

ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A1

Owner of the Declaration	alwitra GmbH
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
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EPDM roofing and waterproofing membranes
EVALASTIC® V, VG, VGSK

alwitra GmbH

www.ibu-epd.com | <https://epd-online.com>



1. General Information

alwitra GmbH

Programme holder

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

Declaration number

EPD-ALW-20190186-IBAC-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

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Valid to

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Dipl. Ing. Hans Peters
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EPDM roofing and waterproofing membrane EVALASTIC® V, VG, VGSK

Owner of the declaration

alwitra GmbH
Am Forst 1
54296 Trier
Germany

Declared product / declared unit

1 m² of average produced roofing and waterproofing membrane EVALASTIC® V, VG, VGSK

Scope:

This EPD is an average EPD for roofing and waterproofing membranes EVALASTIC® V, VG, VGSK made by alwitra GmbH. The products are manufactured in 54411 Hermeskeil, Germany.

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.

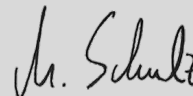
The EPD was created according to the specifications of *EN 15804+A1*. In the following, the standard will be simplified as *EN 15804*.

Verification

The standard *EN 15804* serves as the core PCR

Independent verification of the declaration and data according to *ISO 14025:2010*

☐ internally ☒ externally



Matthias Schulz
(Independent verifier appointed by SVR)

2. Product

2.1 Product description/Product definition

This EPD contains a description of bitumen compatible roofing and waterproofing membrane systems made of EPDM. The declared products consist of a high polymer alloy of ethylene-propylene-diene terpolymer (EPDM) and polypropylene (PP) including additives. EVALASTIC® membranes are equipped with a polyester fleece backing (additionally with glass fleece, where applicable). Self-adhesive membranes are additionally equipped with a self-adhesive coating including release film.

The declared products are manufactured in a calendering process. Seam welding is carried out with hot air.

The EVALASTIC® product line includes the following varieties:

EVALASTIC® V with polyester fleece backing (effective thickness 1.2/1.3/1.5 mm; total thickness 2.1/2.2/2.4 mm)

EVALASTIC® VG with polyester/glass fleece backing

(effective thickness 1.2/1.5 mm; total thickness 2.2/2.4 mm)

EVALASTIC® VGSK with polyester/glass fleece backing and self-adhesive coating (effective thickness 1.2/1.5 mm; total thickness 2.2/2.5 mm)

For placing the product on the market in the EU/EFTA (except Switzerland), Regulation (EU) No 305/2011 (CPR) shall apply. The product requires a Declaration of Performance in accordance with *DIN EN 13956:2013-03*, Flexible sheets for waterproofing - Plastic and rubber sheets for roof waterproofing - Definitions and characteristics

and *DIN EN 13967: 2017-08*, Flexible sheets for waterproofing - Plastic and rubber damp proof sheets including plastic and rubber basement tanking sheet - Definitions and characteristics, as well as CE marking. For application, the respective national regulations shall apply.

2.2 Application

The intended use of the declared product is as follows:

Roof waterproofing

Single-ply waterproofing of non-used and used flat and low slope roofs. Depending on specification, the membranes are applied as follows:

EVALASTIC® V and EVALASTIC® VG

- loose laid under ballast
- mechanically fastened
- adhesive bonding with system adhesive

EVALASTIC® VGSK

- adhesive bonding (self-adhesive coating) to various standard substrates with alwitra wash primer SK or SK-L.
- with its integrated fire retarding layer bonded directly to unbacked EPS insulation boards without any wash primer

Waterproofing of foundations

Single-ply waterproofing of non-waterproof foundations or constructional parts against ground moisture and non-pressing water. The membranes are bonded or loose laid according to requirements as described above.

When applying, the manufacturer installation instructions must be adhered to.

