ENVIRONMENTAL PRODUCT DECLARATION

in compliance with ISO 14025 and EN 15804

Owner of the Declaration	**Paul Bauder GmbH & Co. KG**
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Program Holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration Number	EPD-BAU-20130189-IBCC-EN
Date of Issue	26 September 2013
Valid until	25 September 2018

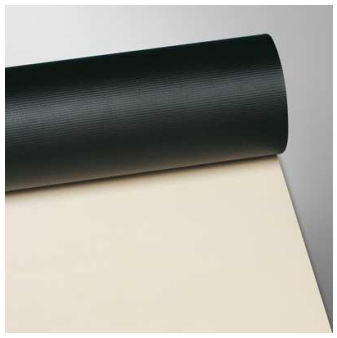
FPO Roofing and Waterproofing Membranes

BauderTHERMOPLAN

Paul Bauder GmbH & Co. KG

Institut Bauen
und Umwelt e.V.

www.bau-umwelt.com



1. General Information

Paul Bauder GmbH & Co. KG

Program Holder
IBU - Institut Bauen und Umwelt e.V.
Panoramastr. 1
D-10178 Berlin

Declaration Number
EPD-BAU-20130189-IBCC-DE

This declaration is based on the product category rules:
Roofing and Waterproofing Membrane Systems of synthetic material and elastomer, 07-2013
(PCR tested and approved by the independent committee of experts)

Issue Date
26 September 2013

Valid to
25 September 2018

Prof. Dr.-Ing. Horst J. Bossenmayer
(President of Institut Bauen und Umwelt e.V.)

Prof. Dr.-Ing. Hans-Wolf Reinhardt
(SVA Chairman)

FPO Synthetic Roofing Membranes THERMOPLAN

Owner of the Declaration
Paul Bauder GmbH & Co. KG
Korntaler Landstraße 63
D-70499 Stuttgart

Declared Product / Declared Unit
The declared unit is one square meter (1 m²) of the mechanically fastened or ballasted, hot-air welded THERMOPLAN FPO roofing and waterproofing membranes, including packaging materials.

Scope:
This document applies to the FPO roofing and waterproofing membranes:

- BauderTHERMOPLAN T (12/15/16/18/20),
- BauderTHERMOPLAN T (15/18/20) V

manufactured in the German BAUDER production facilities in Schwepnitz (Data basis 2012).

The Declaration Holder is liable for the underlying data and supporting evidence for this document.

Verification

The CEN Norm EN 15804 serves as core PCR.
Verification of EPD by an objective third party in compliance with ISO 14025
☐ internal ☒ external

Matthias Schulz
(Independent auditor contracted by SVA)

2. Product

2.1 Product Description

BauderTHERMOPLAN is FPO (Flexible Polyolefin) roofing and waterproofing membranes with a reinforcing insert of synthetic fibers. The product palette is divided into the following variants:

- ***BauderTHERMOPLAN T (12/15/16/18/20)***
  core polyester reinforcement
- ***BauderTHERMOPLAN T (15/18/20) V***
  core polyester reinforcement, backed with special fleece

The reported results declare an average for all THERMOPLAN products. The average is based on the relevant production quantity (in terms of produced surface area) for the calendar year 2012.

2.2 Application

The FPO roofing and waterproofing membranes are installed in a single layer (single-ply) and the seams sealed by hot-air welding. Mechanical fastening, ballast or bonding is used to safeguard against wind suction.

Roofing seal – Single-ply seal for used and unused areas of flat and pitched roofs.

Waterproofing of buildings – Single-ply seal of non-watertight buildings and components against non-pressing water on floors.

BauderTHERMOPLAN roofing and waterproofing membranes are installed depending on requirements:

- mechanically fastened,
- ballasted or
- bonded.

