Environmental Product Declaration

In accordance with ISO 14025 and EN 15804:2012+A2:2019 for:

Woven geotextile

from

Beaulieu Technical Textiles

Beaulieu International Group

Technical Textiles

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
EPD registration number:	S-P-05133
Publication date:	2022-03-07
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General information

Programme information

Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
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CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product category rules (PCR): PCR 2019:14: Construction products version 1.11. UN CPC code: 369 – Other plastic products
PCR review was conducted by: The Technical Committee of the International EPD System Contact via info@environdec.com
Independent third-party verification of the declaration and data, according to ISO 14025:2006: ☐ EPD process certification ☒ EPD verification
Third party verifier: Andrew Norton, Director of Renuables Ltd Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier: ☒ Yes ☐ No

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804. For further information about comparability, see EN 15804 and ISO 14025.

Company information

Owner of the EPD:
Beaulieu Technical Textiles
Boulevard Industriel 3
7780 Comines-Warneton - Belgium
Contact:
Bet Breyne (Bet.Breyne@bintg.com)
Description of the organisation:
Beaulieu Technical Textiles (BTT) is a globally represented and established manufacturer of woven technical fabrics. Combining a pioneering spirit and a hands-on mentality, the products are engineered to deliver sustainable, durable and best-in-class solutions, designed to respond to current demands and future trends
Product-related or management system-related certifications:
ISO 9001 – Quality Management System
ISO 14001 – Environmental Management System
QA-CER – Quality Assurance of Recycled Content

Product information

Product name: Within this EPD, four woven geotextile product groups are covered: Terralys, Coated Terralys, Terralys GCL and Terrabarrier.
Product identification:

Product Group 1: Terralys

Product	Weight (g/m²)
Terralys NGS2	105
Terralys NGS3	150
Terralys LF 14	72
Terralys LF 15	102
Terralys LF 15-15	84
Terralys LF 16	110
Terralys LF 17-16	79
Terralys LF 17-17	92
Terralys LF 17	145
Terralys LF 29-29	134
Terralys LF 29-29 W	159
Terralys LF 35-35	137
Terralys LF 41-41	186
Terralys LF 46-46	186
Terralys LF 46-46 L	186
Terralys LF 57-57	228
Terralys LF 68-68	278
Terralys LF 90-90	356
Terralys LF100-100	411
Terralys LF 360	118
Terralys LF 480	155
Terrasilt GR90	88
Terrasilt GR180	179

Product Group 2: Coated Terralys

Product	Weight textile (g/m²)	Weight coating (g/m²)
Terralys LF 17-17 C1	107	60
Terralys FL 17-17 C2	107	200
Terralys LF 35-35 C1	137	72
Terralys LF 46-46 C1	186	100
Terralys LF 46-46 C2	186	200

Product Group 3: Terralys GCL

Product	Weight (g/m²)
Terralys GCL BL35	110
Terralys GCL BL38	110
Terralys GCL 41-41	186
Terralys GCL BL51	222
Terralys GCL BL58	144
Terralys GCL TN35	110
Terralys GCL TN59	122
Terralys GCL TN49+	122
Terralys GCL WH42	200

Product Group 4: Terrabarrier

Product	Weight textile (g/m²)	Weight coating (g/m²)
Terrabarrier BL365 C3	200	165

Product description:
Woven geotextiles, produced by Beaulieu Technical Textiles, are used in a variety of civil engineering applications such as roads, railways, airports, bridges, tunnels and landfill. The main function of a woven geotextile is to separate two different soil types and prevent both from mixing and interfering with each other. Next to this, woven geotextiles pass water efficiently and prevent destabilisation of the soil by internal flows. This product can also guarantee the stability of structures by providing additional strength to carry the required loads and improve the mechanical performance of a soil mass.
UN CPC code: 369 – Other plastic products
Product composition:

Product Group 1: Terralys

Raw Material	Weight % of declared product
Polypropylene, PP	92,5%
Low Density Polyethylene, LDPE	2,0%
Colour Masterbatch (carbon black)	1,5%
UV Masterbatch	0,5%
Chalk (calcium carbonate)	3,5%

Product Group 2: Coated Terralys*

Raw Material	Weight % of declared coating
Polypropylene, PP	85,0%
Low Density Polyethylene, LDPE	15,0%

* Geotextile composition of Product Group 2 is the same as Product Group 1

Product Group 3: Terralys GCL

Raw Material	Weight % of declared product
Polypropylene, PP	94,5%
Colour Masterbatch (carbon black)	1,5%
UV Masterbatch	0,5%
Chalk (calcium carbonate)	3,5%

