Statement of Verification

BREG EN EPD No.: 000572 Issue 01

This is to verify that the

Environmental Product Declaration

provided by:

Sika Ltd

BRE Global Verified EPD

is in accordance with the requirements of:

EN 15804:2012+A2:2019

and

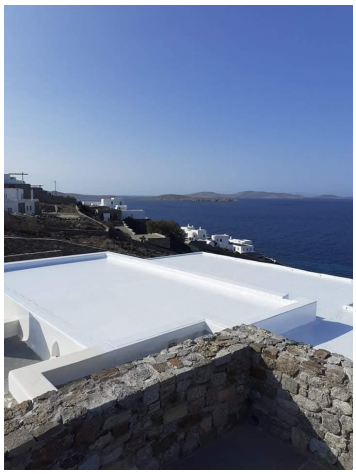
BRE Global Scheme Document SD207

This declaration is for:

SikaRoof® PUR-18

Company Address

Sika House
Miller Street
Preston
PR1 1EA
UK



BUILDING TRUST

Signed for BRE Global Ltd	Emma Baker Operator	01 March 2024 Date of this Issue
01 February 2024 Date of First Issue		28 February 2029 Expiry Date

Environmental Product Declaration

EPD Number: 000572

General Information

EPD Programme Operator	Applicable Product Category Rules
BRE Global Watford, Herts WD25 9XX United Kingdom	BRE 2023 Product Category Rules (PN 514 Rev 3.1) for Type III environmental product declaration of construction products to EN 15804:2012+A2:2019.
Commissioner of LCA study	**LCA consultant/Tool**
Sika Services AG Tüffenwies 16 Zurich 8048 Switzerland	Sika Technology AG Tüffenwies 16 Zurich 8048 Switzerland www.sika.com/sustainability
Declared/Functional Unit	**Applicability/Coverage**
1 m^2 of SikaRoof® PUR-18 liquid applied roofing waterproofing system for a reference service life of 10 years.	Product Average.
EPD Type	**Background database**
Cradle to Gate with options	Sphera Managed LCA Version 2022.2 and ecoinvent Version 3.8

Demonstration of Verification
CEN standard EN 15804 serves as the core PCR [a]
Independent verification of the declaration and data according to EN ISO 14025:2010 ☐Internal ☒ External
(Where appropriate [b])Third party verifier: Roger Connick
a: Product category rules b: Optional for business-to-business communication; mandatory for business-to-consumer communication (see EN ISO 14025:2010, 9.4)

Comparability
Environmental product declarations from different programmes may not be 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 for further guidance

Information modules covered

Product			Construction		Use stage							End-of-life					Benefits and loads beyond the system boundary
					Related to the building fabric					Related to the building							
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4		D
Raw materials supply	Transport	Manufacturing	Transport to site	Construction – Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal		Reuse, Recovery and/or Recycling potential
☑	☑	☑	☑	☑	☐	☐	☐	☐	☐	☐	☐	☑	☑	☑	☑		☑

Note: Ticks indicate the Information Modules declared.

Manufacturing site(s)

This environmental product declaration is for 1 m^2 of the roofing waterproofing system SikaRoof® PUR-18 consisting of Sikalastic®-701 and Sikalastic®-702 produced by Sika Ltd at following manufacturing facility.

Sika House
Miller Street
Preston
PR1 1EA
UK

Construction Product:

Product Description

SikaRoof® PUR-18 is a 2-part, cold-applied, polyurethane hybrid liquid applied membrane roof waterproofing system. The system is highly elastic and UV-stable which provides a durable waterproofing solution and conforms to the ETAG-005 guidelines. The results in this EPD refer to the standard system, consisting of an embeddment layer of 2 L/m2 of Sikalastic®-702 and a top coat of 0.3 L/m2 of Sikalastic®-701. The thickness of the system is 2.3 mm. A formula to calculate results for alternative thicknesses is provided. All further explanations that refer to SikaRoof® PUR-18 apply to all thicknesses.

Technical Information

Property	Value, Unit
Wet density of Sikalastic®-702 (DIN EN ISO 2811-11)	1.24 kg/L
Wet density of Sikalastic®-701 (DIN EN ISO 2811-11	1.25 kg/L
Tensile strength (DIN EN ISO 527-3)	~10 N/ mm2
Tensile strain at break (DIN EN ISO 527-3)	~900 %
External fire performance (ENV-1187)	Broof (t1); Broof (t4)
Reaction to fire (EN13501-1)	Euroclass E
Solar reflectance	Initial: 0.88

Property	Value, Unit
Thermal emittance	Initial: 0.86
Solar reflectance index	Initial: 112

Further information about the product including product data sheets can be accessed via www.sika.com.

