

## Product information for the building certification scheme LEED v4® (Leadership in Energy and Environmental Design)

The intention of this document is to support project teams pursuing LEED v4 certification by providing an overview of how your products contribute to LEED v4 credits. Basis of this information is LEED v4 credit library (08/2014)<sup>1</sup>

# EVALON® V loose laid under ballast, mechanically fastened or bonded

## General Information

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## Product information

### Product description

EVALON® V is a bitumen compatible EVAC (ethylene vinyl acetate copolymer) waterproofing membrane system. The product consists of a high polymer alloy of EVA terpolymer and PVC including additives. The waterproofing membranes are manufactured with a polyester fleece backing in a calendaring process. Seam welding is carried out with hot air or solvent welding agent.

### Application

EVALON® V can be applied in one layer for waterproofing of non-used and used flat and low slope roofs. Depending on specification, the membranes are applied as follows:

- loose laid under ballast (e. g. gravel, tiles, vegetation)
- mechanically fastened or
- bonded

EVALON® V can also be applied in one layer for waterproofing of non-waterproof foundations or constructional parts against ground moisture and non-pressing water. Depending on specification, the membranes can be applied as follows:

- loose laid under ballast
- bonded

Remark: ballast or mechanical fasteners are not included within the LCA results. But bonding with alwitra adhesive L40 or with alwitra adhesive PUR D are included in this fact sheet (see ANNEX).

<sup>1</sup> <http://www.usgbc.org/credits> (08/2014)

## Technical data

### EVALON® V

Description	Value	Unit
Max. tensile force acc. to EN 12311-2 (A)	500	N/50mm
Elongation at max. tensile force acc. to EN 12311-2 (A)	60	%
Peel resistance of the seam joint acc. to EN 12316-2	150	N/50mm
Shear resistance of the seam joint acc. to EN12317-2	400	N/50mm
Tear propagation resistance acc. to EN 12310-1	300	N
Resistance to static load acc. to EN 12730 (B)	20	kg
Water tightness acc. to EN 1928	400	kPa
Artificial ageing acc. to EN 1297	class 0	-
Folding in the cold acc. to EN 495-5	-30	°C
Bitumen compatibility acc. to EN 1548	passed	-
Resistance to root penetration (for green roofs) acc. to EN 13948 or FLL (roofing membranes)	passed	-

## Product declarations

### Environmental product declarations (EPDs):

EPD is available - see section Materials and Resources (MR).

## Sustainable Sites (SS)

### *Summary*

Sustainable sites credits encourage strategies that minimize the impact on ecosystems and water resources.

## Heat island reduction

### *Intent of this credit:*

To minimize effects on microclimates and human and wildlife habitats by reducing heat islands.

Product information for EVALON® V is within this credit:

Item	Value	Unit
Solar reflectance index (SRI) value (roofing materials)	Initial (non-aged): White 106; Grey 38	-
Solar reflectance (SR) value (shading device for nonroof applications, or paving material) - according to DIN EN 410	Initial (non-aged): White 0.86; Grey 0.39	-

## Materials and Resources (MR)

### Summary

Materials and Resources credits encourage using sustainable building materials and reducing waste. Indoor environmental quality credits promote better indoor air quality and access to daylight and views.

### Building product disclosure and optimization - environmental product declarations

#### Intent of this credit

To encourage the use of products and materials for which life-cycle information is available and that have environmentally, economically, and socially preferable life-cycle impacts. To reward project teams for selecting products from manufacturers who have verified improved environmental life-cycle impacts.

Product information for EVALON® V is within this credit:

Item	Value
Critically reviewed LCA acc. to ISO 14044?	yes
Author of the LCA	thinkstep AG, (formerly PE INTERNATIONAL AG), Leinfelden-Echterdingen, Germany
Reviewer	Institute Construction and Environment (IBU - Institut Bauen und Umwelt e.V.), Berlin, Germany
Download link of the document/study	<a href="http://alwitra.de/wp-content/uploads/2014/07/EPD_ALW_20140020_IBA1_EN.pdf">http://alwitra.de/wp-content/uploads/2014/07/EPD_ALW_20140020_IBA1_EN.pdf</a>
Industry-wide (generic) EPD (Type III, including external verification)?	no
Product specific EPD (Type III, including external verification)?	yes
EPD program operator	Institute Construction and Environment (IBU - Institut Bauen und Umwelt e.V.), Berlin, Germany; <a href="http://www.construction-environment.com">www.construction-environment.com</a>
EPD program operator country	Germany
EPD number	EPD-ALW-20140020-IBA1-EN

Following, the resulting indicators of the life cycle impact assessment, of the resource input as well as of residues and other output flows for 1 m<sup>2</sup> installed waterproofing membrane EVALON® V 1.5 mm, mechanically fastened or loose laid under ballast. The ballast, mechanical fasteners or bonding is not included in the calculation as it can vary a lot. But seam welding, welding agent, its VOC emissions and losses of material due to overlap (5 %) are considered for the installation scenario (A5). For the life cycle stage C3 & D, two different scenarios were calculated: scenario 1 for energy recovery and scenario 2 for a recycling scenario. For more detailed information about these scenarios please see the corresponding EPD. For the results of other thicknesses or variants please see ANNEX.

