ENVIRONMENTAL PRODUCT DECLARATION

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

Owner of the Declaration	Letbek A/S
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-LET-20240242-CBI1-EN
Issue date	25.09.2024
Valid to	24.09.2029

Ramps, Danfod, Cones, Covers and Top rings, and support products made of pressure moulded cable waste

Letbek A/S

Institut Bauen und Umwelt e.V.

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LETBEK
re-imagineering plastic

General Information

Letbek A/S

Programme holder

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

Declaration number

EPD-LET-20240242-CBI1-EN

This declaration is based on the product category rules:

Boards and panels made of plastic (interior and exterior applications), 01.06.2023
(PCR checked and approved by the SVR)

Issue date

25.09.2024

Valid to

24.09.2029

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

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

Ramps, Danfod, Cones, Covers and Top rings, and support products made of pressure moulded cable waste

Owner of the declaration

Letbek A/S
Hornevej 18
6862 Tistrup
Denmark

Declared product / declared unit

1 kg of ramps, Danfod, cones, covers and top rings, and support products made of pressure moulded recycled polyethylene and recycled polyvinyl chloride.

Scope:

This Environmental Product Declaration described is a representative EPD of construction products manufactured at Letbek A/S facility in Tistrup, Denmark.
It includes the following products:

- Ramps
- Danfod™
- Cones, covers and top rings
- Support products

All of the above-mentioned products are made of recycled polyethylene and recycled polyvinyl chloride and go through extrusion and pressure moulding processes. The data used was collected at the production site or delivered by suppliers.

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

Mr Olivier Muller,
(Independent verifier)

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Product

Product description/Product definition

This Environmental Product Declaration covers several construction products made of recycled polyethylene (rPE) and recycled polyvinyl chloride (rPVC) by extrusion and pressure moulding. The product group under study covers 60 products, which are used for similar purposes.
The products included are:

- 10002: Fartdæmper
- 10003: Overkørselsrampe
- 10004: Danfod I
- 10005: Danfod II
- 10007: Topring ø320x22/9 mm
- 10009: Topring ø320x30 mm
- 10010: Topring ø320x50 mm
- 10011: Topring ø320x100 mm
- 10012: Topring t/kantsten ø320x30 mm
- 10013: Topring t/kantsten ø320x50 mm
- 10014: Topring t/kantsten ø320/100 mm
- 10015: Topring ø425x22/9 mm
- 10016: Topring ø425x15 mm
- 10017: Topring ø425x30 mm
- 10018: Topring ø425x50 mm
- 10019: Topring ø425x100 mm
- 10020: Topring ø600x22/9 mm
- 10021: Topring ø600x15 mm
- 10022: Topring ø600x30 mm
- 10023: Topring ø600x50 mm
- 10024: Topring ø610x100 mm
- 10025: Topring ø610x150 mm
- 10026: Topring ø800x9/22 mm
- 10027: Topring ø800x15 mm
- 10028: Topring ø800x30 mm
- 10029: Topring ø800x50 mm
- 10030: Topring ø800x100 mm
- 10031: Kegle ø315x200 mm
- 10032: Kegle ø425x150 mm
- 10037: Topring ø280x10 mm
- 10097: Kantpælsokkel Ø210/285x305 mm
- 10261: Topafslutning ø600 mm - Tegra
- 10336: Dæksel ø600x70 mm 25 kg
- 10378: Danfod III 26 kg f/skilte
- 10379: Dæksel ø315 mm m/mønster
  10380: Dæksel ø425 mm m/mønster
- 10388: Danfod 12 kg. 400x400x110 mm m/hul 40x40 mm
- 10404: Danfod 6,5 kg 8-kantet
- 10413: Hydrantdæksler ø355mm
- 10497: Fod til stander m/GB logo 39x39 cm m/hul på 18 mm
- 10537: Gema fod 30 kg
- 10541: Brønddæksel ø355 mm m/Agrometer logo
- 10640: Kegle ø315 mm m/fals
- 10641: Kegle ø425 mm m/fals
- 10642: Dæksel ø315 mm m/fals + BD logo
- 10643: Dæksel ø425 mm m/fals + BD logo
- 10644: Topring ø320x15 mm m/knæk-af-kant
- 10645: Topring ø320x30 mm m/fals
- 10646: Topring ø320x50 mm m/fals
- 10647: Topring ø320x100 mm m/fals
- 10648: Topring ø425x30 mm m/fals
- 10649: Topring ø425x50 mm m/fals
- 10650: Topring ø425x100 mm m/fals
- 10651: Topring ø600x30 mm m/fals
- 10652: Topring ø600x50 mm m/fals
- 10653: Topring ø610x100 mm m/fals
- 10654: Topring ø610x150 mm m/fals
- 10655: Dæksel ø315 mm m/fals
- 10656: Dæksel ø425 mm m/fals
- 10659: Danfod 12 kg m/60x60 mm hul