Main Product Contents

Sikalastic®-702

Material/Chemical Input	%
Polymer	50 – 70
Plasticiser	5 – 15
Pigment	1 – 5
Hardener	5 – 15
Fillers	15 - 35
Additives	< 5

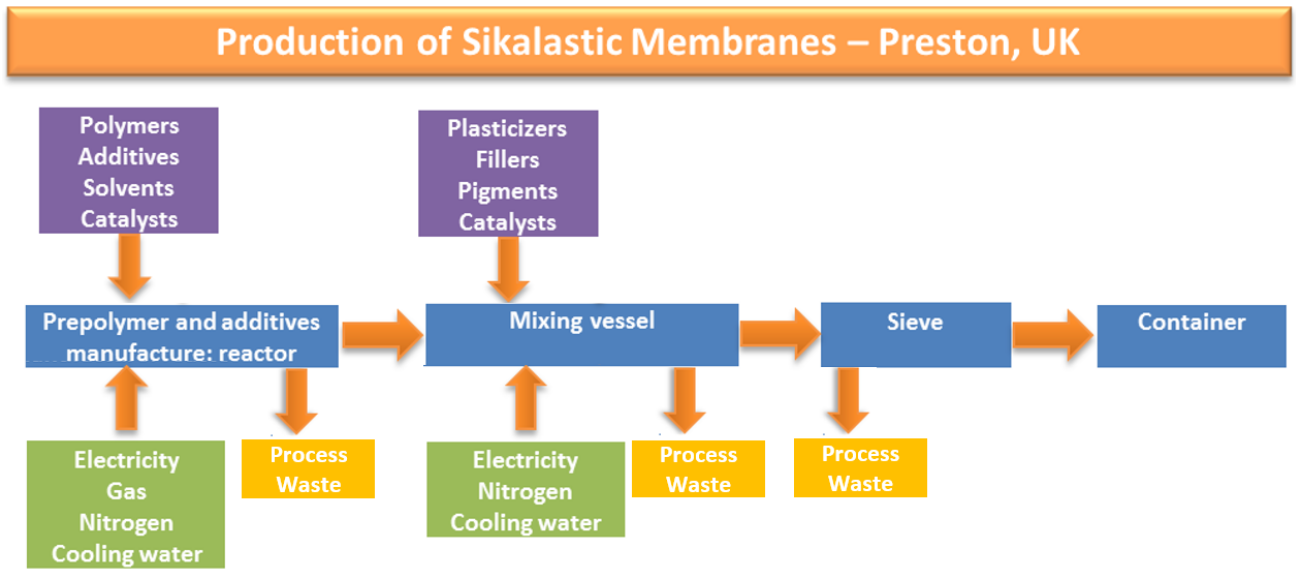
Sikalastic®-701

Material/Chemical Input	%
Polymer	10 – 40
Monomer	5 – 15
Pigment	10 – 20
Hardener	5 – 15
Solvent	10 – 25
Fillers	5 - 15
Additives	< 5

Manufacturing Process

A computer-generated batch card is raised with details of the required raw material proportions, order of additions and production conditions. This process is followed by the manufacture of a pre-polymer and hardener by Incorez Ltd under the control of Sika Liquid Plastics, in accordance with formal quality plans. The specified ingredients are blended and reacted together in stainless steel cylindrical mixing vessels in accordance with pre-set parameters which include temperature, mixing, time, vacuum pressure, and this is done under a nitrogen blanket to eliminate moisture. Every batch is QC tested both in process and on completion in accordance with formal quality plans. Once completed the batches are gravity fed via a filtering system into filling hoppers and tinned off as specific with nitrogen purging to each container.

Process flow diagram



Construction Installation

The topcoat and basecoat for SikaRoof® PUR-18 are Sikalastic®-701 and Sikalastic®-702. Sikalastic®-701 and Sikalastic®-702 are two-component polyurethane coatings that are cold applied on site; they cure to provide completely seamless waterproofing protection with an aesthetically pleasing finish. The products are available in a range of colours.