## Results of the LCA – ENVIRONMENTAL IMPACTS:

Declared unit: 1 m <sup>2</sup> installed roofing and waterproofing membrane EVALON® V 1.5 mm								
Declared life cycle stages (standard DIN EN 15978)	PRODUCT STAGE	CONSTRUCTION PROCESS STAGE			END OF LIFE STAGE		BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARYS	
	A1-A3	A4	A5	C2	C3/1	C3/2	D/1	D/2
GWP [kg CO <sub>2</sub> -eq.]	6.75E+00	3.25E-02	5.10E-01	3.25E-02	3.85E+00	9.51E-01	-2.56E+00	-3.04E+00
ODP [kg CFC11-eq.]	1.41E-08	6.78E-13	7.11E-10	6.78E-13	5.54E-11	5.12E-10	-7.56E-10	-7.24E-09
AP [kg SO <sub>2</sub> -eq.]	2.51E-02	8.47E-05	1.30E-03	8.47E-05	9.30E-04	1.77E-03	-3.52E-03	-1.14E-02
EP [kg PO <sub>4</sub> <sup>3-</sup> - eq.]	2.98E-03	1.92E-05	1.55E-04	1.92E-05	7.24E-05	2.14E-04	-3.96E-04	-1.38E-03
POCP [kg ethene-eq.]	7.87E-03	-2.42E-05	3.96E-04	-2.42E-05	5.26E-05	6.01E-05	-3.25E-04	-4.06E-03
ADPE [kg Sb eq.]	1.20E-05	1.50E-09	6.04E-07	1.50E-09	5.51E-07	1.42E-07	-2.61E-07	-6.18E-06
ADPF [MJ]	1.45E+02	4.44E-01	7.54E+00	4.44E-01	1.81E+00	9.92E+00	-3.39E+01	-6.90E+01

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:

Declared unit: 1 m <sup>2</sup> installed roofing and waterproofing membrane EVALON® V 1.5 mm								
Declared life cycle stages (standard DIN EN 15978)	PRODUCT STAGE	CONSTRUCTION PROCESS STAGE			END OF LIFE STAGE		BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARYS	
	A1-A3	A4	A5	C2	C3/1	C3/2	D/1	D/2
<b>PE total [MJ]</b>	1,72E+02	4,71E-01	8,94E+00	4,71E-01	2,22E+00	1,65E+01	-4,28E+01	-8,06E+01
PERE [MJ]	1.47E+01	2.64E-02	7.62E-01	2.64E-02	1.73E-01	2.5E+00	-3.64E+00	-6.6E+00
PERM [MJ]	0	-	-	-	-	-	-	-
<b>PERT [MJ]</b>	1.47E+01	2.64E-02	7.62E-01	2.64E-02	1.73E-01	2.5E+00	-3.64E+00	-6.6E+00
PENRE [MJ]	1.05E+02	4.45E-01	8.18E+00	4.45E-01	2.05E+00	1.4E+01	-3.92E+01	-7.4E+01
PENRM [MJ]	5.22E+01	-	-	-	-	-	-	-
<b>PENRT [MJ]</b>	1.57E+02	4.45E-01	8.18E+00	4.45E-01	2.05E+00	1.4E+01	-3.92E+01	-7.4E+01
SM [kg]	0	-	-	-	-	-	-	-
RSF [MJ]	0	0	0	0	0	0	0	0
NRSF [MJ]	0	0	0	0	0	0	0	0
FW [m <sup>3</sup> ]	9.52E-02	2.54E-05	5.26E-03	2.54E-05	9.46E-03	3.7E-03	-5.68E-03	-4.9E-02

Caption

PE total = Total use of primary energy resources (=PERT+PENRT); 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:

Declared unit: 1 m <sup>2</sup> installed roofing and waterproofing membrane EVALON® V 1.5 mm								
Declared life cycle stages (standard DIN EN 15978)	PRODUCT STAGE	CONSTRUCTION PROCESS STAGE			END OF LIFE STAGE		BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARYS	
	A1-A3	A4	A5	C2	C3/1	C3/2	D/1	D/2
HWD [kg]	1.26E-02	0.00E+00	1.25E-03	0.00E+00	9.92E-02	0.00E+00	0.00E+00	-5.35E-03
NHWD [kg]	4.46E-01	8.80E-05	2.24E-02	8.80E-05	7.85E-04	8.24E-03	-1.43E-02	-2.29E-01
RWD [kg]	4.83E-03	6.39E-07	2.55E-04	6.39E-07	9.89E-05	1.48E-03	-2.17E-03	-2.12E-03
CRU [kg]	0	0	0	0	0	0	-	-
MFR [kg]	0	0	0	0	0.00E+00	2.10E+00	-	-
MER [kg]	0	0	0	0	2.10E+00	0.00E+00	-	-
EEE [MJ]	-	-	-	-	-	-	7.63E+00	2.12E-01
EET [MJ]	-	-	-	-	-	-	1.83E+01	5.11E-01

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; EE = Exported energy per energy carrier; EEE = Exported energy, electric energy, EET = Exported energy, thermal energy

## Building product disclosure and optimization – sourcing of raw materials

### Intent of this credit

To encourage the use of products and materials for which life cycle information is available and that have environmentally, economically, and socially preferable life cycle impacts. To reward project teams for selecting products verified to have been extracted or sourced in a responsible manner.

