.17 Further information

More information about the company and its products is available in the internet at **www.sika.com**.

3. LCA: Calculation rules

3.1 Declared Unit

This declaration applies to 1 m^2 of installed Sarnafil® TS 77-E polymeric waterproofing membrane, thickness 2.0 mm.

A formula is given in Chapter 5 for independent calculation of the values for other thicknesses.

Declared unit

Name	Value	Unit
Declared unit	1	m^2
Grammage	2.4	kg/m^2
Type of sealing	hot-air weld	-
Conversion factor to 1 kg	0.41667	-
Layer thickness	-	m

3.2 System boundary

Type of EPD: Cradle to gate with options

The system boundaries of the EPD follow the modular structure set forth by *EN 15804*. The LCA takes into account the following modules:

- A1-A3: Extraction, processing and transport of raw materials (e.g. polymers, pigments, processing aids, stabilizers, fillers, flame retardants and carrier materials) used for the production of intermediate products and the waterproofing membrane and the packaging materials used to package the waterproofing membranes, such as wooden pallets, cardboard and PE film, for transport to the plant. Waste processing of production waste (edge trim), which occurs during the production of the waterproofing membrane.
- A4: Transport of the waterproofing membrane to the building site
- A5: Installation of the waterproofing membrane into the building by means of hot-air welding (including welding energy and water consumption), disposal or recycling of packaging, and waterproofing membrane scraps
- C1: Manual deconstruction and removal of the waterproofing membrane (recovery)
- C2: Transport of the recovered waterproofing membrane to waste-processing facility

- C3: Processing of the recovered waterproofing membrane for material recycling (Scenario 1 – C3/1) or thermal energy recovery (Scenario 2 – C3/2)
- C4: Disposal of the recovered waterproofing membrane in landfill
- D: Benefits for reuse, recovery and/or recycling (through thermal energy recovery, recycling of the recovered waterproofing membrane and reuse of the wooden pallets)

3.3 Estimates and assumptions
Various stabilizers and pigments were valued with a general chemical data set (conservative approach). The percentage by mass is < 1 %.

At the end of life, either material recycling of 100% (Scenario 1) or thermal energy recovery of 100% (Scenario 2) is assumed.

3.4 Cut-off criteria
All data was taken into account (recipe constituents, thermal energy used, electricity used). Loads due to transport were taken into account for all inputs and outputs. The manufacture of the production machines and systems and the associated infrastructure were not taken into account in the LCA.

3.5 Background data
The underlying data were extracted from the databases of *GaBi 9* software and *ecoinvent Version 3.4*.

3.6 Data quality
Considering the chronological, geographic and technical aspects as well as the completeness and plausibility, the overall quality of the data is assessed as good. The primary data for assessing the production processes originate from the year 2018 and were collected directly at the plant. All background data sets are more recent than 10 years.

3.7 Period under review
The period of study is the year 2018 (1 January – 31 December 2018).

3.8 Allocation
Mass allocation was applied for production.

Production waste that was recovered and reused internally was simulated as closed-loop recycling in Modules A1-A3, including the energy reclaimed through thermal energy recovery. The material for the manufacture of the product and the production waste have the same quality.

Regarding thermal energy recovery of production waste, benefits for electricity and thermal energy were calculated input-specifically, taking into account the elementary composition and the calorific value.

Regarding material recycling of the reclaimed polymeric waterproofing sheets and the installation scrap, the amount of recyclable membrane was treated as a corresponding polypropylene benefit adjusted with a downgrade.

Benefits for the disposal of packaging, scrap and roofing membrane are credited in Module D. This also applies to the reuse of wooden pallets.

3.9 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 underlying data were extracted from the databases of *GaBi 9* software and *ecoinvent Version 3.4*.

4. LCA: Scenarios and additional technical information

The following technical information serves as a basis for the declared modules or can be used for the development of specific scenarios in the context of a building assessment.

Transport to the building site (A4)

Name	Value	Unit
Litres of fuel	0.0066	l/100km
Transport distance	600	km
Capacity utilization	85	%
Gross density of products transported	1198	kg/m³
Volume-utilization factor	100	%

Einbau ins Gebäude (A5)

Name	Value	Unit
Electricity consumption	0.016	kWh/m²
Installation loss (membrane scrap)	2	%
Overlaps (membrane joints)	6	%

End-of-life stage (C1-C4)
For modelling the end-of-life stage, two different scenarios are calculated, each of which represents a 100 % scenario but also allows pro-rata calculation (for example, Scenario 1 = 80 % / Scenario 2 = 20 %).