For the use and application of the product the respective national provisions at the place of use apply, in Germany for example the building codes of the federal states and the corresponding national specifications.

Application

The products covered by this Environmental Product Declaration have different applications. However, these are grouped into 4 categories, depending on their application:

- Ramps (fartdæmper, overkørselsrampe): movable overpass ramps used in construction sites,
- Cones, covers and top rings (topring, kegle, dæksel): used as manhole covers.
- Danfod™: used in construction sites.
- Support products (kantpælsokkel and Gema fod): used in construction sites and as traffic safety.

Technical Data

No technical specifications are available as the recycled raw materials that the product consists of varies from batch to batch. Certain tests cannot be performed because the material cannot be converted into tensile test specimens.

Constructional data

Name	Value	Unit
Gross density	1330	kg/m^3
Maximum load achieved: ramps	75.9-133	kN
Maximum load achieved: covers according to EN 124-1	9.34-33.7	kN
Maximum load achieved: top rings	316-406	kN

For the remaining products (Danfod™ and support products) there is no constructional data available.

Performance data of the product with respect to its characteristics in accordance with the relevant technical provision (no CE-marking).

Base materials/Ancillary materials

Name	Value	Unit
Recycled PE/PVC	100	%

This product/article/at least one partial article contains substances listed in the candidate list (date: 25.04.2024) exceeding 0.1 percentage by mass: **No**

Manufacture

The products are manufactured by extrusion and pressure moulding at Letbek's facility. The rPE/rPVC mix is added to the extruder, after which the extruded plastic is added to the compressor to be pressure moulded. The waste material generated during production is re-granulated and re-enters to the production loop.

Environment and health during manufacturing

No further environmental protection measures beyond those which are legally prescribed as necessary.

Product processing/installation

The products are manually installed.

Packaging
Products are delivered in pallets (and some with additional pallet frames), wrapped in plastic film and steel band. Pallet, frames and steel band can be recycled. Plastic film can be recycled, although it is generally incinerated.

Conditions of use
The products are designed to withstand heavy traffic and various weather conditions. They require low maintenance, reducing the need for frequent replacements.

Environment and health during use
There are no known harmful substances, emissions, or other environmental or health impacts associated with the use of this product. The product does not release any hazardous chemicals or pollutants during its intended use.

Reference service life
The reference service life is not relevant for consideration of the LCA since the use stage (modules B1-B7) is not included.

LCA: Calculation rules

Declared Unit
The declared unit is 1 kg of product made of pressure moulded recycled polyethylene (rPE) and recycled polyvinyl chloride (rPVC).

Declared unit and mass reference

Name	Value	Unit
Gross density	1330	kg/m^3
Declared unit	1	kg
Conversion factor to 1 kg	1	-

All products declared in this EPD follows the same production process on the same machinery at the exact same location. All products are produced with the same fully recycled mix of PE and PVC, however, there is a variability of the amount of PE and PVC per kg of raw material. However, as a consequence of the cut-off boundary, the recycled content comes into the system burden free for which reason it has no impact on the environmental performance of the products.

