ENVIRONMENTAL PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804+A2*

Owner of the Declaration	KÖSTER BAUCHEMIE AG
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-KBC-20210162-IBC2-EN
Issue date	30.07.2021
Valid to	29.07.2026

KÖSTER TPO Pro

KÖSTER BAUCHEMIE AG

Institut Bauen und Umwelt e.V.

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KÖSTER
Waterproofing Systems

1. General Information

KÖSTER BAUCHEMIE AG

Programme holder

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

Declaration number

EPD-KBC-20210162-IBC2-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

30.07.2021

Valid to

29.07.2026

Dipl.-Ing. Hans Peters
(Chairman of Institut Bauen und Umwelt e.V.)

Florian Pronold
(Managing Director Institut Bauen und Umwelt e.V.)

KÖSTER TPO Pro

Owner of the declaration

KÖSTER BAUCHEMIE AG
Dieselstraße 1-10
26607 Aurich
Germany

Declared product / declared unit

1 m² roofing and waterproofing membrane based on TPO / FPO

Scope:

This EPD applies to 1 m² of the following roofing membranes of different thicknesses. in Chapter 5 only the values of KÖSTER TPO Pro 1.5 are declared. For the other variants, conversion factors are specified in Chapter 3.1.
The life cycle assessment is based on the KÖSTER Bauchemie AG data from the year of production 2019, manufactured in the factory in Aurich in Germany. This document is translated from the German Environmental Product Declaration into English. It is based on the German original version EPD-KBC-20210162-IBC1-DE. The verifier has no influence on the quality of the translation.

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
☐ internally ☒ externally

Matthias Klingler,
(Independent verifier)

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Waterproofing Systems

2. Product

2.1 Product description/Product definition

KÖSTER TPO Pro is a plastic roofing and sealing membrane that can be welded with hot air, made of flexible, thermoplastic polyolefins (FPO / TPO) with a significant proportion of single-grade, recycled polyethylene and with glass fleece as an internal layer.

The internal glass fleece reinforcement serves as an additional support and thus improves the mechanical properties of the roofing and sealing membrane. Regulation (EU) No. 305/2011(CPR) applies to the placing of the product on the market in the EU/EFTA (with the exception of Switzerland). The product requires a declaration of performance taking into account DIN EN 13956:2013, Plastic and elastomeric membranes for roof waterproofing; DIN EN 13967:2012+A1:2017, Plastic and elastomeric membranes for structural waterproofing against ground moisture and water under pressure and the CE marking.

The respective national regulations apply to the use.

2.2 Application

KÖSTER TPO Pro roofing and sealing membranes serve to seal unventilated and ventilated flat roofs, inclined roofs, green roofs, patios, balconies, rooftop gardens and underground garages in the event of direct exposure to the weather and with top load.
They can also be used to seal damp rooms, sprinkler containers and ponds. KÖSTER TPO roofing and sealing membranes can be aid loosely (with top load) or mechanically secured. KÖSTER TPO Pro roofing and sealing membranes can be laid loosely (with top load) and mechanically secured.

2.3 Technical Data

Designation according to EN 20000-201: KÖSTER TPO Pro 1.5:
DE/E1-FPO-BV-E-GV-1,5

Designation according to EN 20000-202: KÖSTER TPO Pro 1.5:
BA-FPO-BV-E-GV-1,5
List of technical data
according to DIN EN 13956 and DIN EN 13967

Note:
These values apply for: KÖSTER TPO Pro 1.5

Name	Value	Unit
Exposure to liquid chemicals including water according to DIN EN 1847 (method A/B)	passed	-
Peel resistance of the seam joint according to EN 12316-2	> 400	N/50mm
Shear resistance of the seam joint der Fügenaht according to EN 12317-2	Failure outside the joint	-
Resistance to impact loads nach EN 12691 (Verfahren A, harter Untergrund)	≥ 400	mm
Tear propagation resistance nach EN 12310-2	≥ 175	N
Tear propagation resistance nach EN 12310-2	≥ 175	N
Resistance to root penetration (for green roofs) nach EN 13948	given	-
Dimensional stability nach EN 1107-2	≤ 0,2	%
Folding in the cold nach EN 495-5	≤ -50	°C
Artificial ageing nach EN 1297 (> 1000 h)	passed	-
Ozone resistance (for EPDM/IIR) nach EN 1844	passed	-
Bitumen compatibility nach EN 1548	passed	-
Elongation at break longitudinally/transversely according to EN 12311-2 (method B) for TPO Pro 1.5/1.8/2.0	≥ 350	%
Tensile strength longitudinally/transversely according to EN 12311-2 (method B) for TPO 1.5/1.8/2.0	≥ 5	N/mm²

- Performance values of the product according to the declaration of performance with regard to its essential characteristics in accordance with EN 13956:201303, Plastic and elastomeric membranes for roof waterproofing; and EN13967:2012+A1:2017, Plastic and elastomeric membranes for structural waterproofing against ground moisture and water under pressure.