2.3 Technical Data

EVALASTIC® V, VG, VGSK roofing and waterproofing membrane

Constructional data

Name	Value	Unit
Waterproof acc. to EN 1928 (roofing membranes)	400	kPa
Tensile strain performance acc. to EN 12311-2 (roofing membranes)	60	%
Peel resistance of the seam joint acc. to EN 12316-2 (roofing membranes)	150	N/50mm
Shear resistance of the seam joint acc. to EN 12317-2 (roofing membranes)	200	N/50mm
Tear propagation resistance acc. to EN 12310-2 (roofing membranes)	300	N
Artificial ageing acc. to EN 1297 (roofing membranes)	cass 0	-
Dimensional stability acc. to EN 1107-2 (roofing membranes)	0.5	%
Folding in the cold acc. to EN 495-5 (roofing membranes)	-40	°C
Bitumen compatibility acc. to EN 1548 (roofing membranes)	passed	-
Resistance to root penetration (for green roofs) acc. to EN 13948 or FLL (roofing membranes)	passed	-
Ozone resistance (for EPDM/IIR) acc. to EN 1844 (roofing membranes)	passed	-
Resistance to impact loads nach EN 12691 (Dichtungsbahnen)	300	mm

Performance values of the product according to the Declaration of Performance in relation to its essential characteristics in accordance with *DIN EN 13956:2013-03* or *DIN EN 13967:2017-08*.

For application, the respective national regulations shall apply; in Germany, application standard *DIN SPEC 20000-201* or *DIN SPEC 20000-202* shall apply.

Roofing membranes according to EN 13956 and application standard DIN SPEC 20000-201

Description/markings:

- EVALASTIC® V
DE/E1 EPDM-BV-K-PV-1,2/1,3 (1,5)
- EVALASTIC® VG
DE/E1 EPDM-BV-K-GV/PV-1,5
- EVALASTIC® VGSK
DE/E1 EPDM-BV-K-GV/PV-1,5-SK

Waterproofing membranes according to *DIN EN 13967* and application standard *DIN SPEC 20000-202*

Description/markings:

- EVALASTIC® V
BA EPDM-BV-K-PV-1,5
- EVALASTIC® VG
BA EPDM-BV-K-GV/PV-1,5
- EVALASTIC® VGSK
BA EPDM-BV-K-GV/PV-1,5-SK

2.4 Delivery status

Standard sizes

EVALASTIC® V (1.2/1.3/1.5)

Length: 25 m

Width: 1.05/1.55

EVALASTIC® VG (1.5)

Length: 25 m

Width: 1.05/1.55 m

EVALASTIC® VGSK (1.5)

Length: 25 m

Width: 1.05 m

Standard colours

Light grey

2.5 Base materials/Ancillary materials

Ethylene propylene diene terpolymer/PP	35 - 45 %
Polypropylene	10 - 15 %
Mineral flame retardant	30 - 40 %
Stabilizers	0.5 - 2 %
Additives	2 - 6 %
Titanium dioxide	0 - 7.5 %
Pigments - depending on colour	0 - 3 %
Backing and self-adhesive coating.	

The product contains substances of the ECHA Candidate List of Substances of Very High Concern (16.07.2019) above 0.1 mass-%, relevant for approval: **no**

The product contains other CMR substances of category 1A or 1B, which are not on the candidate list, above 0.1 mass-% in at least one part of the product: **no**

Biocidal products have been added to this construction product or it has been treated with biocidal products (it is therefore a treated product within the meaning of the Biocidal Products Regulation (EU) No 528/2012): **no**

2.6 Manufacture

The basic materials and the pre-products (except the backing and the self-adhesive coating) are pre-mixed in a mixing machine and subsequently plastified in an extruder together with the other formulation ingredients. The plastics composition as an intermediate is fed over a mixing mill into a calander, where it is rolled out into a homogeneous roofing or waterproofing membrane, and (depending on the membrane type) an underside backing layer is applied. The finished membrane is cooled down over special chill rolls and subsequently cut to its final size and fabricated into rolls. All unbacked production residues (cut-off edge strips) are recycled, *i.e.* directly re-fed into the production process.

Manufacture is subject to the established Quality Management System according to *ISO 9001*.