Product Group 4: Terrabarrier

Raw Material	Weight % of declared textile
High Density Polyethylene, HDPE	96,5%
UV Masterbatch	3,5%

Raw Material	Weight % of declared coating
Low Density Polyethylene, LDPE	95,0%
Colour Masterbatch (carbon black)	3,0%
UV Masterbatch	2,0%

LCA information

Functional unit / declared unit: 1 m² of woven geotextile

Reference service life: Minimum of 100 years in natural soils with pH between 4 and 9 and soil temperatures lower than 25°C (based on standardized testing method, more information in the LCA background report)

Database(s) and LCA software used:

Product specific data was provided by Beaulieu Technical Textiles and within limits (Age < 5 years for specific data). This primary data refers to the period January 2020 to December 2020 and a quality check has been carried out on this data. For generic data, the GaBi-database was used. This database consist of high quality background datasets (Age < 10 years for generic data). The LCA software GaBi Software 10.5.1 & GaBi Content Version 2021.2 was used for inventory and impact assessment calculations.

Description of system boundaries:

This EPD covers the Cradle-to-Grave of a woven geotextile. The EPD follows the guidelines prescribed in EN 15804, namely that all flows with an influence higher than 1% of the total mass, energy or environmental impact are included in the LCA. The total of neglected input flows per module shall be a maximum of 5 % of energy usage and mass.

Life cycle stages and modules															
Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
Raw material supply	Transport	Manufacturing	Transport	Construction installation	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	X	X	X	X	X	X	X	X	X	X	X	X

X = included in the EPD

MND = module not declared

Product stage (A1-A3)

A1 – Raw materials supply

This module takes into account the extraction and processing of all raw materials and energy which occur upstream to the studied manufacturing process.

A2 – Transport to the manufacturing

The raw materials are transported to the manufacturing site.

A3 – Manufacturing

Electricity consumption during manufacturing process coming from the Belgium national grid with a company specific electricity mix.

The sub-modules A1, A2 and A3 are declared as one module A1-A3.

Construction process stage (A4-A5)

A4 – Transport to the building site

Transportation from Beaulieu Technical Textiles to the supplier and from there to the construction site are taken into account. For both transports, the scenarios defined in the Belgian national supplement to EN 15804, i.e. NBN/DTD B 08-001:2017, have been used.

	Factory to supplier	Supplier to construction site
Production in Belgium	100 km	35 km

Factory to supplier: 100% Lorry>32ton (Euro 5)
Supplier to construction site: 90% Lorry 16-32 ton (Euro 5) and 10% Lorry 7,5-16 ton (Euro 5)

A5 – Construction installation

No impacts are associated with the installation of a woven geotextile. Only the environmental impacts related to the disposal of packaging waste are taken into account according to the guidelines prescribed in NBN/DTD B 08-001.

	Landfill	Incineration	Recycling	Reuse
Pallet	0%	40%	40%	20%
HDPE tube	10%	85%	5%	0%
LDPE film	5%	60%	35%	0%

The benefits from exported energy due to incineration of packaging are added to module D.

Use stage (B1-B7)

There are no environmental impact associated with the entire use stage.

End of life stage (C1-C4)

C1 – De-construction demolition

It is assumed that no impacts are associated with demolition of a woven geotextile, since the removal of it comes with the excavation of the subsoil.

C2 – Transport

The default scenario for woven geotextiles from NBN/DTD B 08-001 describes that the end-of-life waste is transported to a sorting facility over a distance of 30 km. Afterwards, the distance between the sorting plant and incineration plant is by default 100 km.

C3 – Waste processing

A default scenario for the sorting facility is defined in NBN/DTD B 08-001.

Impact	Amount
Sorting plant with crusher	0,0037 kWh/kg waste
Diesel consumption	5,9 MJ/m³ bulk volume of waste*

* the bulk density of waste can be calculated as 0,9 x material density.