Name	Value	Unit
For material recycling (Scenario 1: C1, C2/1, C3/1, C4)	100	%
Transport to material recycling facility (Scenario 1: C1, C2/1, C3/1, C4)	250	km
For thermal energy recovery (Scenario 2: C1, C2/2, C3/2, C4)	100	%
Transport to energy recovery facility (Scenario 2: C1, C2/2, C3/2, C4)	50	km

5. LCA: Results

The results displayed below apply to Sarnafil® TS 77-20 E. To calculate results for other thicknesses, please use this formula:

$I_x = ((x+0.48)/2.48)\ I_{2,0}$

[Ix = the unknown parameter value for Sarnafil® TS 77-E products with a thickness of "x" mm (e.g. 1.5mm)]

Two scenarios were calculated in End-of-Life and Module D:
Scenario 1 (C2/1, C3/1, D/1) describes the effects of 100% material recycling, whereas
Scenario 2 (C2/2, C3/2, D/2) refers to 100% thermal energy recovery.

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE 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+A1: 1 m² waterproofing membrane

Parameter	Unit	A1-A3	A4	A5	C1	C2/1	C2/2	C3/1	C3/2	C4	D/1	D/2
GWP	[kg CO_2-Eq.]	3.72E+0	1.11E-1	5.32E-1	0.00E+0	4.68E-2	9.36E-3	2.94E-1	8.00E+0	0.00E+0	-3.41E+0	-2.89E+0
ODP	[kg CFC11-Eq.]	1.50E-8	3.77E-17	1.20E-9	0.00E+0	7.72E-18	1.54E-18	5.61E-15	7.43E-16	0.00E+0	-2.40E-9	-2.40E-9
AP	[kg SO_2-Eq.]	8.25E-3	2.45E-4	7.15E-4	0.00E+0	1.09E-4	2.18E-5	2.70E-4	5.15E-4	0.00E+0	-5.41E-3	-4.08E-3
EP	[kg $(PO_4)^3$-Eq.]	1.70E-3	6.12E-5	1.48E-4	0.00E+0	2.72E-5	5.45E-6	4.53E-5	1.09E-4	0.00E+0	-7.29E-4	-4.34E-4
POCP	[kg ethene-Eq.]	9.91E-4	-8.70E-5	7.43E-5	0.00E+0	-3.64E-5	-7.28E-6	1.74E-5	5.28E-5	0.00E+0	-9.80E-4	-4.36E-4
ADPE	[kg Sb-Eq.]	7.48E-6	1.05E-8	6.05E-7	0.00E+0	3.60E-9	7.20E-10	6.27E-8	4.38E-8	0.00E+0	-8.66E-7	-7.76E-7
ADPF	[MJ]	1.00E+2	1.47E+0	8.25E+0	0.00E+0	6.33E-1	1.27E-1	1.36E+0	8.41E-1	0.00E+0	-1.38E+2	-4.19E+1

Caption	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

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A1: 1 m² waterproofing membrane

Parameter	Unit	A1-A3	A4	A5	C1	C2/1	C2/2	C3/1	C3/2	C4	D/1	D/2
PERE	[MJ]	8.38E+0	9.02E-2	1.06E+0	0.00E+0	3.69E-2	7.37E-3	9.29E-1	1.78E-1	0.00E+0	-6.71E+0	-1.86E+1
PERM	[MJ]	1.99E+0	0.00E+0	-1.59E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PERT	[MJ]	1.04E+1	9.02E-2	9.05E-1	0.00E+0	3.69E-2	7.37E-3	9.29E-1	1.78E-1	0.00E+0	-6.71E+0	-1.86E+1
PENRE	[MJ]	4.95E+1	1.48E+0	4.26E+0	0.00E+0	6.36E-1	1.27E-1	6.20E+1	6.12E+1	0.00E+0	-1.42E+2	-5.99E+1
PENRM	[MJ]	5.70E+1	0.00E+0	4.53E+0	0.00E+0	0.00E+0	0.00E+0	-6.02E+1	-6.02E+1	0.00E+0	0.00E+0	0.00E+0
PENRT	[MJ]	1.06E+2	1.48E+0	8.80E+0	0.00E+0	6.36E-1	1.27E-1	1.78E+0	1.00E+0	0.00E+0	-1.42E+2	-5.99E+1
SM	[kg]	6.87E-2	0.00E+0	5.50E-3	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	-2.43E+0	0.00E+0
RSF	[MJ]	1.78E-21	0.00E+0	1.42E-22	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
NRSF	[MJ]	2.08E-20	0.00E+0	1.67E-21	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
FW	[m³]	1.87E-2	1.04E-4	2.04E-3	0.00E+0	6.23E-5	1.25E-5	9.71E-4	1.73E-2	0.00E+0	-1.63E-2	-1.95E-2