Use Information

Installation works must be carried out by a competent contractor, in accordance with Sika Limited. During the service life of the membrane system there is no ordinary maintenance, repair/refurbishment or replacement required, if it is correctly and properly applied. Therefore, no scenario for the use phase and maintenance is defined.

End of Life

When the SikaRoof® PUR-18 system reaches the end of its life, the system may be primed, and further material applied. At the end of its service life the building is demolished, and as the SikaRoof® PUR-18 membrane systems are attached to the substrate it is generally taken to landfill. The demolition process concerns mainly the structure of which the membrane system is a minor part. Therefore, for this stage no other steps are considered necessary except for the transportation to landfill and landfilling. The end of life of the membrane is assumed in Europe.

Life Cycle Assessment Calculation Rules

Declared / Functional unit description

1 m^2 of SikaRoof® PUR-18 liquid applied roofing waterproofing system for a reference service life of 10 years.

System boundary

In accordance with the modular approach as defined in EN 15804, this cradle to gate with options EPD includes the product stage (A1-A3), construction process stage (A4-A5), end-of-life stage (C1-C4) and the benefits beyond the system boundaries.

Data sources, quality and allocation

The primary data provided by Sika derive from the plant at Preston, UK for 2021. Background LCI datasets are taken from the databases of Sphera Managed LCA Version 2022.2 and ecoinvent Version 3.8.

The total values for 1st of January 2021 to 31st of December 2021 were divided by the total amount of liquid membranes produced. This represents a mass allocation of the ancillary materials, which are water, waste and electricity. As all products that are produced in this site are liquid membranes and the production process for all liquid membranes this type of allocation is deemed as adequate. The cooling water is taken from a borehole and afterwards it is heads directly to wastewater. The production process needs only electricity, the gas consumed is only for heating of the warehouse, therefore it was not included in the analysis.

Benefits from incineration of product losses and for the disposal of packaging are credited in Module D. This also applies to the reuse of wooden pallets.

Cut-off criteria

All data was taken into consideration (recipe constituents, thermal energy used, electricity used). The consumption of natural gas was cut off as it is only used for heating the offices and site, not in the production process.

Transportation was considered for all inputs and outputs.

The manufacturing of the production machines and systems and associated infrastructure were not considered in the LCA

LCA Results

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing environmental impacts									
			GWP-total	GWP-fossil	GWP-biogenic	GWP-luluc	ODP	AP	EP-freshwater
			kg CO_2 eq	kg CO_2 eq	kg CO_2 eq	kg CO_2 eq	kg CFC11 eq	mol H^+ eq	kg $(PO_4)^{3-}$ eq
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	1.33E+01	1.30E+01	2.39E-01	2.71E-03	1.36E-07	3.55E-02	2.57E-04
Construction process stage	Transport	A4	2.50E-02	2.49E-02	-3.43E-05	1.38E-04	1.48E-15	2.42E-05	7.40E-08
	Construction	A5	1.62E+00	1.25E+00	3.67E-01	2.25E-04	7.63E-10	3.06E-03	1.50E-05
Use stage	Use	B1	MND	MND	MND	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND	MND	MND	MND
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	5.42E-02	5.40E-02	-7.43E-05	3.00E-04	3.22E-15	5.24E-05	1.61E-07
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Disposal	C4	4.14E-02	4.26E-02	-1.26E-03	7.85E-05	1.01E-13	3.02E-04	7.23E-08
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	1.82E-01	-4.68E-02	2.29E-01	-1.35E-04	-3.65E-09	-1.88E-04	-8.66E-06

GWP-total = Global warming potential, total;
GWP-fossil = Global warming potential, 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; and
EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment

LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing environmental impacts									
			EP-marine	EP-terrestrial	POCP	ADP-mineral& metals	ADP-fossil	WDP	PM
			kg N eq	mol N eq	kg NMVOC eq	kg Sb eq	MJ, net calorific value	m^3 world eq deprived	disease incidence
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	1.05E-02	7.54E-02	3.38E-02	8.85E-06	2.74E+02	4.90E+00	3.65E-07
Construction process stage	Transport	A4	7.65E-06	9.18E-05	2.12E-05	2.07E-09	3.32E-01	2.23E-04	1.44E-10
	Construction	A5	1.02E-03	6.68E-03	9.08E-02	6.82E-07	2.72E+01	5.22E-01	-3.41E-09
Use stage	Use	B1	MND	MND	MND	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND	MND	MND	MND
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	1.66E-05	1.99E-04	4.59E-05	4.50E-09	7.19E-01	4.83E-04	2.84E-10
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Disposal	C4	7.71E-05	8.47E-04	2.34E-04	4.38E-09	5.57E-01	4.65E-03	3.37E-09
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-5.35E-05	-5.67E-04	-2.03E-04	-2.21E-07	-8.70E-01	-2.54E-02	-2.20E-09

EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment;
EP-terrestrial = Eutrophication potential, accumulated exceedance;
POCP = Formation potential of tropospheric ozone;
ADP-mineral&metals = Abiotic depletion potential for non-fossil resources;
ADP-fossil = Depletion potential of the stratospheric ozone layer;
WDP = Water (user) deprivation potential, deprivation-weighted water consumption; and
PM = Particulate matter.

LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing environmental impacts							
			IRP	ETP-fw	HTP-c	HTP-nc	SQP
			kBq U^{235} eq	CTUe	CTUh	CTUh	dimensionless
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	2.40E+00	1.40E+02	1.66E-08	1.60E-06	3.26E+01
Construction process stage	Transport	A4	6.00E-05	2.30E-01	4.64E-12	2.41E-10	1.14E-01
	Construction	A5	6.73E-03	1.06E+00	1.29E-11	6.16E-09	8.70E-02
Use stage	Use	B1	MND	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND	MND
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	1.18E-04	4.54E-01	9.18E-12	4.75E-10	2.25E-01
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Disposal	C4	6.05E-04	2.84E-01	4.33E-11	4.80E-09	1.10E-01
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-1.00E-02	-6.76E-01	-1.67E-10	-6.78E-10	-1.15E+01

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; and
SQP = Potential soil quality index.

LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing resource use, primary energy								
			PERE	PERM	PERT	PENRE	PENRM	PENRT
			MJ	MJ	MJ	MJ	MJ	MJ
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	3.24E+01	1.94E+00	3.44E+01	2.28E+02	4.53E+01	2.74E+02
Construction process stage	Transport	A4	1.88E-02	0.00E+00	1.88E-02	3.32E-01	0.00E+00	3.32E-01
	Construction	A5	4.11E-01	-1.94E-01	2.17E-01	2.27E+01	4.53E+00	2.73E+01
Use stage	Use	B1	MND	MND	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND	MND	MND
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	4.09E-02	0.00E+00	4.09E-02	0.00E+00	0.00E+00	7.21E-01
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Disposal	C4	8.39E-02	0.00E+00	8.39E-02	5.58E-01	0.00E+00	5.58E-01
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-2.37E+00	0.00E+00	-2.37E+00	-8.70E-01	0.00E+00	-8.70E-01

PERE = Use of renewable primary energy excluding renewable primary energy 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 resource

LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing resource use, secondary materials and fuels, use of water						
			SM	RSF	NRSF	FW
			kg	MJ net calorific value	MJ net calorific value	m^3
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	0.00E+00	0.00E+00	0.00E+00	1.68E-01
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	2.13E-05
	Construction	A5	0.00E+00	0.00E+00	0.00E+00	1.75E-02
Use stage	Use	B1	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	0.00E+00	0.00E+00	0.00E+00	4.62E-05
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	1.41E-04
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0.00E+00	0.00E+00	0.00E+00	-6.62E-04

SM = Use of secondary material;
RSF = Use of renewable secondary fuels;
NRSF = Use of non-renewable secondary fuels;
FW = Net use of fresh water

LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Other environmental information describing waste categories					
			HWD	NHWD	RWD
			kg	kg	kg
Product stage	Raw material supply	A1	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG
	Total (of product stage)	A1-3	2.85E-03	1.56E+00	9.27E-03
Construction process stage	Transport	A4	1.59E-12	4.76E-05	4.09E-07
	Construction	A5	2.85E-04	4.06E-01	9.69E-04
Use stage	Use	B1	MND	MND	MND
	Maintenance	B2	MND	MND	MND
	Repair	B3	MND	MND	MND
	Replacement	B4	MND	MND	MND
	Refurbishment	B5	MND	MND	MND
	Operational energy use	B6	MND	MND	MND
	Operational water use	B7	MND	MND	MND
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	3.45E-12	1.03E-04	8.88E-07
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00
	Disposal	C4	2.87E-11	2.85E+00	6.11E-06
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-4.54E-11	-2.49E-04	-4.66E-05