Product information for EVALON® V is within this credit:

Option 1. raw material source and extraction reporting	Description / Unit
Third-party verified corporate sustainability report (CSR)?	No CSR, but alwitra has a certified environmental management system according to ISO 14001 ( <a href="#">Certificate Registr. No.: 01 104 000580</a> )
Link to download the report	-
Option 2. leadership extraction practices	Description / Unit
Participation in an extended producer responsibility program?	Yes: Member in "ROOFCOLLECT" – a collection and recycling system for thermoplastic membranes
Bio-based products meet the Sustainable Agriculture Network's Sustainable Agriculture Standard?	Not applicable
Wood products certified by the Forest Stewardship Council or USGBC-approved equivalent?	Not applicable
Postconsumer recycled content	0 % postconsumer recycled content
Preconsumer recycled content	0 % preconsumer recycled content 5-10 % internally recycled raw materials

## Building product disclosure and optimization – material ingredients

### *Intent of this credit*

To encourage the use of products and materials for which life-cycle information is available and that have environmentally, economically, and socially preferable life-cycle impacts. To reward project teams for selecting products for which the chemical ingredients in the product are inventoried using an accepted methodology and for selecting products verified to minimize the use and generation of harmful substances. To reward raw material manufacturers who produce products verified to have improved life-cycle impacts.

Product information for EVALON® V is within this credit:

Type of reporting/Item	Value/Comment
Health Product Declaration	no
Green Screen	no
International Alternative Compliance Path – REACH Optimization	The formulation was checked according to the current REACH candidate list. The formulation does not contain any substances of very high concern (SVHC) and is therefore compliant with REACH.

### Disclaimer

The content of, and results shown in this report are based on data and information submitted by the client. Therefore, thinkstep AG makes no representation or warranty, express or implied, in regard of the correctness or completeness of the content of this document or the results shown.

## ANNEX

Following, the resulting indicators of the life cycle impact assessment, of the resource input as well as of residues and other output flows for 1 m<sup>2</sup> installed roofing and waterproofing membrane EVALON® V 1.2 mm, mechanically fastened or loose laid under ballast are displayed.

### Results of the LCA – ENVIRONMENTAL IMPACTS:

Declared unit: 1 m <sup>2</sup> installed roofing and waterproofing membrane EVALON® V 1.2 mm								
Declared life cycle stages (standard DIN EN 15978)	PRODUCT STAGE	CONSTRUCTION PROCESS STAGE			END OF LIFE STAGE		BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARYS	
	A1-A3	A4	A5	C2	C3/1	C3/2	D/1	D/2
GWP [kg CO <sub>2</sub> -eq.]	5.56E+00	2.65E-02	4.22E-01	2.65E-02	3.13E+00	7.75E-01	-2.09E+00	-2.47E+00
ODP [kg CFC11-eq.]	1.13E-08	5.52E-13	5.71E-10	5.52E-13	4.51E-11	4.17E-10	-6.16E-10	-5.89E-09
AP [kg SO <sub>2</sub> -eq.]	2.03E-02	6.90E-05	1.06E-03	6.90E-05	7.57E-04	1.44E-03	-2.87E-03	-9.26E-03
EP [kg PO <sub>4</sub> <sup>3-</sup> - eq.]	2.41E-03	1.57E-05	1.26E-04	1.57E-05	5.89E-05	1.74E-04	-3.22E-04	-1.12E-03
POCP [kg ethene-eq.]	6.36E-03	-1.97E-05	6.16E-04	-1.97E-05	4.28E-05	4.89E-05	-2.65E-04	-3.31E-03
ADPE [kg Sb eq.]	9.64E-06	1.22E-09	4.86E-07	1.22E-09	4.49E-07	1.16E-07	-2.13E-07	-5.04E-06
ADPF [MJ]	1.20E+02	3.62E-01	6.25E+00	3.62E-01	1.47E+00	8.08E+00	-2.76E+01	-5.62E+01