2.3 Technical Data

Parameter	Testing Method	Unit	Requirement
Watertightness for Type B	DIN EN 1928 Method B	kPa / 72h	Passed
Peel resistance of joint	DIN EN 12316-2	N / 50 mm	≥ 300
Shear resistance of joint	DIN EN 12317-2	N / 50 mm	≥ 500, demolition outside the joints
Maximum tensile force	DIN EN 12311-2 A	N / 50 mm	longitudinal: ≥ 1200 transverse: ≥ 1200
Elongation at max. tensile force	DIN EN 12311-2 A	%	longitudinal: ≥ 19 transverse: ≥ 19
Tear propagation resistance	DIN EN 12310-2	N	> 320
Root resistance	DIN EN 13948/FLL	-	FLL fulfilled
Dimensional stability	DIN EN 1107-2	%	< 0,3

Parameter	Testing Method	Unit	Requirement
Cold seaming	DIN EN 495-5	°C	< - 30
UV radiation (1000h)	DIN EN 1297	-	fulfilled > 5000h
Vapor permeance µ	DIN EN 1931	-	about 200.000
Reaction to bitumen	DIN EN 1548	-	complies with DIN EN 13956 Ab. 5.2.1.8 Method B

2.4 Placing in the market /Application rules

Regulation EU Nr. 305/2011 for the marketing of construction products applies. The products require a performance declaration that takes into consideration harmonized specifications and CE marking.

National regulations apply for the use of the products.

Roofing membranes

in compliance with DIN EN 13956 and usage standard DIN V 20000-201:

- BauderTHERMOPLAN T 12/15/16/18/20 DE/E1 FPO-BV-V-PG-1.2 (1.5/1.6/1.8/2.0)
- BauderTHERMOPLAN T 15/18/20 V DE/E1 FPO-BV-V-PG-K-KV- 1.5 (1.8/2.0)

Waterproofing membranes

in compliance with DIN EN 13967 and usage standard DIN V 20000-202:

- BauderTHERMOPLAN T 12/15/16/18/20 BA FPO-BV-V-PG-1.2 (1.5/1.6/1.8/2.0)
- BauderTHERMOPLAN T 15/18/20 V BA FPO-BV-V-PG-K-KV- 1.5 (1.8/2.0)

2.5 Delivery status

FPO roofing and waterproofing membranes are rolled around cardboard sleeves. Each roll is covered with a protective foil and shipped on Euro pallets from the factory. THERMOPLAN variants have the following dimensions:

Variant	Length [m]	Width [m]	Thick-ness [mm]	Color
T12	25	1.5 - 2.0	1.2	pearl white, silver gray
T15	20	1.5 - 2.0	1.5	pearl white, silver gray
T16	20	2.0	1.6	pearl white, silver gray
T18	15 - 20	1.5 - 2.0	1.8	pearl white, silver gray, black
T20	15 - 20	1.5 - 2.0	2.0	pearl white, silver gray
T15V	20	1.5	1.5 + fleece	pearl white, silver gray
T18V	20	1.5	1.8 + fleece	pearl white, silver gray
T20V	20	1.5	2.0 + fleece	pearl white, silver gray
T pre-cut strips	20	0.2 - 1.0	1.2 - 2.0	pearl white, silver gray

2.6 Base materials / Ancillary materials

Material	Elements	Proportion (Mass %)
Polymer	Basis polymer / generated by polymerization of propylene (synthesis)	45 - 55 %
Stabilizers	Phosphite und phenol derivatives for thermal and long-term protection / synthesis	1 - 2 %
Additives	Processing aids or dispersants / synthesis	1 - 2 %
Flame retardant	Aluminum trihydroxide to reduce combustibility / synthesis	40 - 50 %
Finish / Color	Titanium dioxide for white pigment and UV protection and organic or inorganic pigments / synthesis	1 - 2 %
Recycled material	Edge trimming; refuse / accrues during production	0 - 6 %

2.7 Manufacture

A single-stage process is used in the production of FPO roofing and waterproofing membranes.
The mixing and plasticizing of the raw materials onto extruders take place separately for upper and lower sheets.
The polyester reinforcement is placed on the lower sheet and then covered with the upper sheet.
Part of the FPO roofing and waterproofing membranes is backed with special fleece.
Once the membranes have cooled, they are trimmed and packed.
All incurred production waste is recycled and reintroduced directly into the manufacturing process.
Use of a quality management system in compliance with DIN EN ISO 9001 guarantees permanent measurement of product quality and continuous improvement of internal processes.