Further external quality controls (external monitoring) are carried out by the Staatliche Materialprüfungsanstalt Darmstadt, Germany.

2.7 Environment and health during manufacturing

Compliance with the national and system-specific environmental protection requirements during the manufacturing process is guaranteed. Emissions produced in the calander do not exceed the limits stipulated in the Technical Instructions on Air Pollution Control (TA Luft) and are released to the environment without any filtering.

Manufacture is also subject to the established Environmental management system according to *ISO 14001* and the Energy Management System according to *ISO 50001*.

2.8 Product processing/Installation

Due to their thermoplastic properties EVALASTIC® V, VG and VGSK roofing and waterproofing membranes are easy to handle and to process. The overlap welding is carried out with hot air (warm gas). On the roof, no specific health protection measures for staff are required.

When cleaning the seam with solvent welding agent or seam cleaner, the following must be observed:

- avoid skin and eye contact,
- wear gloves,
- no smoking, no open fire, avoid sparking,
- do not inhale vapours, use only outdoors or in well ventilated spaces.

Homogeneous seam welding is advantageous for a permanent waterproof functionality of the parts/membranes to be connected. When applying, the pertinent standards as well as the installation instructions and manufacturer information must be adhered to.

The following application methods are possible depending on the type of membrane:

Loose laying with ballast

(advantage: unproblematic removal of unmixed material)

The membranes are rolled out on a suitable substrate (on a protection layer, if required), aligned and welded in the overlap area.

Example of green roof:

The declared product is used for green roofs as a waterproofing and, at the same time, as a protection against root penetration, as the corresponding certificate is available (resistant to root/rhizome penetration according to *FLL* testing - also without application of biocides).

Mechanical fastening

(advantage: unproblematic removal of unmixed material)

The membranes are rolled out on a suitable substrate (on a protection layer, if required), aligned and usually fastened with approved fastening systems on the supporting structure according to the manufacturer's specification. Usually, the fastening is carried out in the membrane overlap (seam area). After installation of the fasteners, the membranes are welded together. Fastening can also be carried out outside the seam overlap. These fastenings must then be waterproofed according to the system. With mechanical fastening, the complete layer build-up is fixed (incl. thermal insulation, vapour control layer, etc.)

Bonding

If membranes are to be bonded, for environmental reasons, self-adhesive membranes should be applied. The declared products are bitumen-free and solvent-free. After rolling out and aligning the membranes on a suitable substrate (clean, even, solid, with wash primer, if required), the release film is removed from one end of the membrane (approx. 80 - 100 cm). The end of the membrane is bonded to the substrate, the release film is pulled out flat to the side from under the membrane and the membrane is simultaneously pressed on (bonded) over the full size with a broom in a single operation. Subsequently, the laps are welded.

Usage of system adhesives and processing aids

The handling instructions and information on container labels and Safety Data Sheets for adhesives and processing aids such as solvent-welding agent, primer or solvent-containing adhesives must be followed, *e.g.*

- ensure proper ventilation at the workplace
- keep away ignition sources - no smoking
- using skin protection lotion for preventive skin protection is recommended

2.9 Packaging

The packing materials used made of wood, paper/cardboard, polyethylene (PE foil) and PP strapping are recyclable.

If sorted [RS1], collection is carried out by INTERSEROH (INTERSEROH certificate 25288).

Upon request of the sites, INTERSEROH collects the packing materials at the sites of waste generation in containers taking into account legal requirements.

- strapping: PP
- returnable / non-returnable pallets, wood
- boxes, cardboard/paper
- plastic foil (polyethylene foils - LDPE - recyclable)

2.10 Condition of use

Due to the material composition, for the usage period of the declared products no toxic substances (fungicides/biocides) for the elimination of pest biota (fungi, plants, bacteria) or special root control additives (*e.g.* when used as root-resistant waterproofing) are used in the declared products.

2.11 Environment and health during use

There is no evidence of any possible emission of substances during the service life of any type of EVALASTIC® membranes.