#### 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:

Declared unit: 1 m <sup>2</sup> installed roofing and waterproofing membrane EVALON® V 1.2 mm								
Declared life cycle stages (standard DIN EN 15978)	PRODUCT STAGE	CONSTRUCTION PROCESS STAGE			END OF LIFE STAGE		BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARYS	
	A1-A3	A4	A5	C2	C3/1	C3/2	D/1	D/2
<b>PE total [MJ]</b>	1.41E+02	3.85E-01	7.39E+00	3.85E-01	1.81E+00	1.31E+01	-3.49E+01	-6.63E+01
PERE [MJ]	1.19E+01	2.15E-02	6.20E-01	2.15E-02	1.40E-01	2.10E+00	-2.96E+00	-5.30E+00
PERM [MJ]	0.00E+00	-	-	-	-	-	-	-
<b>PERT [MJ]</b>	1.19E+01	2.15E-02	6.20E-01	2.15E-02	1.40E-01	2.10E+00	-2.96E+00	-5.30E+00
PENRE [MJ]	8.64E+01	3.63E-01	6.77E+00	3.63E-01	1.67E+00	1.10E+01	-3.19E+01	-6.10E+01
PENRM [MJ]	4.26E+01	-	-	-	-	-	-	-
<b>PENRT [MJ]</b>	1.29E+02	3.63E-01	6.77E+00	3.63E-01	1.67E+00	1.10E+01	-3.19E+01	-6.10E+01
SM [kg]	0.00E+00	-	-	-	-	-	-	-
RSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW [m <sup>3</sup> ]	7.79E-02	2.07E-05	4.26E-03	2.07E-05	7.70E-03	3.00E-03	-4.62E-03	-4.00E-02

Caption

PE total = Total use of primary energy resources (=PERT+PENRT); 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:

Declared unit: 1 m <sup>2</sup> installed roofing and waterproofing membrane EVALON® V 1.2 mm								
Declared life cycle stages (standard DIN EN 15978)	PRODUCT STAGE	CONSTRUCTION PROCESS STAGE			END OF LIFE STAGE		BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARYS	
	A1-A3	A4	A5	C2	C3/1	C3/2	D/1	D/2
HWD [kg]	1.06E-02	0.00E+00	1.04E-03	0.00E+00	8.08E-02	0.00E+00	0.00E+00	-4.35E-03
NHWD [kg]	3.58E-01	7.18E-05	1.80E-02	7.18E-05	6.40E-04	6.71E-03	-1.16E-02	-1.87E-01
RWD [kg]	3.97E-03	5.21E-07	2.12E-04	5.21E-07	8.05E-05	1.20E-03	-1.77E-03	-1.73E-03
CRU [kg]	0	0	0	0	0	0	-	-
MFR [kg]	0	0	0	0	0.00E+00	1.71E+00	-	-
MER [kg]	0	0	0	0	1.71E+00	0.00E+00	-	-
EEE [MJ]	-	-	-	-	-	-	6.21E+00	1.73E-01
EET [MJ]	-	-	-	-	-	-	1.49E+01	4.17E-01

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; EE = Exported energy per energy carrier; EEE = Exported energy, electric energy, EET = Exported energy, thermal energy



alwitra GmbH & Co.

# Product sustainability fact sheet

Following, the resulting indicators of the life cycle impact assessment, of the resource input as well as of residues and other output flows for 1 m<sup>2</sup> installed roofing and waterproofing membrane EVALON® V 1.2 mm - bonded with alwitra adhesive L 40 are displayed.

## Results of the LCA – ENVIRONMENTAL IMPACTS:

Declared unit: 1 m<sup>2</sup> installed roofing and waterproofing membrane EVALON® V 1.2 mm, bonded with alwitra adhesive L40

Declared life cycle stages (standard DIN EN 15978)	PRODUCT STAGE			CONSTRUCTION PROCESS STAGE			END OF LIFE STAGE		BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARYS	
	A1-A3	A4	A5	C2	C3/1	C3/2	D/1	D/2		
GWP [kg CO <sub>2</sub> -eq.]	5.56E+00	2.65E-02	9.82E-01	2.65E-02	3.13E+00	7.75E-01	-2.09E+00	-2.47E+00		
ODP [kg CFC11-eq.]	1.13E-08	5.52E-13	6.11E-10	5.52E-13	4.51E-11	4.17E-10	-6.16E-10	-5.89E-09		
AP [kg SO <sub>2</sub> -eq.]	2.03E-02	6.90E-05	2.38E-03	6.90E-05	7.57E-04	1.44E-03	-2.87E-03	-9.26E-03		
EP [kg PO <sub>4</sub> <sup>3-</sup> - eq.]	2.43E-03	1.57E-05	2.35E-04	1.57E-05	5.89E-05	1.74E-04	-3.22E-04	-1.12E-03		
POCP [kg ethene-eq.]	6.46E-03	-1.97E-05	1.42E-01	-1.97E-05	4.28E-05	4.89E-05	-2.65E-04	-3.31E-03		
ADPE [kg Sb eq.]	9.64E-06	1.22E-09	2.72E-05	1.22E-09	4.49E-07	1.16E-07	-2.13E-07	-5.04E-06		
ADPF [MJ]	1.20E+02	3.62E-01	2.58E+01	3.62E-01	1.47E+00	8.08E+00	-2.76E+01	-5.62E+01		