- Voluntary information for the product: SPEC 20000-201 and DIN/TS 20000-202

2.4 Delivery status

Reel of TPO / FPO roofing and sealing membrane

KÖSTER TPO Pro 1.5
Length: 20 m
Width: 1500 mm

2.5 Base materials/Ancillary materials

TPO-/-FPO (95-99 %):
The TPO Pro roofing membrane is made from 64% secondary plastic granules (from pre-consumer film scraps). The secondary plastic granules are modeled as load-free material and declared as secondary material.

Glass fleece (1-5 %):
On account of their composition, glass fibres do not come under the definition of man-made vitreous (silicate) fibres (they are neither classified as hazardous, nor do they have to be marked as such).

The substances used are not subject to the labelling requirements of REACH.

2.6 Manufacture

The production of KÖSTER TPO / FPO roofing and sealing membranes is certified in accordance with DIN EN ISO 9001.
The membranes are manufactured on two-nozzle extrusion equipment. The raw material is heated up to the required temperature in an extruder and introduced into the process under pressure.
The two low-viscosity melt streams can be monitored by measuring the temperature and pressure of the mass.
The internal glass fleece insert serves as an additional support and thus improves the mechanical properties of the roofing and sealing membrane.
The required thickness of the roofing and sealing membrane is achieved by regulating the melt streams as they emerge at the ends of the extrusion nozzles.
The sheets are cooled down to below 30 °C after they leave the calendar and before they are wound.
Cooling is effected by means of water-cooled rollers.
The heated water is cooled in a heat exchanger, fed back into the water cycle and reused.

2.7 Environment and health during manufacturing

All of the raw materials used are introduced into the production facility without any environmentally hazardous effects.
Provided the facility is correctly operated, contamination of the environment by waste air, waste water or other waste can be ruled out.
The water is used solely for cooling purposes and does not come into contact with the product.
During production and packaging, no dust emissions that have to be cleaned are created.
At no time is the production personnel exposed to health risks during the production of KÖSTER TPO Pro.
Any material residues created during production, e.g. during start-up or job changes, are fed back into the system during ongoing operation, or are internally recycled as time permits.

2.8 Product processing/Installation

The declared products can be installed as follows:

- Loose installation with top load and wear layer underneath: the sheets are unrolled loosely and the seams are welded using hot air.
- Exposed to weather and mechanically secured: the sheets are installed loosely and mechanically secured with plate anchors for roof sheeting (as a rule in the covered sheet seam), and the seams are welded with hot air.

Optional roofing membrane fasteners and adhesives are not part of the life cycle assessment.

2.9 Packaging

KÖSTER TPO Pro roofing and sealing membranes are packed as standard on a wooden pallet with 25 or 20 reels. The wooden pallets can be reused by the recipient.
Materials used for packaging, such as stretch and shrink film, cardboard edge protectors as well as the wooden pallet, are recycled by the recipient using the system "Der Grüne Punkt – Duales System Deutschland GmbH (DSD)" (Green Dot – German Dual System).

2.10 Condition of use

No changes take place in the material during the useful service life of KÖSTER TPO Pro roofing and sealing membranes.

2.11 Environment and health during use

No adverse influence on the environment or health of the users takes place during the useful service life. No release of emissions from the product into air or water is known.

2.12 Reference service life

Provided the product is installed correctly in accordance with KÖSTER TPO processing regulations, a useful service life of more than 30 years can be expected.

2.13 Extraordinary effects

Fire

The declared product has normal flammability.
Classification in accordance with DIN EN ISO 11925-2 and DIN EN 13501-1 – Class E or building material class B.

Fire protection

Name	Value
Building material class	B2
Fire behavior class according to EN 13501-1	Klasse E

Water

The declared product is resistant to the effects of water.
Classification in accordance with DIN EN 1928 (method B).

Mechanical destruction

The mechanical destruction of KÖSTER TPO Pro roofing and sealing membranes, e.g. through shredding within the framework of product recycling measures, does not lead to any environmentally harmful products or hazardous waste.