2.12 Reference service life

The declared roofing and waterproofing membranes have been in use for approx. 35 years. If exposed to standard load, professionally installed and applied in accordance with the intended use in compliance with the generally accepted engineering standards, the declared products can reach a service life of 35 years and more.

If professionally applied under an ecological protection/wearing layer (e.g. green roof) this service life can be still extended.

The in-use conditions will be significantly enhanced when installed with alwitra system parts as the system parts used in the waterproofing such as rainwater outlets, vents, coated metal sheets or rooflights are flashed against the declared membranes in a homogeneous, waterproof connection. The waterproofing of adjacent constructional elements is complemented by additional components of the product system, e.g. roof edge trim and wall connection profiles.

If the waterproofing consists of the declared products, it will not be necessary to remove it in case of restoration/refurbishment. In fact, the old waterproofing usually can serve as a substrate for the new refurbishment layer.

2.13 Extraordinary effects

Fire

Fire protection

Name	Value
Building material class reaction to fire EN11925-2 / EN13501	class E / passed
External fire performance CEN TS 1187 / EN 13501	Broof (t1) passed

Note:

The test results for Broof(t1) are valid for the roof build-ups tested by alwitra

Water

The substances of the sealing layer used for EVALASTIC® membranes are not water-soluble.

Mechanical destruction

In case of an unexpected mechanical destruction of EVALASTIC® membranes, no adverse environmental impacts have been reported.

2.14 Re-use phase

EVALASTIC® membranes are not re-used in their original form after their service life. When sorted EVALASTIC® membranes can be collected by the "ROOFCOLLECT" system (recycling system for synthetic roofing and waterproofing membranes). The recycled materials gained from the old roofing membranes can be reintroduced into the cycle of materials, e.g. usage in inspection walkway tiles. These inspection walkway tiles are used to protect the waterproofing and to mark the maintenance walkways on flat roofs. The textured surface provides a strong grip, even on sloped and wet areas.

At the end of service life thermal utilisation is also possible. The energy contained in the declared products is recovered, thus saving on additional back-up firing in the waste incineration plant.

2.15 Disposal

If possible, recycling of the declared products, or at least their thermal utilisation should be used as a way of disposal. See also 2.14.

Roofing and waterproofing membranes or residues thereof can be classified as AVV No. 170904 or No. 200139.

2.16 Further information

For further information on the EVALASTIC® product system, e.g. brochures, Declaration of Performance, installation instructions, see the alwitra GmbH web page (www.alwitra.de). Product specific accessories are also available online.

3. LCA: Calculation rules

3.1 Declared Unit

The declared unit is 1 m² of average produced, installed and disposed of/recycled EVALASTIC® roofing and waterproofing membrane system with a thickness of 1.5 mm. The averaging was based on annual production data (total inputs and outputs per year). The values calculated in this way were scaled to a representative thickness and correspond to approx. 90% market share of the delivered products. The approximate calculation of other thicknesses can be done by the following formula:

$I_{d,new} = (I_{decl} \cdot d_{new}) / 1,2$, where

$I_{d,new}$: indicator result in relation to a new thickness

I_{decl} : indicator result of the respective life cycle phase

d_{new} : thickness to be calculated in mm

The life cycle assessment deviations within the produced product varieties can be classified as low (< 5 %).

The deviations are due to e.g. different backings and/or self-adhesive coatings of low mass

Declared unit

Name	Value	Unit
Declared unit	1	m ²
Grammage	1.96	kg/m ²
Conversion factor to 1 kg	0.5	-

3.2 System boundary

In addition to the life cycle stages of the product manufacture (cradle to gate), this life cycle assessment also addresses further options as listed below:

- extraction and supply of raw materials (A1)
- transport of basic materials (A2)
- backing, if applicable (A1)
- membrane manufacture (A3)
- membrane packaging (including transport of the packing materials and end of life)
- transport to site (A4)
- installation on site (fixing with adhesives and seam welding) (A5)

- end of life of the membranes (incl. transport) - material and thermal utilisation (module C2, C3 and D)

3.3 Estimates and assumptions

Scenarios have been designed for the respective modules. Unless otherwise indicated, estimates of these scenarios have been provided by alwitra GmbH for calculation purposes.