System boundary
This is a cradle-to-gate EPD with modules A1-A3, C1-C4 and D.

Product stage - Modules A1-A3
The production stage includes:

- A1, processing of secondary material from previous product systems.
- A2, transport to factory gate.
- A3, manufacturing of products and packaging, as well as processing up to the end-of-waste state.

All the above-mentioned is included in this study. Waste and losses during manufacturing are included in the processes in which they occur, according to the "polluter-pays" principle. Machinery and construction of the manufacturing facility is not included in this study.

End-of-life stage - Modules C1-C4
The end-of-life stage includes:

- C1, deconstruction and demolition.
- C2, transport to waste processing.
- C3, waste processing for reuse, recovery and/or recycling.
- C4, disposal.

The deconstruction of the products is assumed to be done manually. As a result, no processes have been assigned to module C1. Most of the products are sold in the Danish market; hence, the transportation distance is modelled under Danish conditions. A transport distance of 50 km is assumed from the site to the waste processing facilities. End-of-life treatment of packaging material is not included, as module A5 is not declared.

Benefits and loads beyond the system boundaries - Module D
No benefits and loads arise in this module, as the waste material is assumed to be disposed of in a landfill in module C4.

Estimates and assumptions
The transport of raw materials and waste materials was assumed to occur using the same type of vehicle. In addition, a distance of 50 km was assumed to a waste disposal site in module C2.

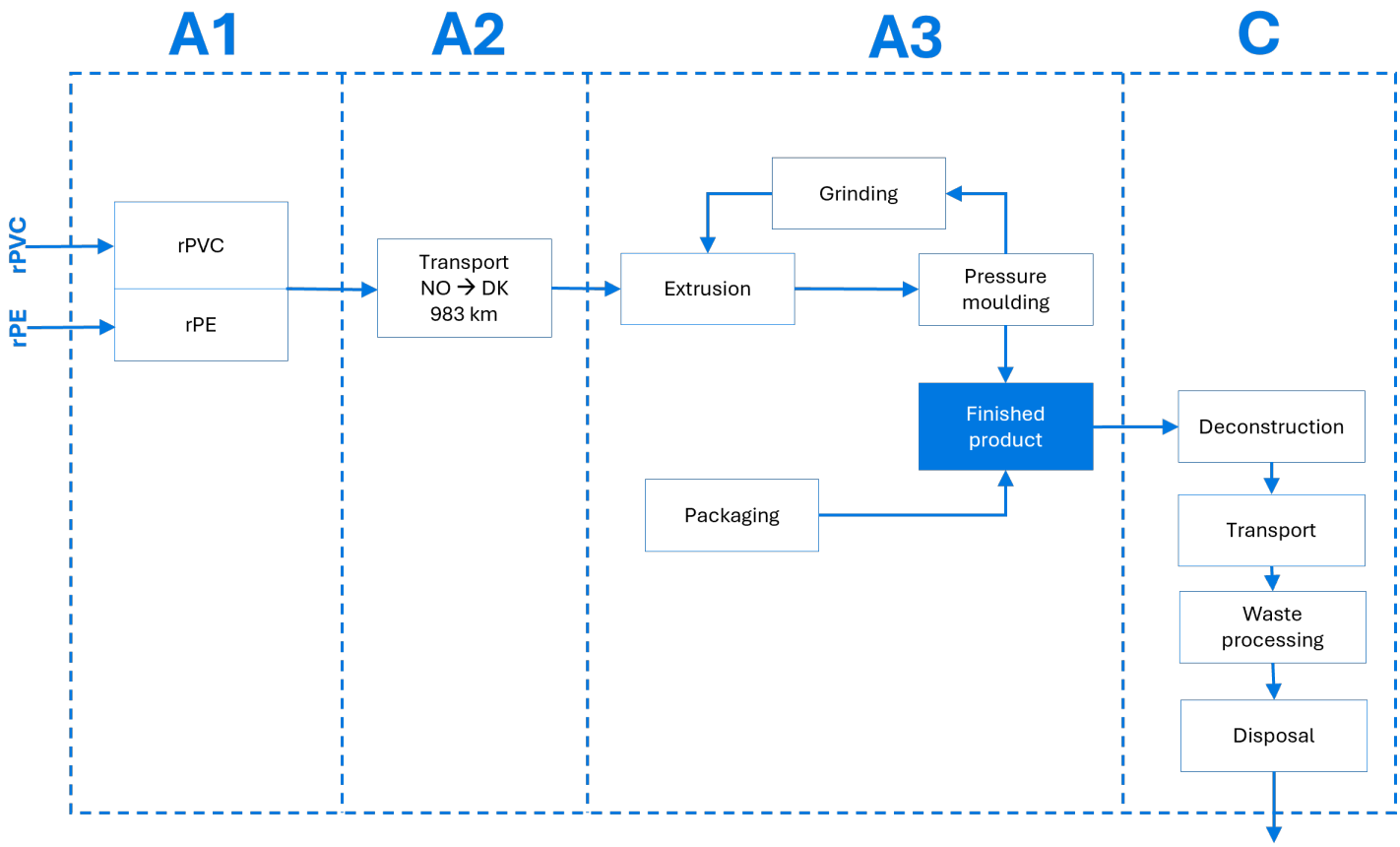
Cut-off criteria
Machinery, spare parts for machinery, as well as inputs needed for operation and maintenance are excluded from this study, as these are expected to be under the cut-off criteria, due to the long lifespan of the machinery.