2.14 Re-use phase

The material of KÖSTER TPO Pro roofing and sealing membranes is recycled. The mechanically fastened plastic roofing membranes are free of rough dirt and impurities and, after they have been cut open, are rolled up again. The sorted roofing membranes are processed in shredding plants and made into ground material. The ground material is taken back by the raw material manufacturer within the framework of material recycling and is used as an admixture in the production of granules for the polymer modification of asphalt. The material can be used in road asphalt for periods of up to 10 years and longer.

2.15 Disposal

If there is no possibility for the membranes to be taken back, they can be stored in proper landfill sites or used for thermal energy generation (incineration) (EU waste code, mixed construction and demolition wastes).

2.16 Further information

The product data sheets, safety information and other technical information can be downloaded from the website of KÖSTER BAUCHMIE AG.
Homepage: www.koester.eu

3. LCA: Calculation rules

3.1 Declared Unit

The declared unit is 1 m² of produced TPO Pro roofing membrane with a thickness of 1.5 mm and a weight per unit area of 1.505 kg/m².
These are not self-adhesive roofing membranes. The seams are joined together by thermal welding.

Declared Unit

Name	Value	Unit
Declared unit	1	m^2
Grammage KÖSTER TPO Pro 1.5	1.505	kg/m^2
Type of sealing (thermal welding)		-
Layer thickness	0.0015	m

The LCA results for other basis weights or product thicknesses can be calculated approximately by linear scaling of the LCA results. For this purpose, all indicators of all life cycle phases shown in chapter 5 are to be multiplied by the quotient of new basis weight and declared basis weight (1.505 kg/m²). Alternatively, the quotient of new product thickness to declared product thickness (1.5 mm) can also be used for the multiplication.

3.2 System boundary

Type of EPD: cradle to plant gate - with options.

Product stage (A1- A3)
Raw material supply as well as truck transport of the raw materials to the plant, Production expenses and manufacture of the packaging material.

Stage of construction of the structure (A4- A5) Module A4: Truck transport to construction site (100 km). Transport distance can be adjusted to building level if necessary (e.g. for 200 actual transport distance: multiply LCA values by factor 2). Module A5: Packaging treatment and resulting credits in module D. Sealing with hot air (energy consumption 0.031 MJ/m²). Offcuts were neglected as they depend on the building context.

Disposal stage (C1- C4)
Module C1: Manual dismantling (unencumbered).
Module C2: Truck transport for waste preparation for material recycling: 250 km (C2/1) and transport for thermal recycling: 50 km (C2/2)
Transport distance can be adjusted on building level if necessary (e.g., for double km actual transport distance: multiply LCA values by factor 2).
Module C3/1: Waste treatment (shredding) for material recycling as an additive in asphalt production.
Module C3/2 loads from thermal recycling.

Credits and loads outside the system boundaries (D)
Scenario D/1: Material recycling as asphalt additive (estimation of saved expenses by using a polyethylene granulate data set). Credit is only given for the primary plastic fraction, i.e. no credit is given for the recycled fraction in the product (double counting).
Scenario D/2: Saved expenses through energy substitution from thermal recycling of the product (substitution of electricity and thermal energy).

3.3 Estimates and assumptions

For a few raw materials with a total mass share of less than 3% of the total product, estimates were made because no suitable background data were available.
The secondary material used in the product system is accounted for unencumbered. The end-of-waste property of this secondary material is reached after processing into secondary granules.

3.4 Cut-off criteria

All data from the operating data survey were taken into consideration in the analysis, i.e. all source materials used according to the recipe, as well as electricity and water requirements. Assumptions were made as regards transportation expenses associated with all input data taken into consideration.
Accordingly, material and energy flows with a share of less than 1 per cent were also taken into account, in accordance with PCR Part A.

3.5 Background data

GaBi databases Service Pack 40 were used for the LCA calculation.

3.6 Data quality

The data quality can be regarded as high. The production of the roofing membranes was modelled with primary data from KÖSTER BAUCHEMIE AG. The corresponding background data items were available in the GaBi database for all relevant preliminary products used. The data used was last revised max. 3 years ago.

3.7 Period under review

Average values for 2019 at the Aurich location were taken into account for the quantities of raw materials, energy and process materials used.

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: Global

3.9 Allocation

During the production of TPO Pro roofing membranes does not result in any waste or by-products. A allocation was therefore not used.

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.

4. LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

The TPO Pro roofing membrane does not contain biogenic carbon. The amount of biogenic carbon contained in the packaging is given in the table below.