Caption	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+A1: 1 m² waterproofing membrane

Parameter	Unit	A1-A3	A4	A5	C1	C2/1	C2/2	C3/1	C3/2	C4	D/1	D/2
HWD	[kg]	2.42E-6	8.44E-8	2.01E-7	0.00E+0	3.55E-8	7.10E-9	1.72E-9	7.98E-10	0.00E+0	-3.54E-8	-2.59E-8
NHWD	[kg]	2.54E-1	9.91E-5	2.24E-2	0.00E+0	5.17E-5	1.03E-5	2.38E-2	3.17E-2	0.00E+0	-1.88E-2	-4.13E-2
RWD	[kg]	2.27E-3	1.76E-6	1.95E-4	0.00E+0	8.62E-7	1.72E-7	1.64E-4	6.43E-5	0.00E+0	-1.38E-3	-6.97E-3
CRU	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
MFR	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.43E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
MER	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
EEE	[MJ]	0.00E+0	0.00E+0	4.26E-1	0.00E+0	0.00E+0	0.00E+0	6.05E-1	1.75E+1	0.00E+0	0.00E+0	0.00E+0
EET	[MJ]	0.00E+0	0.00E+0	7.59E-1	0.00E+0	0.00E+0	0.00E+0	1.10E+0	3.11E+1	0.00E+0	0.00E+0	0.00E+0

Caption	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; EEE = Exported thermal energy

6. LCA: Interpretation

The following charts show the relative contributions of the different modules to the various LCA categories and to primary energy use in a dominance analysis.

The product stage (Modules A1-A3) has by far the greatest impact on nearly all indicators; only global warming potential (GWP) in Scenario 2 is also significantly impacted by greenhouse gases resulting from thermal energy recovery (C3). For this reason, the product stage is examined more closely in the following interpretation.

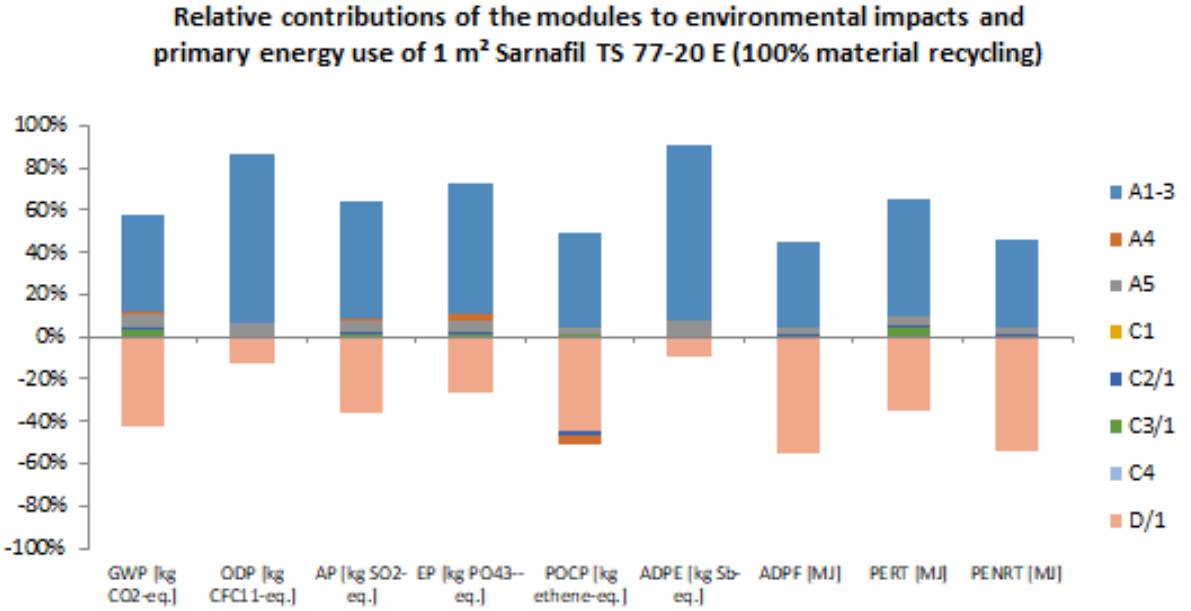
Indicators of the inventory analysis:
Due to electricity use, pre-product manufacturing (47 %), packaging (28 %) and the manufacturing process (25 %) account for most of the use of renewable primary energy resources (PERT). The manufacturing of polymers in the product stage has the greatest impact (85 %) of raw materials on the use of nonrenewable primary energy resources (PENRT), whereas the impact of the production process (electrical energy) amounts to 4 %.