Background data
Background data was used for modules A1, A2, C1-C4 and D. Data from ecoinvent 3.10, EN 15804 database was used as background data and is not more than 5 years old.

Data quality
The robustness of the LCA values is judged to be good. All products belong to the same group, are made from the same raw materials, go through the same manufacturing processes (extrusion, pressure moulding and re-granulation of waste), follow the same end-of-life treatment, and are used for similar purposes. Direct measurements of individual machines were taken. When different machinery is used, the worst-case values relating to electricity consumption are used.

The geographical representativeness is good, as all products are manufactured in Denmark.

Period under review
Production data is based on average values collected in 2023.



Geographic Representativeness
Land or region, in which the declared product system is manufactured, used or handled at the end of the product´s lifespan: Denmark

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.

LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon
The biogenic carbon content quantifies the amount of biogenic carbon in a construction product leaving the factory gate. Both the biogenic content of the product and the accompanying packaging is declared.

Information on describing the biogenic carbon content at factory gate

Name	Value	Unit
Biogenic carbon content in product	-	kg C
Biogenic carbon content in accompanying packaging	0.111	kg C

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

The following technical scenario information covers the disposal of the accompanying packaging material, produced in module A3, on the construction site as module A5 is not declared in this EPD.

Installation into the building (A5)

Name	Value	Unit
Packaging waste for recycling, wood pallet	1.1E-01	kg
Packaging waste for recycling, pallet frames	1.33E-01	kg
Packaging waste for recycling, steel band	1.25E-03	kg
Packaging waste for incineration, plastic film	5.05E-03	kg

End of life (C1-C4)

Name	Value	Unit
Collected separately waste type PE/PVC	1	kg
Landfilling	1	kg

According to Danish Waste Executive Order, non-recyclable PVC waste must be deposited in a landfill. As a result, Letbek's products are assumed to be sorted into fractions on-site, along with other similar products, to be landfilled. Therefore, the waste is assumed to be collected separately from mixed construction waste.

C1 is declared as 0 since manual deconstruction is assumed.
C3 is declared as 0 since no waste processing is assumed at the end-of-life stage, as the declared product is a mix between rPE/rPVC and under Danish regulations, non-recyclable PVC must be landfilled.
D is declared as 0 since the materials are landfilled and no loads or benefits emerge.