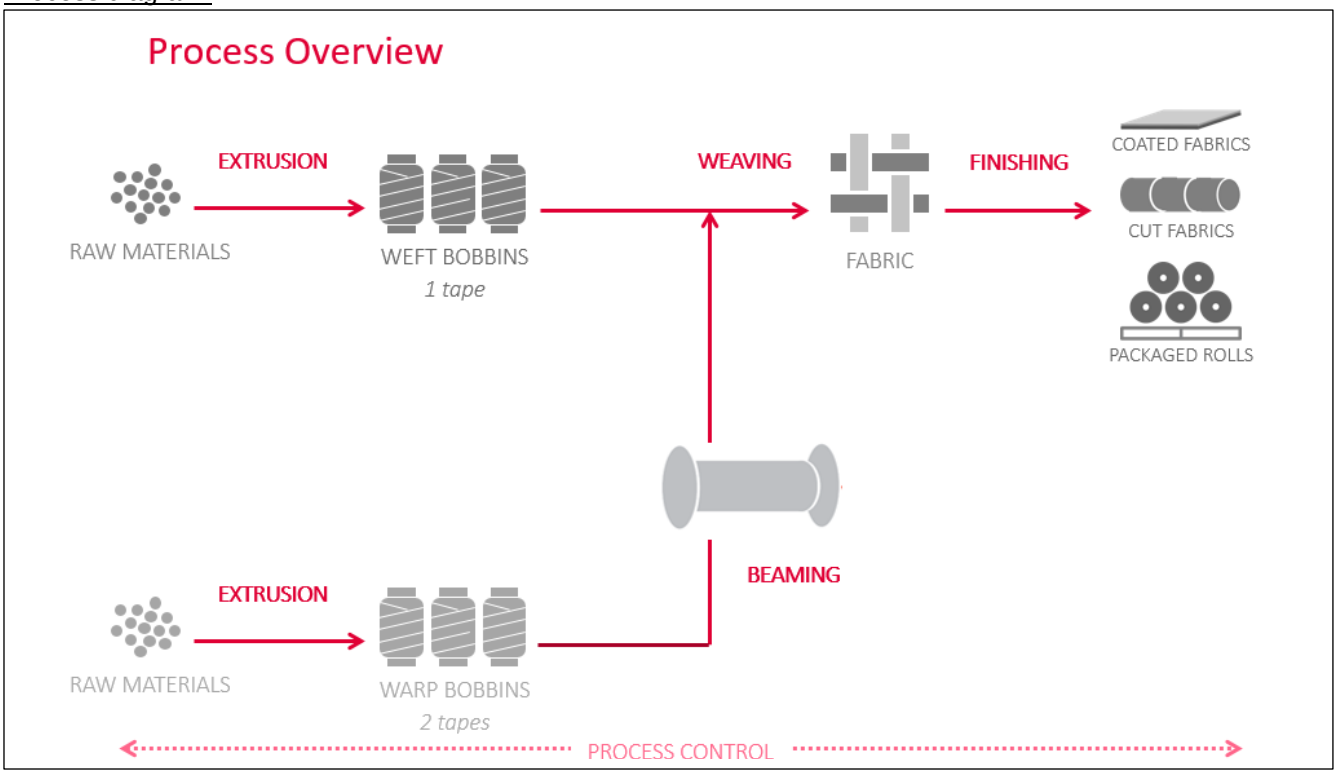
C4 – Disposal

Same assumptions as PlasticsEurope (2018) are taken for the disposal of woven geotextiles. 26% of plastics used in the construction are recycled, 26,5% are sent to landfill and 47,5% are sent to municipal incineration with energy recovery.

Resource recovery stage (D)

The benefits from exported energy due to incineration of the woven geotextile and packaging waste have been declared in this module (heat and electricity credits).

Process diagram:



Process information:

In a first step, all raw materials are dosed and fed to an extruder. In the extruder, the composition is molten and mixed to a homogeneous polymer melt. After passing through a filter, the melt is pushed through a die, resulting in a thin flat film. This film is cut into tapes, which are then stretched to reach the desired mechanical properties. At the end of the extrusion line, the tapes are rolled on bobbins. A part of the bobbins is put on a large beam as preparation of warp tapes for weaving. These beams are then sent together with weft bobbins to the weaving machines, where woven geotextiles are made. As an intermediate step, a coating can be applied on the geotextile. In the finishing step, the geotextiles are cut into the desired length and packed for transportation.

Assumptions, allocation and estimates

- Since water is only used when the film passes through a waterbath during processing, water consumption of the production process is negligible (<0,01% of the total material weight) and left out of the calculation.
- The packaging material between the different woven geotextiles varies slightly. A general packaging material was taken which consists of 62% recycled HDPE, 9% LDPE and 29% wood (coming from the storage of the woven geotextile on a wooden pallet)
- As the database of GaBi didn't have a suitable UV dataset, it is assumed that the UV masterbatch exclusively consist of polypropylene.
- Similar like the UV masterbatch, the colour masterbatch (carbon black) was assumed to comprise of 60% polyethylene and 40% carbon black.
- The chalk masterbatch consists of 70% $CaCO_3$ and 30% PP

Life cycle Assessment (LCA) results

The following tables show the results of the executed LCA for different impact categories. The results refer to 1 m² of woven geotextile, where each group has its own reference weight:

- Group 1: 1 m² of woven geotextile with a weight of 92 g/m² (e.g. Terralys LF 17-17)
- Group 2: 1 m² of woven geotextile with a weight of 167 g/m² (e.g. Terralys LF 17-17 C1)
- Group 3: 1 m² of woven geotextile with a weight of 110 g/m² (e.g. Terralys GCL BL35)
- Group 4: 1 m² of woven geotextile with a weight of 365 g/m² (e.g. Terrabarrier BL365 C3)

Calculation the impact categories for other products within the same group can be done by using the following equation:

$$\mathbf{Impact\ category_{Prod\ 2}} = \mathbf{Impact\ category_{Prod\ 1}} \cdot \frac{\mathbf{Weight_{Prod\ 2}}}{\mathbf{Weight_{Prod\ 1}}}$$

Group 1: 1 m² of woven geotextile with a weight of 92 g/m²

Environmental Impact Categories per declared unit (1 m²)										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-fossil	kg CO_2 eq.	1,91E-01	1,54E-03	2,31E-02	0,00E+00	0,00E+00	1,52E-03	7,85E-05	1,49E-01	-7,93E-02
GWP-biogenic	kg CO_2 eq.	-3,47E-03	-1,97E-06	2,69E-03	0,00E+00	0,00E+00	-1,94E-06	-2,03E-06	7,57E-05	-3,99E-04
GWP-luluc	kg CO_2 eq.	1,00E-04	1,27E-05	1,18E-06	0,00E+00	0,00E+00	1,25E-05	5,48E-07	1,71E-05	-5,53E-05
GWP-total	kg CO_2 eq.	1,87E-01	1,55E-03	2,58E-02	0,00E+00	0,00E+00	1,53E-03	7,70E-05	1,49E-01	-7,98E-02
ODP	kg CFC 11 eq.	1,38E-15	1,98E-19	2,78E-18	0,00E+00	0,00E+00	1,95E-19	3,71E-18	2,66E-16	-9,14E-16
AP	mol H^+ eq.	2,54E-04	5,27E-06	3,27E-06	0,00E+00	0,00E+00	5,17E-06	1,25E-07	4,08E-05	-1,04E-04
EP-freshwater	kg P eq.	2,83E-07	4,59E-09	1,39E-08	0,00E+00	0,00E+00	4,52E-09	4,42E-10	3,52E-07	-1,05E-07
EP-marine	kg N eq.	7,58E-05	2,45E-06	8,35E-07	0,00E+00	0,00E+00	2,40E-06	4,21E-08	9,25E-06	-2,95E-05
EP-terrestrial	mol N eq.	7,91E-04	2,73E-05	1,51E-05	0,00E+00	0,00E+00	2,68E-05	4,51E-07	1,32E-04	-3,16E-04
POCP	kg NMVOC eq.	2,81E-04	4,75E-06	2,28E-06	0,00E+00	0,00E+00	4,66E-06	1,16E-07	2,64E-05	-8,29E-05
ADP_m*	kg Sb eq.	3,51E-08	1,18E-10	5,05E-11	0,00E+00	0,00E+00	1,16E-10	4,21E-11	3,37E-09	-1,33E-08
ADP_f*	MJ	8,36E+00	2,06E-02	6,33E-03	0,00E+00	0,00E+00	2,03E-02	3,11E-03	2,29E-01	-1,38E+00
WDP	m^3	1,38E-03	1,34E-05	2,39E-03	0,00E+00	0,00E+00	1,32E-05	5,22E-06	1,43E-02	-6,13E-03
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP_m = Abiotic depletion potential for non-fossil resources; ADP = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption									

** Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.*

Additional environmental impacts:

Additional Impact Categories per declared unit (1 m²)										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG[1]	kg CO_2 eq.	1,91E-01	1,56E-03	2,31E-02	0,00E+00	0,00E+00	1,53E-03	7,91E-05	1,49E-01	-7,94E-02

[1] The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus almost equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

Use of resources per declared unit (1 m²)										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	3,33E-01	1,15E-03	9,39E-04	0,00E+00	0,00E+00	1,13E-03	8,13E-04	9,14E-02	-3,14E-01
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
PERT	MJ	3,33E-01	1,15E-03	9,39E-04	0,00E+00	0,00E+00	1,13E-03	8,13E-04	9,14E-02	-3,14E-01
PENRE	MJ	8,36E+00	2,06E-02	6,33E-03	0,00E+00	0,00E+00	2,03E-02	3,11E-03	2,29E-01	-1,38E+00
PENRM	MJ.	3,80E+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
PENRT	MJ	1,22E+01	2,06E-02	6,33E-03	0,00E+00	0,00E+00	2,03E-02	3,11E-03	2,29E-01	-1,38E+00
SM	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
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
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
FW	m^3	1,02E-03	1,31E-06	5,61E-05	0,00E+00	0,00E+00	1,30E-06	6,55E-07	3,80E-04	-3,07E-04
Acronyms	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 re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water									