HWD = Hazardous waste disposed;
NHWD = Non-hazardous waste disposed;
RWD = Radioactive waste disposed

LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Other environmental information describing output flows – at end of life

			CRU	MFR	MER	EE	Biogenic carbon (product)	Biogenic carbon (packaging)
			kg	kg	kg	MJ per energy carrier	kg C	kg C
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.46E-02
Construction process stage	Transport	A4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Construction	A5	0.00E+00	0.00E+00	0.00E+00	2.60E-01	0.00E+00	0.00E+00
Use stage	Use	B1	MND	MND	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND	MND	MND
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Potential benefits and loads beyond the system	Reuse, recovery, recycling potential	D	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

CRU = Components for reuse;
MFR = Materials for recycling

MER = Materials for energy recovery;
EE = Exported Energy

Scenarios and additional technical information

Scenarios and additional technical information			
Scenario	Parameter	Units	Results
A4 – Transport to the building site	Transport of the SikaRoof® PUR-18 system to the building site		
	Diesel / Euro 6 Truck	L/km	0.0088
	Distance:	km	250
	Capacity utilisation (incl. empty returns)	%	61
	Bulk density of transported products	kg/m^3	3.6
A5 – Installation in the building	Installation of the SikaRoof® PUR-18 system in the building		
	Ancillary materials for installation (Glassfiber mat)	%	9
	Waste materials from installation wastage	%	10
B2 – Maintenance	Maintenance of the SikaRoof® PUR-18 system		
	No maintenance necessary	N/A	N/A
B3 – Repair	Repair of the SikaRoof® PUR-18 system		
	No repair necessary	N/A	N/A
B4 – Replacement	Replacement of the SikaRoof® PUR-18 system		
	No replacements necessary	N/A	N/A
B5 – Refurbishment	Refurbishment of the SikaRoof® PUR-18 system		
	No refurbishment necessary	N/A	N/A
Reference service life	Reference service life of the SikaRoof® PUR-18 system		
	Reference service life	years	25
B6 – Use of energy; B7 – Use of water	Use of water and energy associated with the use of SikaRoof® PUR-18 system		
	None needed	N/A	N/A
C1 to C4 End of life,	Transport of the SikaRoof® PUR-18 system to the final disposal site		
	Diesel / Euro 6 Truck	L/km	0.0088
	Capacity utilisation (not incl. empty returns)	%	61
	Bulk density of transported product	Kg/m^3	3.6

Scenarios and additional technical information			
Scenario	Parameter	Units	Results
	Waste for final disposal to Landfill	%	100
Module D	The benefits from incineration of waste produced during installation are credited in Module D as avoided generation of electricity and thermal energy, since in modern incineration plants the energy of combustion is used to produce power and thermal energy. The partial reuse of pallets from packaging is also included in Module D as avoided production of new pallets.		

Summary, comments and additional information

Interpretation

The displayed results apply to SikaRoof® PUR-18 with 2.3 mm thickness. To calculate results of SikaRoof® PUR-18 with other thinknesses, the following formula can be used:

Ix = ((x+0.83)/3.13)* I 2.3

[Ix = the unknown parameter value for SikaRoof® PUR-18 systems with a membrane thickness of "x" mm (e.g. 2.6 mm)]

Figure 1 shows the relative contributions of the different modules to the various environmental impact categories and to primary energy use in a dominance analysis.

Most impacts come from Module A1-3, although the installation step (Module A5) has a significant relative impact on POCP (from VOC emissions occurring during installation) and GWP biogenic (from waste disposal of wooden pallet packaging). The Biogenic emissions of the of the D-module are also associated with the wooden pallet, where the credit of reuse of wooden pallets becomes an emission instead of a removal (credit is negative and removal is negative).

Taking a closer look at module A1-3, more than 60% of the impacts come from the raw materials, except for PERT, where 29 % is from formulation, 59 % from packaging and 13 % from the production process, and EP marine, where 44 % is from formulation, 52 % arises from packaging and 5 % from production, namely due to the nitrogen released to the air, and AP, where 54 % arise from the raw materials, 41 % from the packaging and 4 % from the production. The production process (mainly the energy inputs, nitrogen input and release) contributes mostly to GWP fossil (23 %), ODP (12 %), EP freshwater (11 %), and PERNT (13 %). The packaging materials contribute mostly to GWP fossil (23 %), GWP biogenic with a carbon uptake, ODP, AP (41 %), EP marine and terrestrial (30 % and 21 %), POCP (21 %), ADPF (15 %), Water scarcity (10 %) and the energy indicators (PERT 58% and PERNT 15 %).

