

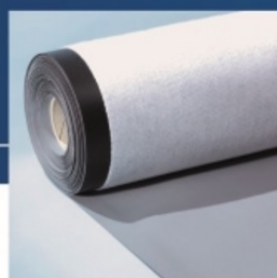
ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A2

Owner of the Declaration	FDT Flachdach Technologie GmbH
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-FDT-20240155-IBA1-EN
Issue date	23.08.2024
Valid to	22.08.2029

Rhepanol hfk, Rhepanol hfk-bs
FDT Flachdach Technologie GmbH

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



1. General Information

FDT Flachdach Technologie GmbH

Programme holder

IBU – Institut Bauen und Umwelt e.V.
 Hegelplatz 1
 10117 Berlin
 Germany

Declaration number

EPD-FDT-20240155-IBA1-EN

This declaration is based on the product category rules:

Plastic and elastomer roofing and sealing sheet systems,
 01.08.2021
 (PCR checked and approved by the SVR)

Issue date

23.08.2024

Valid to

22.08.2029



Dipl.-Ing. Hans Peters
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Florian Pronold
 (Managing Director Institut Bauen und Umwelt e.V.)

Rhepanol hfk, Rhepanol hfk-bs

Owner of the declaration

FDT Flachdach Technologie GmbH
 Eisenbahnstr. 6-8
 68199 Mannheim
 Germany

Declared product / declared unit

1 m² produzierte Dachbahn Rhepanol hfk bzw. Rhepanol hfk-bs

Scope:

This Environmental Product Declaration refers to an average of the following products manufactured by FDT Flachdach Technologie GmbH at its Mannheim plant:

Rhepanol hfk 1.5 mm
 Rhepanol hfk-bs 1.5 mm

The EPD covers the production of the roofing membrane, the transport of the product to the construction site, the installation of the roofing membrane, the incineration, and the ensuing benefits for the next product system.

The results shown declare an average for the two products Rhepanol hfk and Rhepanol hfk-bs. Averaging is based on the corresponding production volumes (by area produced).

The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

The EPD was created according to the specifications of EN 15804+A2. In the following, the standard will be simplified as *EN 15804*.

Verification

The standard EN 15804 serves as the core PCR	
Independent verification of the declaration and data according to ISO 14025:2011	
<input type="checkbox"/>	internally
<input checked="" type="checkbox"/>	externally



Matthias Schulz,
 (Independent verifier)

2. Product

2.1 Product description/Product definition

Rhepanol hfk and Rhepanol hfk-bs are multi-layer bitumen-compatible polyisobutylene (PIB) plastic roofing membranes consisting of high-molecular PIB, copolymers and functional additives with lamination on the underside, available in various colours and designs. The seams are joined using hot air welding.

Rhepanol hfk

Rhepanol hfk (sealing layer: 1.5 mm) has a plastic fleece lamination on the underside (application type for roof waterproofing: DE/E1 PIB--BV--K-1.5 and application type for structural waterproofing: BA PIB--BV--K--PV1.5).

Rhepanol hfk-bs

Rhepanol hfk-bs (sealing layer 1.5 mm) has a plastic fleece/glass fleece composite lamination on the underside (application type for roof waterproofing: DE/E1 PIB--BV--K--PV/GV-1.5 and application type for structural waterproofing: BA-PIB--BV--K--PV/GV-1.5).

The LCA results shown declare an average for the two products Rhepanol hfk and Rhepanol hfk--bs. Averaging is based on the corresponding production volumes (by area produced).

Directive (EU) No. 305/2011(CPR) applies for placing the product on the market in the EU/EFTA (with the exception of Switzerland).

The product requires a Declaration of performance, taking consideration of *DIN EN 13956:2013*, Flexible sheets for waterproofing – Plastic and rubber sheets for roof waterproofing – Definitions and characteristics, or *DIN EN 13967:2017*, Flexible sheets for waterproofing – Plastic and rubber damp-proof sheets including plastic and rubber basement tanking sheet – Definitions and characteristics.