Waste categories per declared unit (1 m²)										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	1,21E-09	1,04E-12	9,76E-13	0,00E+00	0,00E+00	1,02E-12	7,80E-13	5,70E-11	-3,10E-10
Non-hazardous waste disposed	kg	8,09E-03	3,06E-06	1,11E-03	0,00E+00	0,00E+00	3,02E-06	2,67E-06	2,50E-02	-6,49E-04
Radioactive waste disposed	kg	5,67E-04	2,49E-08	2,87E-07	0,00E+00	0,00E+00	2,46E-08	5,76E-07	2,91E-05	-1,01E-04

Output flows per declared unit (1 m²)										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	0,00E+00	0,00E+00	7,35E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Material for recycling	kg	6,21E-03	0,00E+00	1,88E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for energy recovery	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
Exported energy, electricity	MJ	0,00E+00	0,00E+00	5,27E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy, thermal	MJ	0,00E+00	0,00E+00	9,38E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Biogenic carbon content per declared unit (1 m²)		
Indicator	**Unit**	**Value**
Biogenic carbon content in product	kg C	0
Biogenic carbon content in packaging	kg C	0,0015
Note	*1 kg biogenic carbon is equivalent to 44/12 kg CO_2*	

Note: This table applies for all groups because the packaging material for each woven geotextile is the same per declared unit.

Group 2: 1 m² of woven geotextile with a weight of 167 g/m²

Environmental Impact Categories per declared unit (1 m²)										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-fossil	kg CO_2 eq.	3,49E-01	2,80E-03	2,31E-02	0,00E+00	0,00E+00	2,76E-03	1,43E-04	2,71E-01	-1,34E-01
GWP-biogenic	kg CO_2 eq.	-2,18E-03	-3,58E-06	2,69E-03	0,00E+00	0,00E+00	-3,53E-06	-3,69E-06	1,37E-04	-6,74E-04
GWP-luluc	kg CO_2 eq.	1,88E-04	2,30E-05	1,18E-06	0,00E+00	0,00E+00	2,27E-05	9,94E-07	3,10E-05	-9,35E-05
GWP-total	kg CO_2 eq.	3,47E-01	2,82E-03	2,58E-02	0,00E+00	0,00E+00	2,78E-03	1,40E-04	2,71E-01	-1,35E-01
ODP	kg CFC 11 eq.	2,36E-15	3,59E-19	2,78E-18	0,00E+00	0,00E+00	3,53E-19	6,73E-18	4,83E-16	-1,55E-15
AP	mol H^+ eq.	4,65E-04	9,56E-06	3,27E-06	0,00E+00	0,00E+00	9,39E-06	2,27E-07	7,40E-05	-1,76E-04
EP-freshwater	kg P eq.	5,05E-07	8,33E-09	1,39E-08	0,00E+00	0,00E+00	8,21E-09	8,02E-10	6,39E-07	-1,77E-07
EP-marine	kg N eq.	1,38E-04	4,45E-06	8,35E-07	0,00E+00	0,00E+00	4,36E-06	7,64E-08	1,68E-05	-5,00E-05
EP-terrestrial	mol N eq.	1,44E-03	4,96E-05	1,51E-05	0,00E+00	0,00E+00	4,87E-05	8,18E-07	2,39E-04	-5,35E-04
POCP	kg NMVOC eq.	5,14E-04	8,63E-06	2,28E-06	0,00E+00	0,00E+00	8,47E-06	2,10E-07	4,80E-05	-1,40E-04
ADP_m*	kg Sb eq.	6,59E-08	2,14E-10	5,05E-11	0,00E+00	0,00E+00	2,11E-10	7,64E-11	6,12E-09	-2,24E-08
ADP_f*	MJ	1,50E+01	3,74E-02	6,33E-03	0,00E+00	0,00E+00	3,68E-02	5,64E-03	4,16E-01	-2,33E+00
WDP	m^3	1,88E-03	2,44E-05	2,39E-03	0,00E+00	0,00E+00	2,40E-05	9,48E-06	2,59E-02	-1,04E-02
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP_m = Abiotic depletion potential for non-fossil resources; ADP = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption									

** Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.*

Additional environmental impacts:

Additional Impact Categories per declared unit (1 m²)										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG[2]	kg CO_2 eq.	3,49E-01	2,78E-03	2,31E-02	0,00E+00	0,00E+00	2,74E-03	1,42E-04	2,71E-01	-1,34E-01