Within the raw materials, the polymers play an important role in terms of GWP (80%), ODP (74%), AP (65%), EP freshwater (30%), EF marine and terrestrial (69%), POCP (78%), ADPF (83%), ADPE (42%), WDP (22%) PERT (77%) and PENRT (83%). The influence of the pigments can be seen in AP (25%), EP freshwater (39%), EP marine and terrestrial (22%), POCP (11%), ADPE (24%), WDP (18%), and PERT (15%). While the influence of the solvents can be seen in ODP (14%), EP-freshwater (26%) and ADPE (23%). The influence of the plasticizer is generally lower than the other raw materials but can be seen in GWP (6%), POCP (7%), ADPF (7%) and PENRT (7%).

The materials which contribute the most to the impacts are also those representing the greatest part of the total membrane mass (polymers and pigments). The fillers show a low impacted in relation to their mass. It is not possible to check which upstream processes are responsible for the impacts for each of these raw materials since the generic datasets consist of aggregated data.

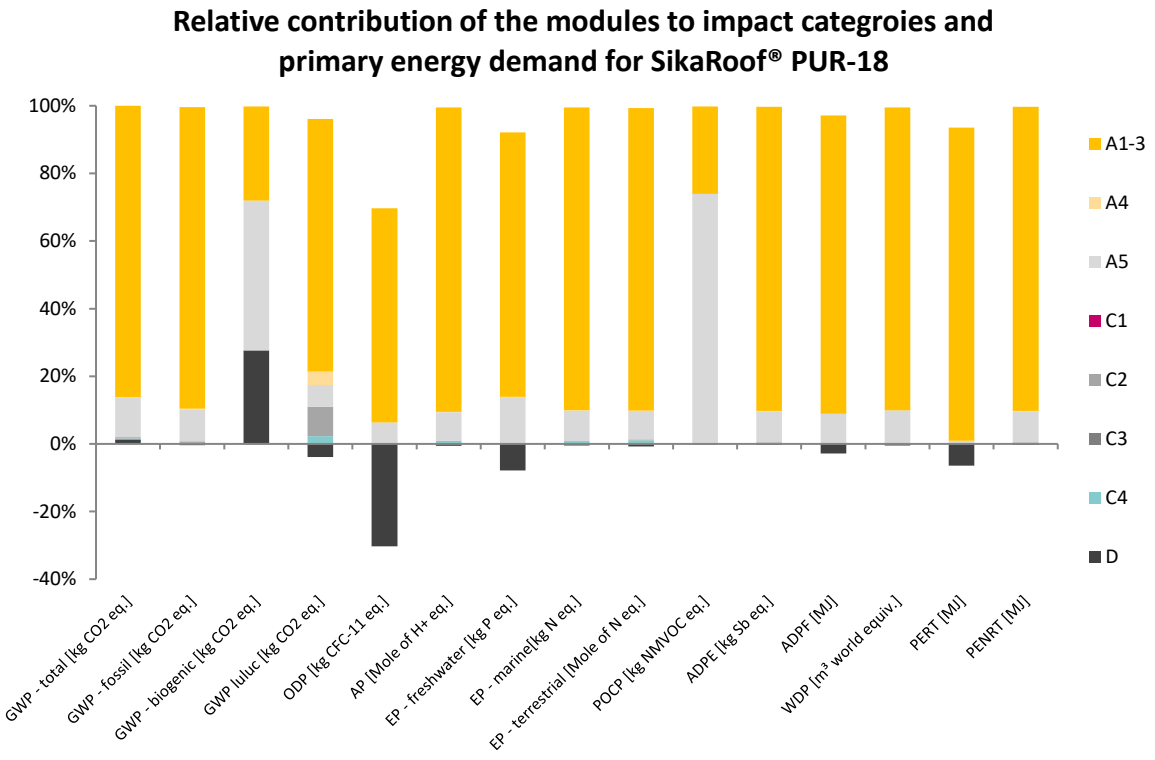


Figure 1

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