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

# Product sustainability fact sheet

## Results of the LCA – RESOURCE USE:

Declared unit: 1 m<sup>2</sup> installed roofing and waterproofing membrane EVALON® V 1.2 mm, bonded with alwitra adhesive L40

Declared life cycle stages (standard DIN EN 15978)	PRODUCT STAGE		CONSTRUCTION PROCESS STAGE			END OF LIFE STAGE		BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARYS	
	A1-A3	A4	A5	C2	C3/1	C3/2	D/1	D/2	
<b>PE total [MJ]</b>	1.41E+02	3.85E-01	2.74E+01	3.85E-01	1.81E+00	1.31E+01	-3.49E+01	-6.63E+01	
PERE [MJ]	1.19E+01	2.15E-02	8.33E-01	2.15E-02	1.40E-01	2.10E+00	-2.96E+00	-5.30E+00	
PERM [MJ]	0.00E+00	-	-	-	-	-	-	-	
<b>PERT [MJ]</b>	1.19E+01	2.15E-02	8.33E-01	2.15E-02	1.40E-01	2.10E+00	-2.96E+00	-5.30E+00	
PENRE [MJ]	8.64E+01	3.63E-01	2.66E+01	3.63E-01	1.67E+00	1.10E+01	-3.19E+01	-6.10E+01	
PENRM [MJ]	4.26E+01	-	-	-	-	-	-	-	
<b>PENRT [MJ]</b>	1.29E+02	3.63E-01	2.66E+01	3.63E-01	1.67E+00	1.10E+01	-3.19E+01	-6.10E+01	
SM [kg]	0.00E+00	-	-	-	-	-	-	-	
RSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
NRSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
FW [m <sup>3</sup> ]	7.68E-02	2.07E-05	5.71E-03	2.07E-05	7.70E-03	3.00E-03	-4.62E-03	-4.00E-02	

Caption

PE total = Total use of primary energy resources (=PERT+PENRT); 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:

Declared unit: 1 m<sup>2</sup> installed roofing and waterproofing membrane EVALON® V 1.2 mm, bonded with alwitra adhesive L40

Declared life cycle stages (standard DIN EN 15978)	PRODUCT STAGE			CONSTRUCTION PROCESS STAGE			END OF LIFE STAGE			BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARYS	
	A1-A3	A4	A5	C2	C3/1	C3/2	D/1	D/2			
HWD [kg]	1.06E-02	0.00E+00	1.52E-03	0.00E+00	8.08E-02	0.00E+00	0.00E+00	-4.35E-03			
NHWD [kg]	3.58E-01	7.18E-05	2.00E-02	7.18E-05	6.40E-04	6.71E-03	-1.16E-02	-1.87E-01			
RWD [kg]	3.97E-03	5.21E-07	3.26E-04	5.21E-07	8.05E-05	1.20E-03	-1.77E-03	-1.73E-03			
CRU [kg]	0	0	0	0	0	0	-	-			
MFR [kg]	0	0	0	0	0.00E+00	1.71E+00	-	-			
MER [kg]	0	0	0	0	1.71E+00	0.00E+00	-	-			
EEE [MJ]	-	-	-	-	-	-	6.21E+00	1.73E-01			
EET [MJ]	-	-	-	-	-	-	1.49E+01	4.17E-01			

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; EE = Exported energy per energy carrier; EEE = Exported energy, electric energy, EET = Exported energy, thermal energy

Following, the resulting indicators of the life cycle impact assessment, of the resource input as well as of residues and other output flows for 1 m<sup>2</sup> installed roofing and waterproofing membrane EVALON® V 1.5 mm - bonded with alwitra adhesive L 40 are displayed.

## Results of the LCA – ENVIRONMENTAL IMPACTS:

Declared unit: 1 m<sup>2</sup> installed roofing and waterproofing membrane EVALON® V 1.5 mm, bonded with alwitra adhesive L 40

Declared life cycle stages (standard DIN EN 15978)	PRODUCT STAGE			CONSTRUCTION PROCESS STAGE			END OF LIFE STAGE			BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARYS	
	A1-A3	A4	A5	C2	C3/1	C3/2	D/1	D/2			
GWP [kg CO <sub>2</sub> -eq.]	6.75E+00	3.25E-02	1.07E+00	3.25E-02	3.85E+00	9.51E-01	-2.56E+00	-3.04E+00			
ODP [kg CFC11-eq.]	1.41E-08	6.78E-13	7.51E-10	6.78E-13	5.54E-11	5.12E-10	-7.56E-10	-7.24E-09			
AP [kg SO <sub>2</sub> -eq.]	2.51E-02	8.47E-05	2.62E-03	8.47E-05	9.30E-04	1.77E-03	-3.52E-03	-1.14E-02			
EP [kg PO <sub>4</sub> <sup>3-</sup> -eq.]	3.01E-03	1.92E-05	2.65E-04	1.92E-05	7.24E-05	2.14E-04	-3.96E-04	-1.38E-03			
POCP [kg ethene-eq.]	8.00E-03	-2.42E-05	1.42E-01	-2.42E-05	5.26E-05	6.01E-05	-3.25E-04	-4.06E-03			
ADPE [kg Sb eq.]	1.20E-05	1.50E-09	2.74E-05	1.50E-09	5.51E-07	1.42E-07	-2.61E-07	-6.18E-06			
ADPF [MJ]	1.45E+02	4.44E-01	2.71E+01	4.44E-01	1.81E+00	9.92E+00	-3.39E+01	-6.90E+01			