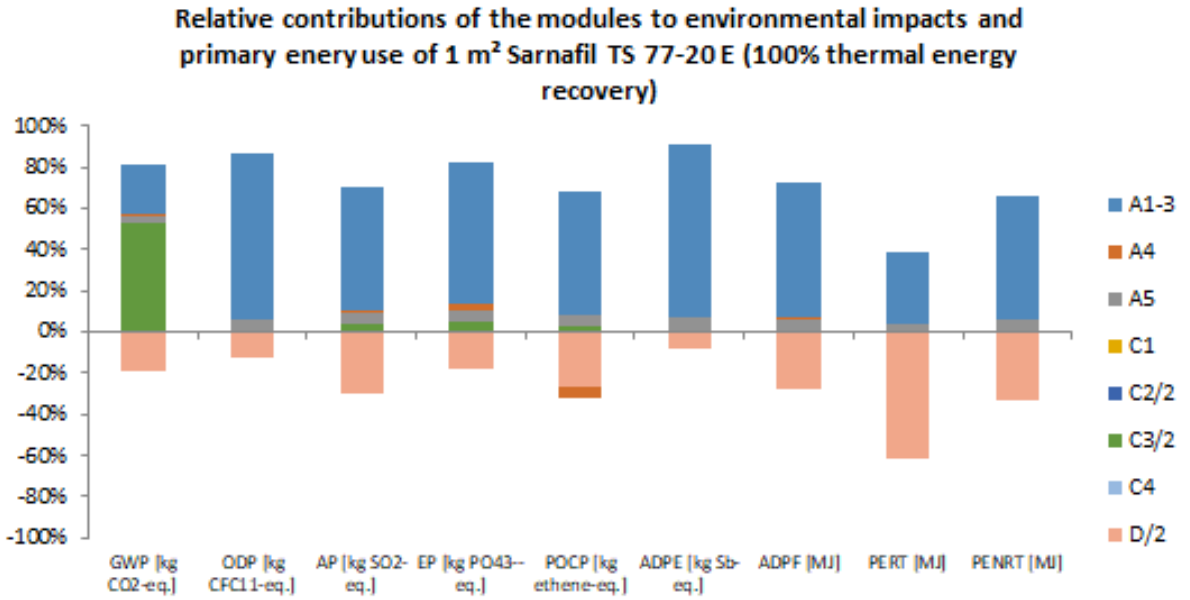
Indicators of the impact assessment:
The dominant influence of pre-product manufacturing is apparent in all impact categories, with at least 80 % of the impact in each category attributed to raw materials. Within pre-product manufacturing, polymers play a significant role regarding GWP (59 %), Acidification Potential of soil and water (AP) (49 %), Eutrophication Potential (EP) (31 %), Formation Potential of Tropospheric Ozone (POCP) (61 %) and Abiotic Depletion Potential for fossil fuels (ADPF) (86 %). The flame retardant has significant impact on GWP (22 %), Depletion Potential of the Stratospheric Ozone layer (ODP) (74 %), AP (18 %), EP (51 %) and POCP (15 %).

Pigments (primarily titanium dioxide) mainly impact AP (18 %) and Abiotic Depletion Potential for non-fossil resources (ADPE) (23 %). In addition, the carrier material impacts the parameters AP (13 %) and ADPE (67 %).

The raw materials with the greatest effect on the impacts also show the greatest percentage by mass of the polymeric waterproofing membrane: polymers, flame retardant and carrier material.

Electricity consumption has the greatest impact in the production process of the polymeric waterproofing membrane. The production process contributes most to GWP (4 %), AP (3 %) and EP (2 %).





7. Requisite evidence

No requisite evidence is required for Sarnafil® TS 77-E polymeric proofing membrane.

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