Use is governed by the respective national regulations

2.2 Application

Rhepanol hfk is used for sealing purposes on both flat and inclined roofs in mechanically fastened or bonded layer structures and for ballasted, green, pebble or used roofs. Rhepanol hfk is also used as a damp-proof sheet (type A) and as a tanking sheet (type T).

Rhepanol hfk-bs is used for sealing purposes on both flat and inclined roofs in mechanically fastened or bonded layer structures and for ballasted, pebble or used roofs with the exception of green roofs. Rhepanol hfk-bs can be laid directly on unbacked polystyrene insulation.

The manufacturer's installation instructions must be observed during processing.

2.3 Technical Data

Technical data

Technical construction data

Name	Value	Unit
Water vapour diffusion resistance value μ , DIN EN 1931 (method B)	$\geq 160.000 \pm 30\%$	
Tensile strength, DIN EN 12311--2 (method A)	≥ 400	N/50mm
Tensile strain (Rhepanol hfk), DIN EN 12311--2 (method A)	≥ 50	%
Tensile strain (Rhepanol hfk--bs), DIN EN 12311--2 (method A)	≥ 20	
Seam peel resistance (Rhepanol hfk), DIN EN 12316--2	≥ 150	N/50 mm
Seam peel resistance (Rhepanol hfk--bs), DIN EN 12316-2	≥ 180	N/50 mm
Seam shear resistance, DIN EN 12317-2	≥ 200 (tearing outside the seam)	N/50 mm
Resistance to abrupt loads, rigid underlay / flexible underlay (Rhepanol hfk), DIN EN 12691	$\geq 700 / \geq 3.500$	mm
Resistance to abrupt loads, rigid underlay / flexible underlay (Rhepanol hfk-bs), DIN EN 12691	$\geq 1.000 / \geq 1.000$	mm
Resistance to static loads, DIN EN 12730 (method A/B)	≥ 20	kg
Tear resistance, DIN EN 12310-2	≥ 150	N
Tear resistance (nail tearing force) (Rhepanol hfk), DIN EN 12310-1	≥ 300	N
Tear resistance (nail tearing force) (Rhepanol hfk--bs), DIN EN 12310-1	≥ 400	N
Dimensional stability after warm storage, DIN EN 1107-2	$\leq 1,0$	%
Performance when exposed to bitumen, DIN EN 1548	passed	
Folding at low temperatures (Rhepanol hfk), DIN EN 495-5	≤ -50	°C
Folding at low temperatures (Rhepanol hfk--bs), DIN EN 495-5	≤ -40	°C
Resistance to chemicals, DIN EN 1847	fulfilled	
Resistance to root penetration (on green roofs) (Rhepanol hfk), to DIN EN 13948 and FLL (roofing membranes)	root- and rootstock-proof	-
UV radiation, DIN EN 1297	Class 0 (5000 h)	h
Water tightness at 72h, DIN EN 1928 (method B)	≥ 400	kPa

The technical data of the product correspond to the values in the Declaration of Performance with regard to its essential characteristics, in accordance with *DIN EN 13956:2012* and *DIN EN 13967:2017* for Rhepanol hfk and Rhepanol hfk-bs.

2.4 Delivery status

The nominal thickness of the sealing layer is 1.5 mm. The dimensions are:

- Rhepanol hfk: 15 m x 1.50 m / 1.00 m / 0.50 m
- Rhepanol hfk--bs: 15 m x 1.50 m

2.5 Base materials/Ancillary materials

Rhepanol hfk and Rhepanol hfk-bs comprises a sealing layer with 40-60% polyisobutylene (PIB) and copolymers, 30-55%

flame retardants (metal hydroxide) and functional additives, 2-10% titanium dioxide and 0.5-2.0% carbon black. In addition, Rhepanol hfk is laminated with a polyester fleece on the back or, in the case of Rhepanol hfk-bs, with a polyester/glass fleece composite. Details can vary slightly depending on the colour.