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

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## Results of the LCA – RESOURCE USE:

Declared unit: 1 m<sup>2</sup> installed roofing and waterproofing membrane EVALON® V 1.5 mm, bonded with alwitra adhesive L 40

Declared life cycle stages (standard DIN EN 15978)	PRODUCT STAGE	CONSTRUCTION PROCESS STAGE			END OF LIFE STAGE			BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARYS	
	A1-A3	A4	A5	C2	C3/1	C3/2	D/1	D/2	
<b>PE total [MJ]</b>	1,72E+02	4,71E-01	2,90E+01	4,71E-01	2,22E+00	1,65E+01	-4,28E+01	-8,06E+01	
PERE [MJ]	1,47E+01	2,64E-02	9,71E-01	2,64E-02	1,73E-01	2,50E+00	-3,64E+00	-6,60E+00	
PERM [MJ]	0,00E+00	-	-	-	-	-	-	-	
<b>PERT [MJ]</b>	1,47E+01	2,64E-02	9,71E-01	2,64E-02	1,73E-01	2,50E+00	-3,64E+00	-6,60E+00	
PENRE [MJ]	1,05E+02	4,45E-01	2,80E+01	4,45E-01	2,05E+00	1,40E+01	-3,92E+01	-7,40E+01	
PENRM [MJ]	5,22E+01	-	-	-	-	-	-	-	
<b>PENRT [MJ]</b>	1,57E+02	4,45E-01	2,80E+01	4,45E-01	2,05E+00	1,40E+01	-3,92E+01	-7,40E+01	
SM [kg]	0,00E+00	-	-	-	-	-	-	-	
RSF [MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	
NRSF [MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	
FW [m <sup>3</sup> ]	9,52E-02	2,54E-05	6,71E-03	2,54E-05	9,46E-03	3,70E-03	-5,68E-03	-4,90E-02	

Caption

PE total = Total use of primary energy resources (=PERT+PENRT); 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:

Declared unit: 1 m<sup>2</sup> installed roofing and waterproofing membrane EVALON® V 1.5 mm, bonded with alwitra adhesive L 40

Declared life cycle stages (standard DIN EN 15978)	PRODUCT STAGE			CONSTRUCTION PROCESS STAGE			END OF LIFE STAGE			BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARYS	
	A1-A3	A4	A5	C2	C3/1	C3/2	D/1	D/2			
HWD [kg]	1.26E-02	0.00E+00	1.73E-03	0.00E+00	9.92E-02	0.00E+00	0.00E+00	0.00E+00	-5.35E-03		
NHWD [kg]	4.46E-01	8.80E-05	2.44E-02	8.80E-05	7.85E-04	8.24E-03	-1.43E-02	-2.29E-01			
RWD [kg]	4.83E-03	6.39E-07	3.69E-04	6.39E-07	9.89E-05	1.48E-03	-2.17E-03	-2.12E-03			
CRU [kg]	0	0	0	0	0	0	-	-			
MFR [kg]	0	0	0	0	0.00E+00	2.10E+00	-	-			
MER [kg]	0	0	0	0	2.10E+00	0.00E+00	-	-			
EEE [MJ]	-	-	-	-	-	-	7.63E+00	2.12E-01			
EET [MJ]	-	-	-	-	-	-	1.83E+01	5.11E-01			

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; EE = Exported energy per energy carrier; EEE = Exported energy, electric energy, EET = Exported energy, thermal energy

Following, the resulting indicators of the life cycle impact assessment, of the resource input as well as of residues and other output flows for 1 m<sup>2</sup> installed roofing and waterproofing membrane EVALON® V 1.2 mm - bonded with alwitra adhesive PUR D are displayed.

## Results of the LCA – ENVIRONMENTAL IMPACTS:

Declared unit: 1 m<sup>2</sup> installed roofing and waterproofing membrane EVALON® V 1.2 mm, bonded with alwitra adhesive PUR D