Module A4: Transport to site, (on average 361 km),

Module A5: Transport distance and quantities of packing materials (50 km)

Module C2: Transport after removal from the roof for scenario C2 360 km classified as "worst case" (C2/1 50 km to waste incineration plant and C2/2 737 to material EoL recycling)

Module C3: In scenario 1 100% thermal utilisation and in scenario 2 100% material recycling of the membranes after removal from the roof (current percentage of scenario 1: 70% of the overall quantity, percentage of scenario 2: 30% of the overall quantity)

Module D: In the case of thermal utilisation of old roofing membranes, power and steam is generated. Credits for these two energy flows have been indicated by the German data sets „DE: Electricity Mix PE“ and „DE: Process Steam from Natural Gas PE“. Material recycling is to be understood as the manufacture of inspection walkway tiles.

3.4 Cut-off criteria

In the LCA, all collected operational data, i.e. all raw materials used according to the formulation, the thermal energy used as well as the power and the water consumption, have been taken into account. Transportation expenditures for all inputs and outputs have been considered. Thus, according to PCR Part A also material and energy flows with a percentage of less than 1 percent of the total mass of the product have been taken into account.

3.5 Background data

The primary data has been provided by alwitra GmbH. The background data has been taken from the data base of the GaBi software from PE INTERNATIONAL (GaBi 9). The German electricity mix has been applied. The last revision of the used data has been carried out less than 3 years ago

3.6 Data quality

The used data originates from the data collection performed by the manufacturer. In addition to the primary data on the manufacture of roofing and

waterproofing membranes at alwitra GmbH, necessary background data on the used basic materials has been specifically modelled or taken from the GaBi database. Production data of the manufacturer has been measured or calculated (power consumption, thermal energy, amounts of basic materials used), transport distances, however, have been partly estimated. For modelling the product stage of synthetic roofing membranes, the data collected by alwitra during the production year 2018 for the different membrane types have been used. All other relevant background data sets have been taken from the GaBi 9 software database and are less than 6 years old. The representativeness can be rated very good. For the basic material of zinc borate data sets had to be modelled.

3.7 Period under review

The data base of this LCA refers to data collected in 2018. The quantities used of raw materials, energy as well as auxiliary and operating materials are taken into account as average values from 12 months of production at the production plant in Hermeskeil, Germany.

3.8 Allocation

In modules A1-A3, internally re-used production residues (edge strips cut off during production) are modelled as closed-loop recycling.

Within the defined system boundaries, in the manufacturing process production data for the product was determined with respect to the overall produced area. During production no further by-products occur. In case of thermal utilisation in a waste incineration plant, depending on the specific input and considering the elementary composition as well as the calorific value, credits for electricity and thermal energy from module A5 and C3 are taken into account in module D. Considering the locations of the production sites, the processes credited refer to the territory of Germany. In Module D there is also a credit for the recycling of the roofing membranes.

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 used background database has to be mentioned.

4. LCA: Scenarios and additional technical information

The following technical information provides the basis for the declared modules or can be used for the design of specific scenarios within the context of a building assessment, if modules are not declared (MND).

Transportation to site (A4)

Name	Value	Unit
Litres of fuel	0.002	l/100km
Transport distance	361	km
Capacity utilisation (including empty runs)	85	%
Gross density of products transported	1228	kg/m ³
Capacity utilisation volume factor	100	-

Integration into the building (A5)

Name	Value	Unit
Electricity consumption	0.013	kWh
VOC in the air	0.015	kg
Loss of material (due to overlaps)	5	%

Reference service life

Name	Value	Unit
Reference service life depending on the local conditions and in combination with a maintenance	35	a

service contract		
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End of life (C1-C4)

Name	Value	Unit
Recycling (in scenario 2)	1.94	kg
Energy recovery (in scenario 1)	1.94	kg