1) The product contains substances from the ECHA List of Candidates of Substances of Very High Concern (SVHC) (dated 14 June 2023) exceeding 0.1% by mass: **no**

2) The product contains other CMR substances in categories 1A or 1B, which are not on the candidate list, exceeding 0.1% by mass in at least one partial product: **no**

3) Biocide products were added to this construction product, or it has been treated with biocide products (this then concerns a treated product as defined by the (EU) Regulation on Biocide Products No. 528/2012): **no**

2.6 Manufacture

Rhepanol hfk or Rhepanol hfk-bs compounds are produced by a mixer in which the individual raw materials are combined to form a homogeneous mass before being granulated. The granulate is added to a calendar via another mixing extruder and mixing roll which shapes the lower foil layer. In another process step, the top foil layer is manufactured the same way and applied to the bottom foil layer. The plastic membrane and polyester fleece are then bonded together with Rhepanol hfk or polyester/glass fleece composite with Rhepanol hfk-bs. The manufacturing process is rounded off with packing the roofing membranes.

Production is subject to continuous measurement of product quality as part of the implemented quality management system in accordance with *ISO 9001* and the energy management system in accordance with *ISO 50001*. The certification agency is TÜV Süd Management Service.

Furthermore, external quality inspections (external monitoring) are carried out by an external, recognised state materials testing institute, as well as further quality audits for approvals in the export sector.

2.7 Environment and health during manufacturing

1.1 In addition to national regulations, the following is used in the manufacture of Rhepanol hfk and Rhepanol hfk-bs for environmentally-friendly production:

- An electric separator is used for waste air which achieves a high degree of waste air purity.
- The plant in Mannheim has an energy management system certified to *DIN 50001*.
- Waste heat for heating and hot water is used in the energy-efficient production processes.
- The production waste incurred is redirected to the production circuit in the form of in-company recycling.
- In order to ensure the health and safety of employees, workplace designs are continuously improved for the purpose of physical relief and optimised ergonomics and regular seminars are held on the topic of health and safety.

2.8 Product processing/Installation

Rhepanol hfk or Rhepanol hfk-bs roofing membranes are rolled out on the roof and joined using hot air welding.

Rhepanol hfk or Rhepanol hfk-bs is mechanically fastened, bonded or laid loosely under ballast, e.g. gravel or paving, as well as under greenery (the latter is not the case with Rhepanol hfk-bs).

The manufacturer's installation instructions must be observed during processing. The current product data sheet must always be observed for each product (see website).

2.9 Packaging

The rolls of Rhepanol hfk or Rhepanol hfk-bs, each individually wrapped in foil, are shipped on a pallet. The core of the roll is made of recycled cardboard. A protective separating layer made of cardboard is between the pallet and rolls and the top side of the rolls features an additional protective layer made of PP. The rolls are secured by wooden wedges. The pallet is bound with plastic straps. All packaging materials are recyclable and reusable.

2.10 Condition of use

According to our many years of experience, the functionality and waterproofing function is maintained over a very long period of time when installed professionally and used as intended. Irrespective of this, the roofing membrane is subject to natural ageing.

2.11 Environment and health during use

There are no indications of possible environmentally hazardous or harmful substance emissions during the utilisation phase.

2.12 Reference service life

The service life is basically dependent on the thickness of the web and environmental influences. Under normal conditions, correct installation and regular maintenance, empirical values indicate that Rhepanol hfk and Rhepanol hfk-bs have a life cycle of 35 years and more.

2.13 Extraordinary effects

Fire

Rhepanol hfk und Rhepanol hfk-bs

Name	Value
Reaction to fire tests, DIN EN 11925-2 and DIN EN 13501-1	Class E / passed
Performance in case of external fire exposure to roofs, DIN CEN / TS 1187: 2012--03 and DIN EN 13501--5	Broof (t1) / passed*)

*) : Test results in accordance with *DIN CEN/TS 1187* are available for Rhepanol hfk and Rhepanol hfk-bs for the roof structures tested by FDT.