2.8 Environment and health during manufacturing

The Maximum Allowable Concentration (MAC) during production is regularly monitored and maintained. In addition to the general industrial safety standards, preventive measures are offered and implemented.
National and factory-specific requirements for environmental protection are observed during the manufacturing process. Water used to cool the product is recirculated in order to achieve optimal use of raw material.

2.9 Product processing/Installation

FPO roofing and waterproofing membranes can be installed in the following ways:

- ***Loosely laid, mechanically fastened***

The products are loosely laid and then mechanically fastened with approved fastening elements at the edges or on the open field area. The seams (membrane overlaps) and trim are hot-air welded.

- ***Loosely laid, ballasted***

The products are loosely laid and then secured with ballast of vegetation (green roof), gravel or paving. Seams are sealed with hot-air welding.

- ***Bonded***

The fleece-backed products are partially or fully bonded with 1-K-PU adhesive to the substrate. The seams (membrane overlaps) and trim are hot-air welded.

In all types of installation the relevant standards and guidelines (e.g., DIN 18531, DIN 18195 and technical guidelines of the German Roofing Industry – flat roof guidelines) and installation instructions and manufacturer's information are to be observed.

Remnants from FPO roofing and waterproofing membranes can be reused or disposed of as mixed building and demolition waste (waste disposal code 17 09 04 as per List of Wastes Ordinance (AVV).

2.10 Packaging
The FPO roofing and waterproofing membranes are wrapped around cardboard sleeves, individually packaged in PE protective foil and delivered on wooden pallets. PE stretch foils are used to secure the load. All packaging materials are recyclable.
Single-variety collections are taken back and recycled by INTERSEROH (INTERSEROH Certificate 27113).

2.11 Condition of use
During the period of use, no changes occur in the materials in the FPO roofing and waterproofing membranes.

2.12 Environmental and health during use
During use the FPO roofing and waterproofing membranes have no negative impact on the environment or the health of the user.

2.13 Service life
The service life depends on the thickness of the roofing and waterproofing membrane and the utilized surface protection (gravel, vegetation).
The expected service life of properly installed Bauder THERMOPLAN T20 is more than 40 years.

2.14 Extraordinary effects
Fire

Parameter	Test Method	Requirement
Exposure to external fire	DIN V ENV 1187	passed*
Reaction to fire	DIN EN ISO 11925-2	Class E as per DIN EN 13501-1

* In defined roof structures

Fire Protection

Designation	Value
Building material class	E
Burning droplets	-
Toxic gas development	-

Water
When properly used, the declared FPO roofing and waterproofing membranes are water insoluble and water resistant. Watertightness is tested for compliance with DIN EN 1928.

Mechanical Destruction
No environmentally harmful products and no hazardous waste are generated by the destruction of FPO roofing and waterproofing membranes.

2.15 Re-use phase
FPO roofing and waterproofing membranes are dismantled and recycled at the end of their useful life. Loosely laid roof structures are suitable for single-variety dismantling. Adhesive residue and fleece particles are unavoidable with bonded roof structures. Once the membranes have been thoroughly cleaned, the materials can be separated and crushed for recycling. Then used plastics can be returned to the material cycle.

Thermal recycling is an option at the end of the product's service life. The energy contained in the declared product can be recovered through the use of an incinerator.

2.16 Disposal
A list of waste disposal codes as per the European Waste Catalogue and List of Wastes Ordinance for the individual product components follows.

Packaging
INTERSEHROH AG handles disposal of packaging materials. The packaging components that accrue during installation in a building have the following waste disposal codes:

- EAK 15 01 01: Paper and cardboard packaging
- EAK 15 01 02: Plastic packaging
- EAK 15 01 03: Wooden packaging

End of Life
The product has the following waste disposal code at the end of its life:

- EAK 17 09 04: Mixed building and demolition waste, except for those with the codes 17 09 01, 17 09 02 and 17 09 03.