5. LCA: Results

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	MND	X	X	MND	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A1: 1 m² of average produced and installed EVALASTIC

Parameter	Unit	A1-A3	A4	A5	C2/1	C2/2	C3/1	C3/2	D/1	D/2
GWP	[kg CO ₂ -Eq.]	8.61E+0	3.31E-2	6.25E-1	4.53E-3	6.68E-2	5.26E+0	8.25E-1	-3.18E+0	-5.67E+0
ODP	[kg CFC11-Eq.]	6.09E-13	1.13E-17	3.08E-14	1.54E-18	2.28E-17	3.63E-15	3.18E-14	-6.62E-14	-6.93E-14
AP	[kg SO ₂ -Eq.]	2.09E-2	6.85E-5	1.08E-3	9.38E-6	1.38E-4	1.36E-3	1.31E-3	-3.35E-3	-1.34E-2
EP	[kg (PO ₄) ³ -Eq.]	2.14E-3	1.70E-5	1.15E-4	2.33E-6	3.44E-5	1.32E-4	2.25E-4	-5.67E-4	-1.37E-3
POCP	[kg ethene-Eq.]	1.76E-3	-2.35E-5	8.89E-5	-3.22E-6	-4.75E-5	5.55E-5	3.00E-5	-2.89E-4	-1.13E-3
ADPE	[kg Sb-Eq.]	2.37E-4	3.12E-9	1.19E-5	4.27E-10	6.30E-9	7.78E-7	3.23E-7	-7.47E-7	-1.52E-4
ADPF	[MJ]	1.74E+2	4.41E-1	8.77E+0	6.04E-2	8.90E-1	2.20E+0	8.28E+0	-4.14E+1	-1.12E+2

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 - RESOURCE USE according to EN 15804+A1: 1 m² of average produced and installed EVALASTIC

Parameter	Unit	A1-A3	A4	A5	C2/1	C2/2	C3/1	C3/2	D/1	D/2
PERE	[MJ]	2.56E+1	2.69E-2	2.69E+0	3.69E-3	5.44E-2	6.14E-1	5.29E+0	-1.09E+1	-1.63E+1
PERM	[MJ]	1.29E+0	0.00E+0	-1.29E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PERT	[MJ]	2.69E+1	2.69E-2	1.40E+0	3.69E-3	5.44E-2	6.14E-1	5.29E+0	-1.09E+1	-1.63E+1
PENRE	[MJ]	1.10E+2	4.42E-1	9.73E+0	6.06E-2	8.93E-1	7.82E+1	1.06E+1	-4.63E+1	-1.20E+2
PENRM	[MJ]	7.61E+1	0.00E+0	-3.03E-1	0.00E+0	0.00E+0	-7.58E+1	0.00E+0	0.00E+0	0.00E+0
PENRT	[MJ]	1.86E+2	4.42E-1	9.43E+0	6.06E-2	8.93E-1	2.47E+0	1.06E+1	-4.63E+1	-1.20E+2
SM	[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
RSF	[MJ]	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
NRSF	[MJ]	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
FW	[m ³]	4.20E-2	3.09E-5	2.60E-3	4.23E-6	6.23E-5	1.29E-2	2.88E-3	-5.92E-3	-2.70E-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 – OUTPUT FLOWS AND WASTE CATEGORIES according to EN 15804+A1: 1 m² of average produced and installed EVALASTIC