Water

Rhepanol hfk and Rhepanol hfk-bs have no known effects on the environment through exposure to water.

Mechanical destruction

Rhepanol hfk and Rhepanol hfk--bs are highly resilient and robust. No environmental impacts are known in the event of unanticipated mechanical destruction.

2.14 Re-use phase

Rhepanol hfk and Rhepanol hfk--bs can be recycled after the use phase. When separated by type, Rhepanol hfk und Rhepanol hfk-bs can be directed to the 'ROOFCOLLECT' collection system (recycling system for synthetic roofing and waterproofing membrane systems) or another recycling system.

Thermal utilisation is also possible with the result that the energy contained in Rhepanol hfk and Rhepanol hfk-bs is released and used during incineration. As a general rule, material recycling should take preference over waste incineration.

2.15 Disposal

The waste codes (AVV) for Rhepanol hfk and Rhepanol hfk-bs are as follows:

- 170904 (Mixed building and demolition rubble)
- 200139 (Plastics)

2.16 Further information

Further information on Rhepanol hfk and Rhepanol hfk--bs, such as brochures, data sheets, installation instructions, and technical manuals, can be found on the *website*.

3. LCA: Calculation rules

3.1 Declared Unit

The declared unit is 1 m² produced Rhepanol hfk and Rhepanol hfk-bs roofing membrane with a sealing layer of 1.5 mm.

Declared Unit

Name	Value	Unit
Declared unit	1	m ²
Grammage	2.01	kg/m ²
Type of sealing (thermal welding or connection using seaming tape and primer)	Thermal welding	-
Thickness	1,5	mm
Layer thickness	0,0015	m

The LCA results listed in this EPD declare an average of the two products Rhepanol hfk and Rhepanol hfk-bs and refer to a thickness of 1.5 mm. Averaging is based on the corresponding production volumes (by area produced).

The LCA values can be regarded as robust in terms of variability of the production process, geographical representativity and the influence of underlying data and preliminary products compared to the environmental impacts caused by actual production.

3.2 System boundary

The EPD type is in accordance with *EN 15804+A2*. This is an EPD from the cradle to the factory gate with options, Modules C1-C4 and Module D (A1-A3 + C + D and additional Modules A4 and A5).

The individual life cycle stages are described below.

- **Modules A1-A3:**
The product stage comprises Modules A1 (production and upstream chains of the raw materials used), A2 (transport to the production site), and A3 (energy and waste flows and packaging materials).
- **Modules A4-A5:** These modules include the transport to the construction site (A4) and utilisation of the packaging material (A5).
- **Module C1:** Manual dismantling of the roofing membranes is declared in this module.
- **Module C2:** This module declares the transport of the used roofing membranes for waste management at the end of product life.
- **Module C3:** This module includes the thermal utilisation (100%) of the roofing membranes in a waste incineration plant (MVA) with an R1 value > 0.6.
- **Module C4:** Landfilling is not of relevance for the roofing membranes.
- **Module D:**
The potential benefits for the next product system are declared in this module. In addition, potential credits from the utilisation of packaging from Module A5 are indicated.

3.3 Estimates and assumptions

The underlying data set for polybutylene was used as a conservative estimate for polyisobutylene, as the exact data set for the polymer was not available. Where no specific LCA FE processes were available, the individual recipe ingredients were estimated on the basis of information provided by the manufacturer or literary sources.

3.4 Cut-off criteria

The specific emissions associated with the provision of thermal and electric energy are taken into consideration in the upstream chains of energy provision. It can be assumed that additional emissions arising during manufacture are very low and therefore irrelevant. Assumptions were made as regards the transport expenses associated with all input and output data taken into consideration or the actual transport distances were applied. It can be assumed that the processes ignored would have contributed less than 5% to the impact categories under review. The manufacture of machinery, plants and other infrastructure required for production of the items under review was not taken into consideration in the LCA.