Recycling is generally preferred over disposal (incineration).

2.17 Further information
Contact information is on the back page of this declaration. Additional product information is available as an online download. Product-specific BAUDER accessories also are available online at www.bauder.de.

3. LCA: Calculation Rules

3.1 Declared Unit
The declared unit is the average for one square meter (1 m²) of the mechanically fastened or ballasted, hot-air welded THERMOPLAN FPO Roofing and Waterproofing Membranes, variants T (12/15/16/18/20) and T (15/18/20) V, including packaging materials. Data have been weighted according to production volume for 2012.

Description	Value	Unit
Declared unit	1	m²
Surface weight	2.210	kg/m²
Conversion factor to 1 kg	0.452	m²/kg

3.2 System boundary
Type of EPD: Cradle to Gate (with options).

In accordance with EN 15804, the following modules were used:
Module A1-3
All upstream chains of utilized raw materials and materials and their procurement transport. Production processes including energy and waste flows (Cradle to Gate). Incurred wastes are accounted for up till End of Waste status.

Module A4-5
Transportation to the building site and average installation expenditure (hot air welding and accrued scrap). Recycling of packaging materials. Fastening material is not part of the examined product system. Refer to separate EPDs for the products and materials (metal/plastic) used.

Module C2
Transportation to waste management at End of Life.

Module C3
Recycling of product, including pre-processing.

Module C4
Thermal recycling (incineration) to reduce waste volume for disposal.

Module D
Credits from waste treatment in Modules A5, C3 and C4.

3.3 Estimates and assumptions
No estimates or assumptions were made that are relevant for the interpretation of LCA results.

3.4 Cut-off criteria
All incoming material and energy flows without exception were taken into consideration. Therefore, it may be assumed that the portion of neglected results from impact categories does not exceed 5%.

3.5 Background data
Modeling of the life cycle utilized the current version of the GaBi (GaBi 6) software system for Life Cycle Assessment. All background data records were retrieved from the GaBi database and the ecoinvent database (Version 2.2).

3.6 Data quality
The background data records from the GaBi database were from the reference year 2010 and the utilized ecoinvent data records were from 1995 to 2002. Some data records therefore were older than 10 years, but are still considered the most suitable available data for modeling the examined product system. Based on past experience, the ecoinvent data records in general are considered conservative.

Data for the examined product were captured by means of analyses of internal production and environmental data and of LCA-relevant data within the supply chain. The collected data were checked for plausibility and consistency, allowing for the assumption of a good representative sample.

3.7 Period under review
Data were collected during the analysis period from 1 January 2012 to 31 December 2012.

3.8 Allocation
The material input and output flows were captured on the basis of corresponding production quantities. The energy input and output flows based on total quantities from 2012 were taken into account and allocated according to measured consumption in production.
The credits from Modules A5 and C3 are shown in Module D-1 and credits from Modules A5 and C4 in Module D-2.

3.9 Comparability
A comparison or assessment of EPD data is possible only when all data records are created according to DIN EN 15804 and the building context or the product-specific performance characteristics are taken into consideration.

4. LCA: Scenarios and Additional Technical Information

Transport to the construction site (A4)

Transport means	Truck 17.3 tons load capacity, Euro 3
Transport distance	517 km
Utilization (including empty trips)	85 %

The transport distance was modeled on average distance to customer base. European data records were used for the European distribution channels.

Installation in the building (A5)

Installation expenditure:

Energy for hot air welding	0.0207 kWh/m²
Material loss during installation	1%

Energy consumption for hot air is measured; information about material loss is based on experience. Other information is not relevant to the installation.

Disposal transport:

Transport means:	Truck 17.3 tons load capacity, Euro 3
Transport distance:	75 km
Utilization (including empty trips)	85 %

Data records representing a European average are used.

Reference service life

Service life	35 years

Transport to disposal (C2)

Transport means	: Truck 17.3 tons load capacity, Euro 3

Scenario 1:

Transport distance (C3)	250 km

Scenario 2:

Transport distance (C4)	75 km
Utilization (including empty trips)	85 %

Distance modeling took into account the availability of waste management companies for Scenario 1 and 2 based on estimated values. Data records representing a European average are used.