Information describing the biogenic carbon content at the plant gate

Name	Value	Unit
Biogenic carbon content in product	-	kg C
Biogenic carbon content in accompanying packaging	0.011	kg C

Note: 1 kg of biogenic carbon is equivalent to 44/12 kg of CO_2.

The following technical information forms the basis for the declared modules or can be used for developing specific scenarios within the context of a building appraisal if modules are not declared (MND).

There are two scenarios for the End-of-Life (modules C2, C3 and D): the first proceeds from 100 % material recycling. The second scenario is based on 100 % thermal utilisation. Individual scenarios for combinations of thermal utilisation and material recycling can then be calculated from the results of these two 100 % scenarios.

Transport to construction site (A4)

Name	Value	Unit
Litres of fuel (Diesel pro kg Produkt)	0.00167	l/100km
Transport distance	100	km
Capacity utilisation (including empty runs)	61	%

Installation in the building (A5)

Name	Value	Unit
Electricity consumption	0.0086	kWh

In the LCA, no offcuts were taken into account during installation, as these are strongly dependent on the building context. Offcuts can be taken into account at building level, if relevant, by scaling the LCA results for the relevant life cycle phases. Example: 2% waste during installation; multiplication of the LCA results by a factor of 0.02.

Reference service life

Name	Value	Unit
Life Span (according to BBSR)	20	a

End of Life (C1- C4)

Name	Value	Unit
Szenario 1: For material recycling	1,505	kg
Szenario 2: For energy recovery	1,505	kg
Transport distance for reuse (Szenario 1)	250	km
Transport distance to thermal utilization in waste incineration plant (Szenario 2)	50	km

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5. LCA: Results

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	MND	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 m² TPO Pro (1,5 mm Thickness, 1,505 kg/m²)

Parameter	Unit	A1-A3	A4	A5	C1	C2/1	C2/2	C3/1	C3/2	D/1	D/2
GWP-total	kg CO_2 eq	1.61E+00	9.21E-03	6.67E-02	0	2.27E-02	4.54E-03	3.38E-03	4.72E+00	-9.63E-01	-2.39E+00
GWP-fossil	kg CO_2 eq	1.64E+00	9.16E-03	8.52E-03	0	2.25E-02	4.51E-03	3.37E-03	4.72E+00	-9.58E-01	-2.38E+00
GWP-biogenic	kg CO_2 eq	-3.25E-02	3.68E-06	5.82E-02	0	0	0	1.12E-05	8.54E-05	-4.8E-03	-5.6E-03
GWP-luluc	kg CO_2 eq	2.14E-03	3.83E-05	5.61E-06	0	1.83E-04	3.66E-05	4.88E-06	3.07E-05	-1.9E-04	-1.68E-03
ODP	kg CFC11 eq	2.36E-14	2.25E-18	8.37E-17	0	2.71E-18	5.43E-19	7.4E-17	4.04E-16	-2.15E-15	-2.5E-14
AP	mol H^+ eq	1.6E-02	8.24E-06	1.65E-05	0	2.32E-05	4.63E-06	7.43E-06	4.82E-04	-2.04E-03	-3.34E-03
EP-freshwater	kg P eq	9.16E-06	1.99E-08	1.04E-08	0	6.86E-08	1.37E-08	8.99E-09	5.68E-08	-1.01E-06	-3.09E-06
EP-marine	kg N eq	9.79E-04	2.51E-06	4.54E-06	0	6.75E-06	1.35E-06	1.65E-06	1.01E-04	-5.03E-04	-8.63E-04
EP-terrestrial	mol N eq	1.06E-02	3.06E-05	5.97E-05	0	8.13E-05	1.63E-05	1.73E-05	2.22E-03	-5.37E-03	-9.25E-03
POCP	kg NMVOC eq	3.9E-03	6.74E-06	1.24E-05	0	1.87E-05	3.75E-06	4.52E-06	2.99E-04	-2.44E-03	-2.48E-03
ADPE	kg Sb eq	1.84E-02	7.6E-10	1.12E-09	0	1.62E-09	3.24E-10	9.74E-10	6.18E-09	-1.11E-07	-3.93E-07
ADPF	MJ	3.62E+01	1.22E-01	7.41E-02	0	3.01E-01	6.01E-02	5.92E-02	6.32E-01	-3.77E+01	-4.03E+01
WDP	m^3 world eq deprived	1.42E-01	3.94E-05	7.23E-03	0	2.02E-04	4.04E-05	7.34E-04	4.36E-01	-1.84E-01	-2.48E-01

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 TPO Pro (1,5 mm Thickness, 1,505 kg/m²)