3.5 Background data

The primary data was provided by FDT Flachdach Technologie GmbH. The underlying data comes from the LCA FE software database from Sphera Solutions GmbH *LCAFE 2023*. The German green power mix was applied.

3.6 Data quality

The representativity can be classified as very good. Manufacturing of the synthetic roofing membrane systems was modelled using primary data from FDT Flachdach Technologie GmbH. All other relevant underlying data sets were taken from the *LCAFE CUP 2023.1* software database and are not

3.7 Period under review

The data for this Life Cycle Analysis is based on data records from 2022. The volumes of raw materials, energy, ancillaries and consumables used are considered as average annual values in the Mannheim-Neckarau manufacturing plant

3.8 Geographic Representativeness

Land or region, in which the declared product system is manufactured, used or handled at the end of the product's lifespan: Germany

3.9 Allocation

Production waste which is reused internally (the edge trims in production) is modelled as closed-loop recycling in Modules A1-A3

3.10 Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to *EN 15804* and the building context, respectively the product-specific characteristics of performance, are taken into account. The *LCAFE software version CUP2023.1* underlying database was used.

4. LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

The product does not contain any biogenic carbon.

Name	Value	Unit
Biogenic carbon content in the product	--	kg C
Biogenic carbon content in the associated packaging	0,0009	kg C

Note: 1 kg of biogenic carbon is equivalent to 44/12 kg of CO₂.

Transport to construction site (A4)

Assumptions for Module A4 are as follows:

Name	Value	Unit
Litres of fuel	0.0018	l/100km
Transport distance	100	km
Capacity utilisation (including empty runs)	61	%

Construction installation process (A5)

The following packaging materials were declared for the analysis of 1 m² roofing membrane:

Name	Value	Unit
Stretch foil, PE - ((packaging material)	6	g
Precuts PP - (packaging material)	3	g
Protective layer, cardboard - (packaging material)	2	g
Output substances following waste treatment on site	0.011	kg

Reference Service Life

The reference service life is dependent on the thickness of the roofing and waterproofing membrane and possibly the surface protection (gravel, green roof) used. A weighted average was calculated. The service life is based on the company's experience.

Name	Value	Unit
Life Span to manufacturer	35	a

End of Life (C1-C4)

Assumptions for the product end of life are as follows:

Name	Value	Unit
No power consumption - manual dismantling (C1)	0	kWh
Material loss through dismantling	0	%
Transport distance to EoL site (C2)	50	km
Energy recovery incineration	2.01	kg
Landfilling	-	kg

Reuse, recovery and recycling potential (D), relevant scenario details

Energy substitution and potential credits from A5 (packaging disposal) and C3 (incineration of the roofing membrane) are declared in Module D.

5. LCA: Results

The following table depicts the results for Rhepanol hfk, Rhepanol hfk-bs:

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)

Product stage			Construction process stage		Use stage							End of life stage				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	MND	MND	MNR	MNR	MNR	MND	MND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 m² Dachbahn Rhepanol hfk, Rhepanol hfk-bs