End-of-Life stages (C3-C4)

Scenario 1:

Recycling (C3)	100 %

Scenario 2:

Energy recovery (C4)	100 %

For the modeling of End of Life (EoL), each scenario was calculated at 100%, but each may also be expressed proportionally (e.g., Scenario 1 = 30% / Scenario 2 = 70%).
The processes in EoL were modeled with data records representing a European average. Intra-Europe transport and recovery rates were taken into account.

Reuse, recovery and recycling potential (D)
Module D shows credits for the product's energy recovery in EoL (resulting from Modules C3 and C4) and for packaging materials (resulting from Module A5). To allow for separate views of the EoL scenarios, figures are shown in the Modules D-1 (credits from Scenario 1) and D-2 (credits from Scenario 2).

5. LCA: Results

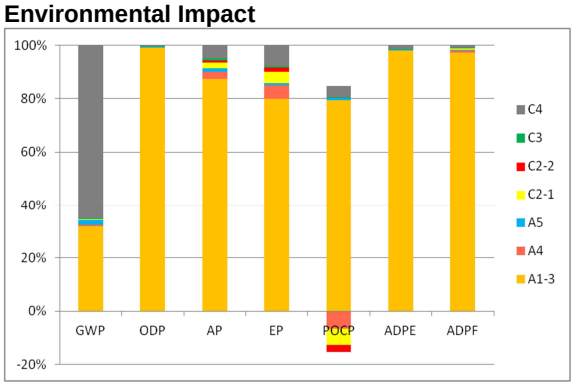
Raw material supply	Transport	Manufac-turing	Transport from gate to site	Assembly	Use	Mainte-nance	Repair	Replace-ment	Refurbish-ment	Operation-al energy use	Operation-al water use	De-con-struction / demolition	Transport	Waste processing	Disposal	Re-use, recovery, recycling potential
A1	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
X	X	X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X