Parameter	Unit	A1-A3	A4	A5	C2/1	C2/2	C3/1	C3/2	D/1	D/2
HWD	[kg]	5.39E-7	2.52E-8	2.83E-8	3.45E-9	5.09E-8	1.36E-8	5.84E-8	-2.60E-8	-3.36E-7
NHWD	[kg]	7.56E-1	2.97E-5	3.98E-2	4.07E-6	6.00E-5	5.50E-1	1.01E-2	-2.43E-2	-4.86E-1
RWD	[kg]	5.02E-3	5.26E-7	2.60E-4	7.20E-8	1.06E-6	1.05E-4	9.14E-4	-1.91E-3	-3.25E-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
MFR	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.96E+0	0.00E+0	0.00E+0
MER	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.96E+0	0.00E+0	0.00E+0	0.00E+0
EEE	[MJ]	0.00E+0	0.00E+0	2.45E-1	0.00E+0	0.00E+0	9.80E+0	0.00E+0	0.00E+0	0.00E+0
EET	[MJ]	0.00E+0	0.00E+0	5.72E-1	0.00E+0	0.00E+0	2.25E+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 supply of raw materials (module A1) shows a significant influence on the overall environmental profile of the roofing membranes, except for ODP (which is dominated by packaging). With the exception of ODP, between approx. 45 and 95 % of the

environmental impacts are caused by the raw materials used, depending on the indicator. The highest contributions for all indicators are made by the production of the raw materials EPDM and aluminium hydroxide (about 20 % each in the production phase).

Transport (modules A2, A4 and C2), manufacturing (module A3) and assembly (module A5) show an overall low contribution. With few exceptions, the relative contributions to the indicator results are well below 5%.
The combustion emissions of the "thermal recovery" scenario contribute to the greenhouse effect to a relevant extent (approx. 30 % relative contribution). In all other impact categories, the influence is low.

At the end of the product life cycle, the product properties allow a material conversion as inspection walkway tiles. This possibility of "material recycling" can lead to a significant overall reduction in environmental impacts in direct comparison to "thermal recycling" in the disposal phase. In practice, it is therefore preferable to thermal recycling.

7. Requisite evidence

8. References

IBU

IBU (2016): General EPD programme guide of the Institut Bauen und Umwelt e.V. (IBU). Version 1.1, Institut Bauen und Umwelt e.V., Berlin.

IBU

PCR - Part A: Calculation rules for the Life Cycle Assessment and Requirements on the Background Report, Version 1.2, Institut Bauen und Umwelt e.V., www.bau-umwelt.com, 2019

IBU

Part B PCR Instructions for building related products and services - Plastic and rubber roofing and waterproofing membrane systems (11/2017)

ISO 14025

DIN EN /ISO 14025:2011-10/, Environmental labels and declarations - Type III environmental declarations - Principles and procedures.

EN 15804

EN 15804:2012-04+A1 2013/, Sustainability of construction works - Environmental product declarations - Core rules for the product category construction products.

EN 495:2013-08

EN 495:2013 -08 Flexible sheets for waterproofing - Determination of foldability at low temperature – Part 5: Plastic and rubber sheets for roof waterproofing

EN 1844

DIN EN 1844: 2013-08 Flexible sheets for waterproofing - Determination of resistance to ozone - Plastic and rubber sheets for roof waterproofing

CEN TS 1187

DIN CEN TS 1187: 2012-03, Test methods for external fire exposure to roofs

EN 1297

DIN EN 1297: 2004-12, Flexible sheets for waterproofing - Bitumen, plastic and rubber sheets for roof waterproofing - Method of artificial ageing by long term exposure to the combination of UV radiation, elevated temperature and water

EN 1548:2007-11

DIN EN 1548: 2007-11, Flexible sheets for waterproofing - Plastic and rubber sheets for roof waterproofing - Method for exposure to bitumen

EN 1928

DIN EN 1928: 2000-07, Flexible sheets for waterproofing - Bitumen, plastic and rubber sheets for roof waterproofing - Determination of watertightness

ISO 9001

ISO 9001:2015-11, Quality management systems - Requirements

ISO 11925

ISO 11925-2: 2011-02, Reaction to fire tests - Ignitability of products subjected to direct impingement of flame

EN 1107-2

DIN EN 1107-2:2001-04, Flexible sheets for waterproofing - Determination of dimensional stability - Part 2: Plastic and rubber sheets for roof waterproofing; German version EN 1107-2:2001

EN 12310-2

DIN EN 12310-1: 2000-12, Flexible sheets for waterproofing - Determination of resistance to tear propagation (nail shaft) - Part 1: Plastic and rubber sheets for roof waterproofing