Declared life cycle stages (standard DIN EN 15978)	PRODUCT STAGE			CONSTRUCTION PROCESS STAGE			END OF LIFE STAGE			BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARYS	
	A1-A3	A4	A5	C2	C3/1	C3/2	D/1	D/2			
GWP [kg CO <sub>2</sub> -eq.]	5.56E+00	2.65E-02	1.07E+00	2.65E-02	3.13E+00	7.75E-01	-2.09E+00	-2.47E+00			
ODP [kg CFC11-eq.]	1.13E-08	5.52E-13	6.79E-10	5.52E-13	4.51E-11	4.17E-10	-6.16E-10	-5.89E-09			
AP [kg SO <sub>2</sub> -eq.]	2.03E-02	6.90E-05	2.21E-03	6.90E-05	7.57E-04	1.44E-03	-2.87E-03	-9.26E-03			
EP [kg PO <sub>4</sub> <sup>3-</sup> -eq.]	2.43E-03	1.57E-05	2.85E-04	1.57E-05	5.89E-05	1.74E-04	-3.22E-04	-1.12E-03			
POCP [kg ethene-eq.]	6.46E-03	-1.97E-05	4.28E-03	-1.97E-05	4.28E-05	4.89E-05	-2.65E-04	-3.31E-03			
ADPE [kg Sb eq.]	9.64E-06	1.22E-09	2.58E-06	1.22E-09	4.49E-07	1.16E-07	-2.13E-07	-5.04E-06			
ADPF [MJ]	1.20E+02	3.62E-01	1.95E+01	3.62E-01	1.47E+00	8.08E+00	-2.76E+01	-5.62E+01			

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

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## Results of the LCA – RESOURCE USE:

Declared unit: 1 m<sup>2</sup> installed roofing and waterproofing membrane EVALON® V 1.2 mm, bonded with alwitra adhesive PUR D

Declared life cycle stages (standard DIN EN 15978)	PRODUCT STAGE		CONSTRUCTION PROCESS STAGE			END OF LIFE STAGE		BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARYS	
	A1-A3	A4	A5	C2	C3/1	C3/2	D/1	D/2	
<b>PE total [MJ]</b>	1.41E+02	3.85E-01	2.18E+01	3.85E-01	1.81E+00	1.31E+01	-3.49E+01	-6.63E+01	
PERE [MJ]	1.19E+01	2.15E-02	1.13E+00	2.15E-02	7.27E-02	2.10E+00	-7.19E-01	-5.30E+00	
PERM [MJ]	0.00E+00	-	-	-	-	-	-	-	
<b>PERT [MJ]</b>	1.19E+01	2.15E-02	1.13E+00	2.15E-02	1.40E-01	2.10E+00	-2.96E+00	-5.30E+00	
PENRE [MJ]	8.64E+01	3.63E-01	2.07E+01	3.63E-01	1.67E+00	1.10E+01	-3.19E+01	-6.10E+01	
PENRM [MJ]	4.26E+01	-	-	-	-	-	-	-	
<b>PENRT [MJ]</b>	1.29E+02	3.63E-01	2.07E+01	3.63E-01	1.67E+00	1.10E+01	-3.19E+01	-6.10E+01	
SM [kg]	0.00E+00	-	-	-	-	-	-	-	
RSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
NRSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	
FW [m <sup>3</sup> ]	7.68E-02	2.07E-05	7.42E-03	2.07E-05	7.70E-03	3.00E-03	-4.62E-03	-4.00E-02	

Caption

PE total = Total use of primary energy resources (=PERT+PENRT); 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:

Declared unit: 1 m<sup>2</sup> installed roofing and waterproofing membrane EVALON® V 1.2 mm, bonded with alwitra adhesive PUR D

Declared life cycle stages (standard DIN EN 15978)	PRODUCT STAGE			CONSTRUCTION PROCESS STAGE			END OF LIFE STAGE			BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARYS	
	A1-A3	A4	A5	C2	C3/1	C3/2	D/1	D/2			
HWD [kg]	1.06E-02	0.00E+00	2.48E-03	0.00E+00	8.08E-02	0.00E+00	0.00E+00	0.00E+00	-4.35E-03		
NHWD [kg]	3.58E-01	7.18E-05	2.46E-02	7.18E-05	6.40E-04	6.71E-03	-1.16E-02	-1.87E-01			
RWD [kg]	3.97E-03	5.21E-07	5.17E-04	5.21E-07	8.05E-05	1.20E-03	-1.77E-03	-1.73E-03			
CRU [kg]	0	0	0	0	0	0	-	-			
MFR [kg]	0	0	0	0	0.00E+00	1.71E+00	-	-			
MER [kg]	0	0	0	0	1.71E+00	0.00E+00	-	-			
EEE [MJ]	-	-	-	-	-	-	6.21E+00	1.73E-01			
EET [MJ]	-	-	-	-	-	-	1.49E+01	4.17E-01			

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; EE = Exported energy per energy carrier; EEE = Exported energy, electric energy, EET = Exported energy, thermal energy

Following, the resulting indicators of the life cycle impact assessment, of the resource input as well as of residues and other output flows for 1 m<sup>2</sup> installed roofing and waterproofing membrane EVALON® V 1.5 mm - bonded with alwitra adhesive PUR D are displayed.