Parameter	Unit	A1-3	A4	A5	C2-1	C2-2	C3	C4	D-1	D-2
LCA RESLTS: ENVIRONMENTAL IMPACT of 1 m² BauderTHERMOPLAN T(12/15/16/18/20) and T (15/18/20) V										
Global Warming Potential (GWP)	[kg CO_2 equiv.]	3.11E+00	5.42E-02	1.72E-01	2.97E-02	1.19E-02	1.47E-02	6.36E+00	-3.13E+00	-3.69E+00
Depletion potential of the stratospheric ozone layer (ODP)	[kg CFC11 equiv.]	6.49E-09	9.48E-13	2.12E-11	5.27E-13	2.17E-13	1.32E-11	2.79E-11	-4.09E-10	-3.13E-11
Acidification potential of land and water (AP)	[kg SO_2 equiv.]	8.15E-03	2.46E-04	1.23E-04	1.91E-04	7.68E-05	6.96E-05	4.58E-04	-6.66E-03	-3.46E-03
Eutrophication Potential (EP)	[kg PO_4^{3-} equiv.]	8.78E-04	5.67E-05	8.99E-06	4.60E-05	1.86E-05	3.67E-06	8.67E-05	-5.12E-04	-4.16E-04
Formation potential of tropospheric ozone photochemical oxidants (POCP)	[kg ethylene equiv.]	9.92E-04	-8.07E-05	8.21E-06	-7.78E-05	-3.14E-05	4.10E-06	5.45E-05	-1.13E-03	-4.69E-04
Abiotic Depletion Potential for non fossil resources (ADPE)	[kg Sb equiv.]	1.95E-06	2.02E-09	4.64E-09	1.13E-09	4.67E-10	2.02E-09	3.05E-08	-8.64E-07	-1.70E-07
Abiotic Depletion Potential for fossil resources (ADPF)	[MJ]	9.79E+01	7.51E-01	4.31E-01	4.11E-01	1.65E-01	2.59E-01	8.11E-01	-1.24E+02	-6.04E+01
LCA RESULTS: RESOURCE UTILIZATION for 1 m² BauderTHERMOPLAN T(12/15/16/18/20) and T (15/18/20) V										
Renewable primary energy as energy carrier (PERE)	[MJ]	4.52E+00	2.95E-02	6.64E-02	1.68E-02	7.15E-03	4.32E-02	6.19E-02	-1.90E+00	-9.01E-02
Renewable primary energy resources as material utilization (PERM)	[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	0.00E+00
Total use of renewable primary energy resources (PERT)	*[MJ]*	*4.52E+00*	*2.95E-02*	*6.64E-02*	*1.68E-02*	*7.15E-03*	*4.32E-02*	*6.19E-02*	*-1.90E+00*	*-9.01E-02*
Non renewable primary energy as energy carrier (PENRE)	[MJ]	9.80E+01	7.51E-01	4.32E-01	4.11E-01	1.65E-01	2.60E-01	8.12E-01	-1.24E+02	-6.04E+01
Non renewable primary energy as material utilization (PENRM)	[MJ]	2.17E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of non renewable primary energy resources *(PENRT)*	*[MJ]*	*9.80E+01*	*7.51E-01*	*4.32E-01*	*4.11E-01*	*1.65E-01*	*2.60E-01*	*8.12E-01*	*-1.24E+02*	*-6.04E+01*
Use of secondary material (SM)	[kg]	1.10E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels (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	0.00E+00
Use of non renewable secondary fuels (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	0.00E+00
Use of net fresh water (FW)	[m³]	-	-	-	-	-	-	-	-	-
LCA RESULTS: OUTPUT FLOWS AND WASTE CATEGORIES for 1 m² BauderTHERMOPLAN T(12/15/16/18/20) and T (15/18/20) V										
Hazardous Waste Disposed (HWD)	[kg]	-	-	-	-	-	-	-	-	-
Non-Hazardous Waste Disposed (NHWD)	[kg]	-	-	-	-	-	-	-	-	-
Radioactive Waste Disposed (RWD)	[kg]	-	-	-	-	-	-	-	-	-
Components for Re-Use (CRU)	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials For Recycling (MFR)	[kg]	1.10E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.92E+00	0.00E+00	0.00E+00	0.00E+00
Materials for Energy Recovery (MER)	[kg]	6.27E-02	0.00E+00	7.06E-02	0.00E+00	0.00E+00	0.00E+00	2.10E+00	0.00E+00	0.00E+00
Exported Electrical Energy (EEE)	[MJ]	3.72E-01	0.00E+00	2.39E-01	0.00E+00	0.00E+00	0.00E+00	1.21E+01	0.00E+00	0.00E+00
Exported Thermal Energy (ETE)	[MJ]	8.98E-01	0.00E+00	6.57E-01	0.00E+00	0.00E+00	0.00E+00	3.30E+01	0.00E+00	0.00E+00

6. LCA: Interpretation

Results from Module D are not included in the interpretation because they involve expenditures and credits related to a downstream product system.

Environmental Impact



Module A1-3 has a dominant influence on almost every environmental impact. In the following paragraphs the environmental impact is analyzed using the example of Global Warming Potential (GWP) in order to identify the responsible sources throughout the life cycle.
The manufacturing phase (**Module A1-3**) has a share of about 30% of total GWP. The produced FPO mixture dominates with up to 90% of the total emissions in this module. Once again the value drivers here are the PP/EPDM granules with about 55% and electricity consumption with about 15%. The calendering of the FPO Roofing and Waterproofing Membranes amounts to nearly 5% of the manufacturing phase. In this aspect the reinforcements and PET fleece play as small a role as the packaging.
Transportation to the customer is not of great environmental relevance (**A4**). Product installation at the building site (**A5**), for which packaging materials are used and power is consumed for hot-air welding, makes a small but notable contribution to the impact.
Disposal transportation (**C2-1 / C-2**) has hardly any effect on the result. The recycling of the product at EoL likewise has hardly any environmental impact (**C3**), while the disposal of the product and associated emissions from the incinerator (**C4**) make a significantly high contribution (about 65%) to the total. In the remaining CML categories, thermal waste recycling also claims a notable share, but does not dominate the overall result as significantly as in GWP.