EN 12311-2

DIN EN 12311-2: 2013-11, Flexible sheets for waterproofing - Determination of tensile properties - Part 2: Plastic and rubber sheets for roof waterproofing

EN 12316-2

DIN EN 12316-2: 2013-08, Flexible sheets for waterproofing - Determination of peel resistance of joints - Part 2: Plastic and rubber sheets for roof waterproofing

EN 12317-2

DIN EN 12317-2: 2010-12, Flexible sheets for waterproofing - Determination of shear resistance of joints Part 2: Plastic and rubber sheets for roof waterproofing

EN 12691

DIN EN 12691:2018-05, Flexible sheets for waterproofing - Bitumen, plastic and rubber sheets for roof waterproofing - Determination of resistance to impact loads; German version EN 12691:2018

EN 12730

DIN EN 12730: 2015-06, Flexible sheets for waterproofing - Bitumen, plastic and rubber sheets for

roof waterproofing - Determination of resistance to static loading

EN 13501-1

DIN EN 13501-1, 2010-01: Fire classification of construction products and building elements - Part 1: Classification using test data from reaction to fire tests

EN 13948

DIN EN 13948: 2008-01, Flexible sheets for waterproofing - Bitumen, plastic and rubber sheets for roof waterproofing - Determination of resistance to root penetration

EN 13956

DIN EN 13956: 2013-03, Flexible sheets for waterproofing - Plastic and rubber sheets for roof waterproofing - Definitions and characteristics

EN 13967

DIN EN 13967: 2017-08, Flexible sheets for waterproofing - Plastic and rubber damp proof sheets including plastic and rubber basement tanking sheet - Definitions and characteristics

DIN SPEC 20000-201

DIN SPEC 20000-201: 2018-08, Use of building products in construction works - Part 201: Adaption standard for flexible sheets for waterproofing according to European standards for the use as waterproofing of roofs

DIN SPEC 20000-202

DIN SPEC 20000-202: 2016-03, Use of building products in construction works - Part 202: Adaption standard for flexible sheets for waterproofing according to European standards for the use as waterproofing of elements in contact with soil, of indoor applications and of tanks and pools

DIN 18531

DIN 18531-1: 2017-07 Waterproofing of roofs, balconies and walkways -
Part 1: Non-utilized and utilized roofs - Requirements and principles for execution and design

DIN 18531-2

DIN 18531-1: 2017-07 Waterproofing of roofs, balconies and walkways -
Part 1: Non-utilized and utilized roofs - Materials

DIN 18531-3

DIN 18531-3: 2017-07 Waterproofing of roofs, balconies and walkways -
Part 1: Non-utilized and utilized roofs -
Selection, execution and detailing

DIN 18531-4

DIN 18531-4: 2017-07 Waterproofing of roofs, balconies and walkways -
Part 1: Non-utilized and utilized roofs -
Repair

DIN 18531-5

DIN 18531-5: 2017-07 Waterproofing of roofs, balconies and walkways -
Part 1: Non-utilized and utilized roofs - Balconies, loggias and walkways

ISO 14001

EN ISO 14001: 2015-11, Environmental management systems - Requirements with guidance for use

ISO 50001

EN ISO 50001: 2018-12, Energy management systems - Requirements with guidance for use

AVV

Ordinance on the Implementation of the European Waste Catalogue Waste Catalogue Ordinance (AVV)

FLL

Forschungsgesellschaft Landschaftsentwicklung Landschaftsbau e.V. [Landscape Research, Development and Construction Society]
"Verfahren zur Untersuchung der Wurzelfestigkeit von Bahnen und Beschichtungen für Dachbegrünungen nach dem FLL-Verfahren" [Testing of root resistance of membranes and coatings for green roofs according to the FLL method]

GaBi 9

GaBi 9 SP39 dataset documentation for the software-system and databases, LBP, University of Stuttgart and thinkstep, Leinfelden-Echterdingen, 2019 (<http://documentation.gabi-software.com/>)

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