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	kg CO ₂ eq	5.7E+00	1.48E-02	3.23E-02	0	7.41E-03	4.6E+00	0	-2.13E+00
GWP-fossil	kg CO ₂ eq	5.66E+00	1.47E-02	2.91E-02	0	7.34E-03	4.6E+00	0	-2.11E+00
GWP-biogenic	kg CO ₂ eq	4.62E-02	5.34E-05	3.12E-03	0	2.67E-05	4.65E-04	0	-1.91E-02
GWP-luluc	kg CO ₂ eq	1.03E-03	8.79E-05	6.03E-08	0	4.4E-05	2.64E-05	0	-1.93E-04
ODP	kg CFC11 eq	4.37E-11	3.63E-15	3.13E-15	0	1.81E-15	7.25E-13	0	-2.58E-11
AP	mol H ⁺ eq	9.3E-03	1.24E-05	5.33E-06	0	6.2E-06	1.35E-03	0	-2.12E-03
EP-freshwater	kg P eq	1.34E-05	3.46E-08	7.79E-10	0	1.73E-08	2.02E-07	0	-5.72E-06
EP-marine	kg N eq	2.51E-03	3.55E-06	1.01E-06	0	1.77E-06	4.17E-04	0	-7.86E-04
EP-terrestrial	mol N eq	2.68E-02	4.52E-05	2.49E-05	0	2.26E-05	6.45E-03	0	-8.35E-03
POCP	kg NMVOC eq	1.02E-02	1.04E-05	2.7E-06	0	5.21E-06	1.09E-03	0	-2.02E-03
ADPE	kg Sb eq	3.5E-07	1.06E-09	2.34E-11	0	5.3E-10	5.45E-09	0	-1.84E-07
ADPF	MJ	1.22E+02	2E-01	5.28E-03	0	9.99E-02	1.2E+00	0	-3.28E+01
WDP	m ³ world eq deprived	2.69E-01	7.72E-05	3.01E-03	0	3.86E-05	4.69E-01	0	-2.79E-02

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; WDP = Water (user) deprivation potential

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 m² Dachbahn Rhepanol hfk, Rhepanol hfk-bs

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	2.03E+01	1.34E-02	3.75E-02	0	6.7E-03	3.55E-01	0	-1.26E+01
PERM	MJ	3.6E-02	0	-3.6E-02	0	0	0	0	0
PERT	MJ	2.03E+01	1.34E-02	1.53E-03	0	6.7E-03	3.55E-01	0	-1.26E+01
PENRE	MJ	6.98E+01	2E-01	4.33E-01	0	1E-01	5.31E+01	0	-3.28E+01
PENRM	MJ	5.24E+01	0	-4.28E-01	0	0	-5.19E+01	0	0
PENRT	MJ	1.22E+02	2E-01	5.28E-03	0	1E-01	1.2E+00	0	-3.28E+01
SM	kg	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0
FW	m ³	1.92E-02	1.19E-05	7.07E-05	0	5.96E-06	1.11E-02	0	-4.47E-03

PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 m² Dachbahn Rhepanol hfk, Rhepanol hfk-bs

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	kg	4.89E-09	3.37E-13	7.52E-14	0	1.69E-13	1.91E-11	0	-1.96E-09
NHWD	kg	3.99E-01	3E-05	1.77E-04	0	1.5E-05	9.81E-02	0	-1.77E-02
RWD	kg	1E-03	2.64E-07	1.58E-07	0	1.32E-07	3.66E-05	0	-1.3E-03
CRU	kg	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0	0
EEE	MJ	0	0	5.64E-02	0	0	7.71E+00	0	0

EET	MJ	0	0	1.3E-01	0	0	1.77E+01	0	0
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HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy

**RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional:
 1 m² Dachbahn Rhepanol hfk, Rhepanol hfk-bs**

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	Disease incidence	1.66E-07	9.12E-11	3.26E-11	0	4.56E-11	7.37E-09	0	-1.55E-08
IR	kBq U235 eq	1.27E-01	2.82E-05	1.67E-05	0	1.41E-05	3.87E-03	0	-1.37E-01
ETP-fw	CTUe	5.48E+01	1.44E-01	2.03E-03	0	7.22E-02	4.35E-01	0	-5.6E+00
HTP-c	CTUh	2.33E-09	2.91E-12	2.19E-13	0	1.45E-12	4.87E-11	0	-3.99E-10
HTP-nc	CTUh	1.52E-07	1.46E-10	6.67E-12	0	7.28E-11	2.91E-09	0	-1.24E-08
SQP	SQP	1.55E+01	7.11E-02	1.65E-03	0	3.56E-02	3.62E-01	0	-8.72E+00

PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index

Limitation note 1 – applies for the indicator 'Potential impact of human exposure to U235': This impact category mainly addresses the potential impact of low-dose ionising radiation on human health in the nuclear fuel cycle. This does not consider impacts attributable to possible nuclear accidents and occupational exposure, nor to the disposal of radioactive waste in underground facilities. Potential ionising radiation from soil, radon and some building materials is also not measured by this indicator.