Resource Utilization

Primary energy
On the whole, results are dominated by the non-renewable share of renewable energies.
Module **A1-3** decisively dominates (at about 98.5%) the energy balance sheet throughout the entire life cycle. The downstream chains of raw and auxiliary materials are responsible for the most part. The manufacturing alone of the FPO compound amounts to 85% and electricity use another 10%. Within the compound the utilized plastic granules account for nearly 85% and the color/finish (including granule portion) about 5%. The calendering of the FPO Roofing and Waterproofing Membranes claims a share of 3.5% and the packaging about 1.5%.
Product installation (**A5**), for which the incinerator route was modeled and the energy use for sealing the roofing and waterproofing was measured, accounted for <0.1%.
Neither the recycling route (**C3**) (<0.9%) nor the incineration route (**C4**) (<0.7%) have a notable effect on the overall result. The same applies to transportation (**A4, C2-1** and **C2-2**), which has a share of almost 2%.

Water Use
*N/A**

Waste Categories
*N/A**

** According to the SVA decision of 4 October 2012, no statement can be made regarding Water and Waste Indicators if non-EN15804-compliant data records exceed 3% of records. Because data records to that extent were used in the analyzed product system, unintended misinterpretations ought to be precluded by non-disclosure of results.*

7. Requisite Evidence

No evidence required.

8. References

Institut Bauen und Umwelt 2011: Institut Bauen und Umwelt e.V., Berlin (publisher): Creation of Environmental Product Declarations (EDP); EDP program fundamentals of the Institut Bauen und Umwelt e.V. (IBU), 2011-09.
www.bau-umwelt.de

PCR 2013, Part A: Institut Bauen und Umwelt e.V., Berlin (publisher.): Product Category Rules for building products from the program for environmental product declarations of the Institut Bauen und Umwelt (IBU), Part A: Calculation rules for Life Cycle Assessment and requirements for background report, 2013-04.

PCR 2013, Part B: Institut Bauen und Umwelt e.V., Berlin (publisher): PCR instructions for building products and services in the building product group roofing and waterproofing membrane systems of synthetics and elastomer, 2013-07.

Forschungsgesellschaft Landschaftsentwicklung Landschaftsbau (FLL Guidelines): Green-roof Guidelines 2008: FLL procedure for investigating resistance to root penetration at green-roof sites; 2008.

DIN EN 495-5: Flexible sheets for waterproofing – Determination of foldability at low temperature – Part 5: Plastic and rubber sheets for roof waterproofing; German Version EN 495-5:2012.

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

DIN V ENV 1187: Test methods for external fire exposure to roofs; German Version; ENV 1187:2002 + A1:2005, 2006-10.

DIN EN 1296: Flexible sheets for waterproofing - Bitumen, plastic and rubber sheets for roof waterproofing - Method for artificial ageing by long term exposure to elevated temperature; German version EN 1296:2000.

DIN EN 1297: 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; German version EN 1297:2004.

DIN EN 1548: Flexible sheets for waterproofing - Plastic and rubber sheets for roof waterproofing - Method for exposure to bitumen; German version EN 1548:2007.

DIN EN 1928: Flexible sheets for waterproofing - Bitumen, plastic and rubber sheets for roof waterproofing - Determination of watertightness; German version EN 1928:2000.

DIN EN 1931: Flexible sheets for waterproofing - Bitumen, plastic and rubber sheets for roof waterproofing - Determination of water vapour transmission properties; German version EN 1931:2000.

DIN EN ISO 9001: Quality Management System - Requirements (ISO 9001:2008); trilingual version EN ISO 9001:2008.

DIN EN ISO 11925-2: Reaction to fire tests - Ignitability of products subjected to direct impingement of flame - Part 2: Single-flame source test (ISO 11925-2:2010); German version EN ISO 11925-2:2010.