LCA: Results

The following tables show the LCA results obtained in this study.
For calculation of the results, characterization was used on a model created of individual inputs from different LCIA methods to comply with *EN 15804+A2*. The LCIA has been calculated in Excel using the following methods from ecoinvent 3.10:

- EF v.3.1 *EN 15804*
- *EN 15804* inventory indicators according to *ISO 21930*

The additional indicators are retrieved by using ecoinvent cumulative LCIA results for the system model *EN 15804*, cut-off. It follows *ISO 21930* for all the datasets; hence, the results include all the background processes as well as foreground processes.

The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins or risks.

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	MND	MND	MND	MND	MNR	MNR	MNR	MND	MND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 kg plastic product (PE/PVC)

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Global Warming Potential total (GWP-total)	kg CO_2 eq	3.24E-01	0	9.51E-03	0	6.77E-02	0
Global Warming Potential fossil fuels (GWP-fossil)	kg CO_2 eq	6.83E-01	0	9.5E-03	0	6.76E-02	0
Global Warming Potential biogenic (GWP-biogenic)	kg CO_2 eq	-3.59E-01	0	6.25E-06	0	1.02E-04	0
Global Warming Potential luluc (GWP-luluc)	kg CO_2 eq	4.4E-04	0	3.16E-06	0	2.11E-06	0
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC11 eq	1.16E-08	0	1.89E-10	0	3.4E-10	0
Acidification potential of land and water (AP)	mol H^+ eq	1.74E-03	0	1.69E-05	0	2.14E-04	0
Eutrophication potential aquatic freshwater (EP-freshwater)	kg P eq	1.84E-04	0	6.43E-07	0	7.41E-07	0
Eutrophication potential aquatic marine (EP-marine)	kg N eq	4.8E-04	0	4.75E-06	0	3.85E-04	0
Eutrophication potential terrestrial (EP-terrestrial)	mol N eq	5.05E-03	0	5.13E-05	0	3.05E-04	0
Formation potential of tropospheric ozone photochemical oxidants (POCP)	kg NMVOC eq	2.16E-03	0	3.29E-05	0	1.31E-04	0
Abiotic depletion potential for non fossil resources (ADPE)	kg Sb eq	1.95E-06	0	3.16E-08	0	2.44E-08	0
Abiotic depletion potential for fossil resources (ADPF)	MJ	9.87E+00	0	1.34E-01	0	2.39E-01	0
Water use (WDP)	m^3 world eq deprived	9.63E-02	0	6.53E-04	0	1.59E-03	0

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 kg plastic product (PE/PVC)

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Renewable primary energy as energy carrier (PERE)	MJ	2.82E+00	0	2.29E-03	0	6.32E-03	0
Renewable primary energy resources as material utilization (PERM)	MJ	3.42E+00	0	0	0	0	0
Total use of renewable primary energy resources (PERT)	MJ	6.24E+00	0	2.29E-03	0	6.32E-03	0
Non renewable primary energy as energy carrier (PENRE)	MJ	9.43E+00	0	1.34E-01	0	2.39E-01	0
Non renewable primary energy as material utilization (PENRM)	MJ	2.17E+01	0	0	0	0	0
Total use of non renewable primary energy resources (PENRT)	MJ	3.11E+01	0	1.34E-01	0	2.39E-01	0
Use of secondary material (SM)	kg	1E+00	0	0	0	0	0
Use of renewable secondary fuels (RSF)	MJ	0	0	0	0	0	0
Use of non renewable secondary fuels (NRSF)	MJ	0	0	0	0	0	0
Use of net fresh water (FW)	m^3	9.45E-03	0	1.8E-05	0	0	0

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 kg plastic product (PE/PVC)

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Hazardous waste disposed (HWD)	kg	5.01E-02	0	1.95E-04	0	3.63E-04	0
Non hazardous waste disposed (NHWD)	kg	1.05E+00	0	4.12E-03	0	1E+00	0
Radioactive waste disposed (RWD)	kg	3E-06	0	1.07E-08	0	1.86E-08	0
Components for re-use (CRU)	kg	0	0	0	0	0	0
Materials for recycling (MFR)	kg	0	0	0	0	0	0
Materials for energy recovery (MER)	kg	0	0	0	0	0	0