## Results of the LCA – ENVIRONMENTAL IMPACTS:

Declared unit: 1 m<sup>2</sup> installed roofing and waterproofing membrane EVALON® V 1.5 mm, bonded with alwitra adhesive PUR D

Declared life cycle stages (standard DIN EN 15978)	PRODUCT STAGE			CONSTRUCTION PROCESS STAGE			END OF LIFE STAGE			BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARYS	
	A1-A3	A4	A5	C2	C3/1	C3/2	D/1	D/2			
GWP [kg CO <sub>2</sub> -eq.]	6.74E+00	3.25E-02	1.15E+00	3.25E-02	3.85E+00	9.51E-01	-2.56E+00	-3.04E+00			
ODP [kg CFC11-eq.]	1.41E-08	6.78E-13	8.19E-10	6.78E-13	5.54E-11	5.12E-10	-7.56E-10	-7.24E-09			
AP [kg SO <sub>2</sub> -eq.]	2.51E-02	8.47E-05	2.45E-03	8.47E-05	9.30E-04	1.77E-03	-3.52E-03	-1.14E-02			
EP [kg PO <sub>4</sub> <sup>3-</sup> -eq.]	3.01E-03	1.92E-05	3.14E-04	1.92E-05	7.24E-05	2.14E-04	-3.96E-04	-1.38E-03			
POCP [kg ethene-eq.]	8.00E-03	-2.42E-05	4.36E-03	-2.42E-05	5.26E-05	6.01E-05	-3.25E-04	-4.06E-03			
ADPE [kg Sb eq.]	1.20E-05	1.50E-09	2.70E-06	1.50E-09	5.51E-07	1.42E-07	-2.61E-07	-6.18E-06			
ADPF [MJ]	1.45E+02	4.44E-01	2.08E+01	4.44E-01	1.81E+00	9.92E+00	-3.39E+01	-6.90E+01			

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

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## Results of the LCA – RESOURCE USE:

Declared unit: 1 m<sup>2</sup> installed roofing and waterproofing membrane EVALON® V 1.5 mm, bonded with alwitra adhesive PUR D

Declared life cycle stages (standard DIN EN 15978)	PRODUCT STAGE			CONSTRUCTION PROCESS STAGE			END OF LIFE STAGE		BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARYS	
	A1-A3	A4	A5	C2	C3/1	C3/2	D/1	D/2		
<b>PE total [MJ]</b>	1.72E+02	4.71E-01	2.34E+01	4.71E-01	2.22E+00	1.65E+01	-4.28E+01	-8.06E+01		
PERE [MJ]	1.47E+01	2.64E-02	1.27E+00	2.64E-02	1.73E-01	2.50E+00	-3.64E+00	-6.60E+00		
PERM [MJ]	0.00E+00	-	-	-	-	-	-	-		
<b>PERT [MJ]</b>	1.47E+01	2.64E-02	1.27E+00	2.64E-02	1.73E-01	2.50E+00	-3.64E+00	-6.60E+00		
PENRE [MJ]	1.05E+02	4.45E-01	2.21E+01	4.45E-01	2.05E+00	1.40E+01	-3.92E+01	-7.40E+01		
PENRM [MJ]	5.22E+01	-	-	-	-	-	-	-		
<b>PENRT [MJ]</b>	1.57E+02	4.45E-01	2.21E+01	4.45E-01	2.05E+00	1.40E+01	-3.92E+01	-7.40E+01		
SM [kg]	0.00E+00	-	-	-	-	-	-	-		
RSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
NRSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00		
FW [m <sup>3</sup> ]	9.67E-02	2.54E-05	8.48E-03	2.54E-05	9.46E-03	3.70E-03	-5.68E-03	-4.90E-02		

Caption

PE total = Total use of primary energy resources (=PERT+PENRT); 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



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## Results of the LCA – OUTPUT FLOWS AND WASTE CATEGORIES:

Declared unit: 1 m<sup>2</sup> installed roofing and waterproofing membrane EVALON® V 1.5 mm, bonded with alwitra adhesive PUR D

Declared life cycle stages (standard DIN EN 15978)	PRODUCT STAGE			CONSTRUCTION PROCESS STAGE			END OF LIFE STAGE			BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARYS	
	A1-A3	A4	A5	C2	C3/1	C3/2	D/1	D/2			
HWD [kg]	1.26E-02	0.00E+00	2.69E-03	0.00E+00	9.92E-02	0.00E+00	0.00E+00	-5.35E-03			
NHWD [kg]	4.46E-01	8.80E-05	2.90E-02	8.80E-05	7.85E-04	8.24E-03	-1.43E-02	-2.29E-01			
RWD [kg]	4.83E-03	6.39E-07	5.60E-04	6.39E-07	9.89E-05	1.48E-03	-2.17E-03	-2.12E-03			
CRU [kg]	0	0	0	0	0	0	-	-			
MFR [kg]	0	0	0	0	0.00E+00	2.10E+00	-	-			
MER [kg]	0	0	0	0	2.10E+00	0.00E+00	-	-			
EEE [MJ]	-	-	-	-	-	-	7.63E+00	2.12E-01			
EET [MJ]	-	-	-	-	-	-	1.83E+01	5.11E-01			

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; EE = Exported energy per energy carrier; EEE = Exported energy, electric energy, EET = Exported energy, thermal energy