DIN EN 12310-2: Flexible sheets for waterproofing - Determination of resistance to tearing - Part 2: Plastic and rubber sheets for roof waterproofing; German version EN 12310-2:2000.

DIN EN 12311-2: Flexible sheets for waterproofing - Determination of tensile properties - Part 2: Plastic and rubber sheets for roof waterproofing; German version EN 12311-2:2010.

DIN EN 12316-2: Flexible sheets for waterproofing - Determination of peel resistance of joints - Part 2: Plastic and rubber sheets for roof waterproofing; German version EN 12316-2:2013.

DIN EN 12317-2: Flexible sheets for waterproofing - Determination of shear resistance of joints - Part 2: Plastic and rubber sheets for roof waterproofing; German version EN 12317-2:2010.

DIN EN 13501-1: Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests; German version EN 13501-1:2007+A1:2009.

DIN EN 13948: Flexible sheets for waterproofing - Bitumen, plastic and rubber sheets for roof waterproofing - Determination of resistance to root penetration; German version EN 13948:2007.

DIN EN 13956: Flexible sheets for waterproofing - Plastic and rubber sheets for roof waterproofing - Definitions and characteristics; German version FprEN 13956.

DIN EN 13967: Flexible sheets for waterproofing - Plastic and rubber damp proof sheets including plastic and rubber basement tanking sheet - Definitions and characteristics; German version EN 13967:2012.

DIN EN ISO 14025: Environmental labels and declarations - Type III environmental declarations - Principles and procedures (ISO 14025:2006); German and English version EN ISO 14025:2011.

DIN EN 14909: Flexible sheets for waterproofing - Plastic and rubber damp proof courses - Definitions and characteristics; German version EN 14909:2012.

DIN EN 15804: Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products; German version EN 15804:2012.

DIN 18195-1: Waterproofing of buildings - Part 1: Principles, definitions, attribution of waterproofing types; 2011-12.

DIN 18195-2: Waterproofing of buildings - Part 2: Materials; 2009-04.

DIN 18195-3: Waterproofing of buildings - Part 3: Requirements of the ground and working properties of materials; 2011-12.

DIN 18195-4: Waterproofing of buildings - Part 4: Waterproofing against ground moisture (Capillary water, retained water) and non-accumulating seepage water under floor slabs on walls, design and execution; 2011-12.

DIN 18195-5: Waterproofing of buildings - Part 5: Water-proofing against non-pressing water on floors and in wet areas, design and execution; 2011-12.

DIN 18195-6: Waterproofing of buildings - Part 6: Proofing against outside pressing water and accumulating seepage water, design and execution; 2011-12.

DIN 18195-7: Waterproofing of buildings - Part 7: Water-proofing against pressing water from the inside, dimensioning and execution; 2009-07.

DIN 18195-8: Waterproofing of buildings - Part 8: Water-proofing over joints for movements; 2011-12.

DIN 18195-9: Waterproofing of buildings - Part 9: Penetrations, transitions, connections and endings; 2010-05.

DIN 18195-10: Waterproofing of buildings - Part 10: Protective layers and protective measures; 2011-12.

DIN 18531-1: Waterproofing of roofs - Sealings for non-utilized roofs - Part 1: Terms and definitions, requirements, design principles; 2010-05.

DIN 18531-2: Waterproofing of roofs - Sealings for non-utilized roofs - Part 2: Materials; 2010-05.

DIN 18531-3: Waterproofing of roofs - Sealings for non-utilized roofs - Part 3: Design, handling of materials, execution of sealings; 2010-05.

DIN 18531-4: Waterproofing of roofs - Sealings for non-utilized roofs - Part 4: Maintenance; 2010-05.

DIN V 20000-201: 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; 2006-11.

DIN V 20000-202: 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; 2007-12.

Ecoinvent: Life Cycle Inventory database, Version 2.2. Swiss Centre for Life Cycle Inventories, St. Gallen.

GaBi 6: Software and Database for Life Cycle Engineering, IKP [Institute for Polymer Testing and Polymer Science] University of Stuttgart and PE Europe AG, Leinfelden-Echterdingen, 2012.

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