Exported electrical energy (EEE)	MJ	0	0	0	0	0	0
Exported thermal energy (EET)	MJ	0	0	0	0	0	0

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional:
1 kg plastic product (PE/PVC)

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Incidence of disease due to PM emissions (PM)	Disease incidence	2.9E-08	0	6.99E-10	0	1.63E-09	0
Human exposure efficiency relative to U235 (IR)	kBq U235 eq	5.73E-02	0	1.73E-04	0	3.42E-04	0
Comparative toxic unit for ecosystems (ETP-fw)	CTUe	2.46E+00	0	3.64E-02	0	6.35E+00	0
Comparative toxic unit for humans (carcinogenic) (HTP-c)	CTUh	3.79E-09	0	6.75E-11	0	6.23E-11	0
Comparative toxic unit for humans (noncarcinogenic) (HTP-nc)	CTUh	6.3E-09	0	8.65E-11	0	2.09E-10	0
Soil quality index (SQP)	SQP	3.47E+01	0	8.07E-02	0	5.7E-01	0

Disclaimer 1 – for the indicator 'Potential Human exposure efficiency relative to U235'. This impact category deals mainly with the eventual impact of low-dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure or radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, radon and from some construction materials is also not measured by this indicator.

Disclaimer 2 – for the indicators 'abiotic depletion potential for non-fossil resources', 'abiotic depletion potential for fossil resources', 'water (user) deprivation potential, deprivation-weighted water consumption', 'potential comparative toxic unit for ecosystems', 'potential comparative toxic unit for humans – cancerogenic', 'Potential comparative toxic unit for humans - not cancerogenic', 'potential soil quality index'. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high as there is limited experience with the indicator.

References

Standards

EN 124-1
EN 124-1:2015, Gully tops and manhole tops for vehicular and pedestrian areas - Part 1: Definitions, classification, general principles of design, performance requirements and test methods

EN 15804
EN 15804:2012+A2:2019+AC:2021, Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products.

ISO 14025
EN ISO 14025:2011, Environmental labels and declarations — Type III environmental declarations — Principles and procedures.

ISO 14040
ISO 14040:2006, Environmental management –Life cycle assessment - Principles and framework; English version

ISO 14044
ISO 14044:2006, Environment Management – Life Cycle Assessment - Requirements and Instructions; English version

ECHA candidate list
Candidate List of substances of very high concern for Authorisation
https://echa.europa.eu/candidate-list-table [Accessed 25-04-2024]

Ecoinvent 3.10
Ecoinvent database version 3.10, cut-off, EN15804 model. LCIA methodology EF v3.1 EN15804.Wernet, G., Bauer, C., Steubing, B., Reinhard, J., Moreno-Ruiz, E., and Weidema, B., 2016. The ecoinvent database version 3 (part I): overview and methodology. The International Journal of Life Cycle Assessment, [online] 21(9), pp.1218–1230. Available at: https://ecoinvent.org/ecoinvent-v3-10/ [Accessed 12-04-2023].

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IBU PCR Part A
PCR - Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report according to EN 15804+A2:2019. Version 1.2

IBU PCR Part B
PCR - Part B: Requirements on the EPD for Boards and panels made of plastic (interior and exterior applications) - version 7 (2023)

Further references

Publisher

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

+49 (0)30 3087748- 0
info@ibu-epd.com
www.ibu-epd.com

Programme holder

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

+49 (0)30 3087748- 0
info@ibu-epd.com
www.ibu-epd.com

Author of the Life Cycle Assessment

Viegand Maagøe
Nørre Farimagsgade 37
1364 København K
Denmark

+45 33349000
info@viegandmaagoe.dk
viegandmaagoe.dk

Owner of the Declaration

Letbek A/S
Hornevej 18
6862 Tistrup
Denmark

+45 75299444
info@letbek.dk
www.letbek.com