Parameter	Unit	A1-A3	A4	A5	C1	C2/1	C2/2	C3/1	C3/2	D/1	D/2
PERE	MJ	6.02E+00	7.08E-03	4.22E-01	0	1.69E-02	3.38E-03	2.62E-02	1.35E-01	-7.77E-01	-8.88E+00
PERM	MJ	3.93E-01	0	-3.93E-01	0	0	0	ND	ND	0	0
PERT	MJ	6.41E+00	7.08E-03	2.95E-02	0	1.69E-02	3.38E-03	2.62E-02	1.35E-01	-7.77E-01	-8.88E+00
PENRE	MJ	2.33E+01	1.22E-01	1.3E-01	0	3.01E-01	6.02E-02	1.3E+01	1.35E+01	-3.77E+01	-4.04E+01
PENRM	MJ	1.29E+01	0	-5.6E-02	0	0	0	-1.29E+01	-1.29E+01	0	0
PENRT	MJ	3.62E+01	1.22E-01	7.41E-02	0	3.01E-01	6.02E-02	5.92E-02	6.32E-01	-3.77E+01	-4.04E+01
SM	kg	1.01E+00	0	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0
FW	m^3	1.85E-02	6.34E-06	1.83E-04	0	1.96E-05	3.91E-06	3.03E-05	1.02E-02	-4.72E-03	-1.03E-02

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 TPO Pro (1,5 mm Thickness, 1,505 kg/m²)

Parameter	Unit	A1-A3	A4	A5	C1	C2/1	C2/2	C3/1	C3/2	D/1	D/2
HWD	kg	2.84E-08	4.54E-09	3.44E-11	0	1.4E-08	2.8E-09	2.45E-11	4.12E-10	-7E-09	-1.61E-08
NHWD	kg	1.67E-01	2.13E-05	4.81E-04	0	4.61E-05	9.21E-06	4.2E-05	1.87E-02	-6.45E-03	-1.87E-02
RWD	kg	8.4E-04	1.28E-07	1E-05	0	3.73E-07	7.45E-08	8.98E-06	4.25E-05	-2.59E-04	-3.03E-03
CRU	kg	0	0	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	1.51E+00	0	0	0
MER	kg	0	0	0	0	0	0	0	0	0	0
EEE	MJ	0	0	9.39E-02	0	0	0	0	1.01E+01	0	0

EET	MJ	0	0	1.68E-01	0	0	0	0	1.79E+01	0	0

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 TPO Pro (1,5 mm Thickness, 1,505 kg/m²)

Parameter	Unit	A1-A3	A4	A5	C1	C2/1	C2/2	C3/1	C3/2	D/1	D/2
PM	Disease incidence	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
IR	kBq U235 eq	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
ETP-fw	CTUe	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HTP-c	CTUh	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HTP-nc	CTUh	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SQP	SQP	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

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

The additional (optional) environmental impacts according to EN 15804 + A2 have not been declared because the uncertainties in these results are significant.
Limitation note 2 - applies to the indicators ADPE, ADPF, WDP, ETP-fw, HTP-c, HTP-nc, SQP The results of this environmental impact indicator must be used with caution, as the uncertainties in these results are high or as there is limited experience with the indicator.
This EPD was created using a software tool.

6. LCA: Interpretation

Of high importance for the environmental profile of the product are the energy consumption and the primary polyethylene used. In particular, the impact categories greenhouse potential and ozone creation potential are dominated by this. With the exception of acidification potential, these two processes also make significant contributions in all other impact categories.
In the case of biogenic global warming potential, the uptake of atmospheric carbon dioxide during plant growth in connection with packaging (wooden pallet and cardboard) is evident.
The dominance in acidification potential and resource consumption (minerals and metals) results from the upstream chain process of the inorganic synergist to flame retardant.
In the other impact categories, the contribution is relevant (ozone formation potential) to low.
The indicators eutrophication and water scarcity are dominated by the UV stabilizer. Since the actual material used was estimated with a similar process from the GaBi databases, the actual contributions may vary.
The use of titanium dioxide provides relevant contributions in eutrophication and the ozone formation potential. In all other impact categories, the contributions are small.
The glass mat is of low relevance to the environmental profile.

7. Requisite evidence

No evidence is required

8. References

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

ISO 14025
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EN 15804
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The literature referred to in the Environmental Product Declaration must be listed in full.Standards already fully quoted in the EPD do not need to be listed here again.
The current version of PCR Part A and PCR Part B of the PCR document on which they are based must be referenced.

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