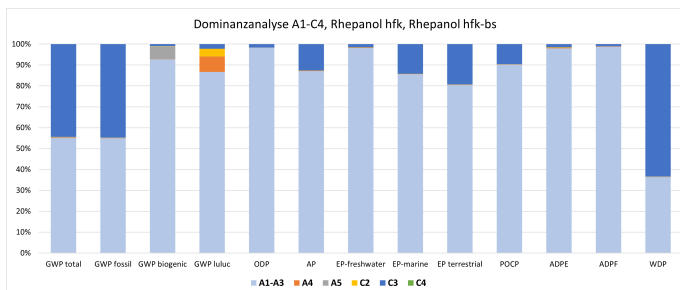
Limitation note 2 – applies for the indicators: 'Potential for abiotic resource depletion – Non-fossil resources', 'Potential for abiotic resource depletion – Fossil fuels', 'Water depletion potential (users)', 'Potential ecosystem toxicity comparison unit', 'Potential human toxicity comparison unit – Carcinogenic effect', 'Potential human toxicity comparison unit – Non-carcinogenic effect', 'Potential soil quality index'.

The results of this environmental impact indicator must be used with caution, as the uncertainties in these results are high or there is only limited experience with the indicator.

This EPD was created using a software tool.

6. LCA: Interpretation

The following figure shows the effect of environmental influences based on Modules A1-C4 and allows the following interpretation:



Modules A1-A3, product manufacturing, have a dominant influence on almost all of the indicators analysed. In the following, the environmental impact is first interpreted on the basis of global warming potential (GWP total) and the main influencing factors are identified.

Global warming potential (GWP total)

The total GWP of the declared product for Modules A1-C4 is mainly influenced by product manufacture (Modules A1-A3) (approx. 58%). The main factor here is the energy required to manufacture the raw materials and preliminary products (especially the polymers). Transport to the customer (Module A4) has no significant relevance in terms of GWP. Installation on the construction site contributes around <1% to the GWP total, while disposal transport (Module C2) only has a minor influence on the result. The energy recovery of the product and

the associated emissions from the incineration plants (Module C3) contribute approx. 42% to the overall result.

Ozone depletion potential (ODP)

The ozone depletion potential of the declared product is mainly influenced by product manufacture (Modules A1-A3) (approx. 98%). As with the GWP total, the ozone depletion potential (ODP) is mainly caused by the provision of raw materials and the manufacturing process, while transport to the customer (Module A4), installation on the construction site (Module A5), and disposal transport (Module C2) have no major impact on the ODP. Energy recovery of the product (Module C3) makes a small contribution to ODP at approx. 2%.

In the case of the **POCP**, **AP** and **EP** indicators, the influence of energy recovery (Module C3) is increasing. This influence is around 10% for POCP, around 11% for AP, and 9 to 20% for EP.

Abiotic depletion of resources (ADP)

The ADP is determined at 98-99% by product manufacture (Modules A1-A3).

Water consumption (WDP)

The WDP of the declared product is influenced by production (Modules A1-A3) (approx. 38%). Transport to the customer (Module A4) and installation on the construction site (Module A5) have no major effect on the WDP. Disposal transport (Module C2) has almost no influence on the result. Energy utilisation of the product as part of incineration (Module C3) makes a significant contribution to water consumption (approx. 62%).

7. Requisite evidence

No proof is required.

8. References

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No. 17 09 04

Mixed construction and demolition waste other than that mentioned in 17 09 01, 17 09 02 and 17 09 03

No. 200139

Plastics

ECHA list; CMR substances, candidate list

See:

REACH

(EC) DIRECTIVE No. 1907/2006 OF THE EUROPEAN PARLIAMENT AND COUNCIL of 18 December 2006 on the Registration, Evaluation, Authorisation of Chemicals

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