Use of resources per declared unit (1 m²)										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	5,76E-01	2,09E-03	9,39E-04	0,00E+00	0,00E+00	2,06E-03	1,48E-03	1,66E-01	-5,31E-01
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
PERT	MJ	5,76E-01	2,09E-03	9,39E-04	0,00E+00	0,00E+00	2,06E-03	1,48E-03	1,66E-01	-5,31E-01
PENRE	MJ	1,53E+01	3,74E-02	6,33E-03	0,00E+00	0,00E+00	3,69E-02	5,64E-03	4,16E-01	-2,33E+00
PENRM	MJ.	7,00E+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
PENRT	MJ	2,23E+01	3,74E-02	6,33E-03	0,00E+00	0,00E+00	3,69E-02	5,64E-03	4,16E-01	-2,33E+00
SM	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
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

[2] The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus almost equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

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
FW	m^3	1,82E-03	2,39E-06	5,61E-05	0,00E+00	0,00E+00	2,35E-06	1,19E-06	6,89E-04	-5,19E-04
Acronyms	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 re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water									

Waste categories per declared unit (1 m²)

Indicator	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
Hazardous waste disposed	kg	2,06E-09	1,89E-12	9,76E-13	0,00E+00	0,00E+00	1,86E-12	1,42E-12	1,04E-10	-5,24E-10
Non-hazardous waste disposed	kg	1,40E-02	5,56E-06	1,11E-03	0,00E+00	0,00E+00	5,48E-06	4,84E-06	4,53E-02	-1,10E-03
Radioactive waste disposed	kg	9,12E-04	4,53E-08	2,87E-07	0,00E+00	0,00E+00	4,46E-08	1,05E-06	5,28E-05	-1,71E-04

Output flows per declared unit (1 m²)

Indicator	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
Components for re-use	kg	0,00E+00	0,00E+00	7,35E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Material for recycling	kg	1,77E-02	0,00E+00	1,88E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for energy recovery	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
Exported energy, electricity	MJ	0,00E+00	0,00E+00	5,27E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy, thermal	MJ	0,00E+00	0,00E+00	9,38E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Group 3: 1 m² of woven geotextile with a weight of 110 g/m²

Environmental Impact Categories per declared unit (1 m²)

Indicator	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
GWP-fossil	kg CO_2 eq.	2,26E-01	1,84E-03	2,31E-02	0,00E+00	0,00E+00	1,82E-03	9,39E-05	1,78E-01	-9,25E-02
GWP-biogenic	kg CO_2 eq.	-3,20E-03	-2,36E-06	2,69E-03	0,00E+00	0,00E+00	-2,32E-06	-2,43E-06	9,05E-05	-4,65E-04
GWP-luluc	kg CO_2 eq.	1,17E-04	1,51E-05	1,18E-06	0,00E+00	0,00E+00	1,49E-05	6,55E-07	2,04E-05	-6,45E-05
GWP-total	kg CO_2 eq.	2,23E-01	1,86E-03	2,58E-02	0,00E+00	0,00E+00	1,83E-03	9,21E-05	1,78E-01	-9,30E-02
ODP	kg CFC 11 eq.	1,56E-15	2,36E-19	2,78E-18	0,00E+00	0,00E+00	2,33E-19	4,43E-18	3,18E-16	-1,07E-15
AP	mol H^+ eq.	3,00E-04	6,30E-06	3,27E-06	0,00E+00	0,00E+00	6,18E-06	1,49E-07	4,87E-05	-1,21E-04
EP-freshwater	kg P eq.	3,28E-07	5,49E-09	1,39E-08	0,00E+00	0,00E+00	5,41E-09	5,28E-10	4,21E-07	-1,22E-07
EP-marine	kg N eq.	8,95E-05	2,93E-06	8,35E-07	0,00E+00	0,00E+00	2,87E-06	5,03E-08	1,11E-05	-3,44E-05
EP-terrestrial	mol N eq.	9,34E-04	3,27E-05	1,51E-05	0,00E+00	0,00E+00	3,21E-05	5,39E-07	1,57E-04	-3,69E-04
POCP	kg NMVOC eq.	3,33E-04	5,68E-06	2,28E-06	0,00E+00	0,00E+00	5,58E-06	1,38E-07	3,16E-05	-9,67E-05
ADP_m*	kg Sb eq.	4,15E-08	1,41E-10	5,05E-11	0,00E+00	0,00E+00	1,39E-10	5,03E-11	4,03E-09	-1,55E-08
ADP_f*	MJ	9,92E+00	2,46E-02	6,33E-03	0,00E+00	0,00E+00	2,43E-02	3,71E-03	2,74E-01	-1,61E+00
WDP	m^3	1,54E-03	1,61E-05	2,39E-03	0,00E+00	0,00E+00	1,58E-05	6,25E-06	1,71E-02	-7,15E-03

Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP_m = Abiotic depletion potential for non-fossil resources; ADP = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption

** Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.*

Additional environmental impacts:

Additional Impact Categories per declared unit (1 m²)

Indicator	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
GWP-GHG[3]	kg CO_2 eq.	2,26E-01	1,83E-03	2,31E-02	0,00E+00	0,00E+00	1,80E-03	9,32E-05	1,78E-01	-9,24E-02

Use of resources per declared unit (1 m²)

Indicator	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
PERE	MJ	3,79E-01	1,37E-03	9,39E-04	0,00E+00	0,00E+00	1,35E-03	9,72E-04	1,09E-01	-3,66E-01
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
PERT	MJ	3,79E-01	1,37E-03	9,39E-04	0,00E+00	0,00E+00	1,35E-03	9,72E-04	1,09E-01	-3,66E-01
PENRE	MJ	9,92E+00	2,46E-02	6,33E-03	0,00E+00	0,00E+00	2,43E-02	3,72E-03	2,74E-01	-1,61E+00
PENRM	MJ.	4,54E+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
PENRT	MJ	1,45E+01	2,46E-02	6,33E-03	0,00E+00	0,00E+00	2,43E-02	3,72E-03	2,74E-01	-1,61E+00
SM	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
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
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
FW	m^3	1,20E-03	1,57E-06	5,61E-05	0,00E+00	0,00E+00	1,55E-06	7,83E-07	4,54E-04	-3,58E-04

Acronyms	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 re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

Waste categories per declared unit (1 m²)

Indicator	Unit	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
Hazardous waste disposed	kg	1,39E-09	1,24E-12	9,76E-13	0,00E+00	0,00E+00	1,22E-12	9,33E-13	6,82E-11	-3,61E-10
Non-hazardous waste disposed	kg	9,46E-03	3,66E-06	1,11E-03	0,00E+00	0,00E+00	3,61E-06	3,19E-06	2,98E-02	-7,57E-04
Radioactive waste disposed	kg	6,64E-04	2,98E-08	2,87E-07	0,00E+00	0,00E+00	2,94E-08	6,89E-07	3,48E-05	-1,18E-04

[3] The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus almost equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

Output flows per declared unit (1 m²)										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	0,00E+00	0,00E+00	7,35E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Material for recycling	kg	7,31E-03	0,00E+00	1,88E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for energy recovery	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
Exported energy, electricity	MJ	0,00E+00	0,00E+00	5,27E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy, thermal	MJ	0,00E+00	0,00E+00	9,38E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Group 4: 1 m² of woven geotextile with a weight of 365 g/m²

Environmental Impact Categories per declared unit (1 m²)										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-fossil	kg CO_2 eq.	7,71E-01	6,12E-03	2,31E-02	0,00E+00	0,00E+00	6,03E-03	3,12E-04	5,92E-01	-2,79E-01
GWP-biogenic	kg CO_2 eq.	1,45E-03	-7,82E-06	2,69E-03	0,00E+00	0,00E+00	-7,71E-06	-8,06E-06	3,00E-04	-1,40E-03
GWP-luluc	kg CO_2 eq.	4,89E-04	5,02E-05	1,18E-06	0,00E+00	0,00E+00	4,95E-05	2,17E-06	6,78E-05	-1,94E-04
GWP-total	kg CO_2 eq.	7,73E-01	6,16E-03	2,58E-02	0,00E+00	0,00E+00	6,07E-03	3,06E-04	5,92E-01	-2,80E-01
ODP	kg CFC 11 eq.	5,92E-15	7,84E-19	2,78E-18	0,00E+00	0,00E+00	7,72E-19	1,47E-17	1,06E-15	-3,21E-15
AP	mol H^+ eq.	1,05E-03	2,09E-05	3,27E-06	0,00E+00	0,00E+00	2,05E-05	4,95E-07	1,62E-04	-3,66E-04
EP-freshwater	kg P eq.	1,20E-06	1,82E-08	1,39E-08	0,00E+00	0,00E+00	1,79E-08	1,75E-09	1,40E-06	-3,67E-07
EP-marine	kg N eq.	3,10E-04	9,72E-06	8,35E-07	0,00E+00	0,00E+00	9,53E-06	1,67E-07	3,67E-05	-1,04E-04
EP-terrestrial	mol N eq.	3,23E-03	1,08E-04	1,51E-05	0,00E+00	0,00E+00	1,06E-04	1,79E-06	5,22E-04	-1,11E-03
POCP	kg NMVOC eq.	1,09E-03	1,89E-05	2,28E-06	0,00E+00	0,00E+00	1,85E-05	4,59E-07	1,05E-04	-2,91E-04
ADP_m*	kg Sb eq.	1,56E-07	4,67E-10	5,05E-11	0,00E+00	0,00E+00	4,60E-10	1,67E-10	1,34E-08	-4,66E-08
ADP_f*	MJ	3,21E+01	8,17E-02	6,33E-03	0,00E+00	0,00E+00	8,05E-02	1,23E-02	9,10E-01	-4,84E+00
WDP	m^3	3,50E-03	5,33E-05	2,39E-03	0,00E+00	0,00E+00	5,25E-05	2,07E-05	5,66E-02	-2,16E-02
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP_m = Abiotic depletion potential for non-fossil resources; ADP = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption									

** Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.*

Additional environmental impacts:

Additional Impact Categories per declared unit (1 m²)										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG[4]	kg CO_2 eq.	7,71E-01	6,17E-03	2,31E-02	0,00E+00	0,00E+00	6,08E-03	3,14E-04	5,92E-01	-2,79E-01

[4] The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus almost equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

Use of resources per declared unit (1 m²)										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	1,46E+00	4,56E-03	9,39E-04	0,00E+00	0,00E+00	4,49E-03	3,22E-03	3,62E-01	-1,10E+00
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
PERT	MJ	1,46E+00	4,56E-03	9,39E-04	0,00E+00	0,00E+00	4,49E-03	3,22E-03	3,62E-01	-1,10E+00
PENRE	MJ	3,21E+01	8,18E-02	6,33E-03	0,00E+00	0,00E+00	8,06E-02	1,23E-02	9,10E-01	-4,84E+00
PENRM	MJ.	1,57E+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
PENRT	MJ	4,79E+01	8,18E-02	6,33E-03	0,00E+00	0,00E+00	8,06E-02	1,23E-02	9,10E-01	-4,84E+00
SM	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
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
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
FW	m^3	3,83E-03	5,22E-06	5,61E-05	0,00E+00	0,00E+00	5,14E-06	2,60E-06	1,51E-03	-4,69E-05
Acronyms	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 re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water									

Waste categories per declared unit (1 m²)										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	4,29E-09	4,12E-12	9,76E-13	0,00E+00	0,00E+00	4,06E-12	3,10E-12	2,26E-10	-1,09E-09
Non-hazardous waste disposed	kg	2,96E-02	1,21E-05	1,11E-03	0,00E+00	0,00E+00	1,20E-05	1,06E-05	9,90E-02	-2,28E-03
Radioactive waste disposed	kg	1,52E-03	9,89E-08	2,87E-07	0,00E+00	0,00E+00	9,75E-08	2,29E-06	1,15E-04	-3,55E-04

Output flows per declared unit (1 m²)										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	0,00E+00	0,00E+00	7,35E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Material for recycling	kg	3,41E-02	0,00E+00	1,88E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for energy recovery	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
Exported energy, electricity	MJ	0,00E+00	0,00E+00	5,27E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy, thermal	MJ	0,00E+00	0,00E+00	9,38E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Additional information

Transport to the building site (A4)		
Scenario information	**Unit**	**Value**
Vehicle type for transport	n/a	10% Euro 5 truck, 14-20t gross weight, 11,4t payload 90% Euro 5 truck, 26-28t gross weight, 18.4t payload
Distance to supplier	km	100
Distance to construction site	km	35
Capacity utilisation	%	50
Bulk density of transported products	kg/dm³	0,91
Volumes capacity utilisation factor	n/a	0,60

Installation of the product (A5)		
Scenario information	**Unit**	**Value**
Ancillary materials	kg	0
Water use	m³	0
Other resource use	kg	0
Energy type and consumption	kWh	0
Plastic tube packaging waste	kg	0,0078
Plastic film packaging waste	kg	0,0012
Wooden pallet packaging waste	kg	0,0037
Direct emission to ambient air, soil and water	kg	0

Reference service life	
RSL information	**Years**
Reference service life	100 years

End of life (C1-C4)			
Process	**Scenario information**	**Unit**	**Value**
Collection process	% collected separately	%	0
	% collected with mixed construction waste	%	100
Recovery system specified by type	% for re-use	%	0
	% for recycling	%	26
	% for energy recovery	%	47,5
Disposal specified by type	% for final deposition	%	26,5

References

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