



Environmental Product Declaration

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

LIP 544 Multi Light Tile Mortar

***from LIP Bygningsartikler A/S, Industrivej 16 · DK-5580 Nørre
Aaby***



Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
EPD registration number:	S-P-09194
Publication date:	31-07-2023 (version 1)
Valid until:	31-07-2028 (version 1)

An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com

General information

Owner of the declaration and manufacturer:

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Declaration issued: 31-07-2023 (version1)

EPD Prepared by: Bureau Veritas HSE, Denmark.

EPD Verified by: Bureau Veritas Certification, Audit Team:

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Standards: ISO 14025 and EN 15804+A2:2019. EPD's of other construction products may not be comparable if they do not comply with this standard.

Statement: This report records that the LCA based information and the additional information declared in the EPD meets the requirements of the European Standard EN 15804:2012+A2:2019 and PCR 2019:14 v 1.2.5.

Scope: This LCA study is intended to be used in cradle-to-gate with options EPD and covers the life cycle sub-modules A1-A3, A4, A5, C1-C4, and D the following tile mortar in table 1, produced by LIP Bygningsartikler A/S at the same production site. The product specific EPD will be accessible on <http://www.lip.dk/> together with safety data sheet and product information, providing information for business-to-business communication. The Geographical scope is Europe and the product follows the UN CPC 3733 - Refractory cements, mortars, concretes and similar compositions n.e.c.

About LIP Bygningsartikler A/S

LIP Bygningsartikler A/S is a Danish Company, which since its founding in 1967 has produced high quality products at competitive prices.

The product range from the beginning was tile adhesive and sealants, which since then has been expanded with products within flooring putty, waterproofing, silicone, epoxy, filler compounds, etc.

All our products are continuously under internal as well as external quality control, so that we can always live up to our slogan:

LIP - when building on quality!

Product information

Product represented

LIP 544 Multi Light Tile Mortar.



Figure 1: Pictures of the LIP product covered in this project report.

Product description

This product is manufactured by LIP Byggningsartikler A/S in the production plants located in Nørre Aaby, Denmark. This product is used for fixing and laying wall and floor tiles, marble, facing bricks, glass wool batts, Rockwool batts, polystyrene veneers, etc.

The manufacturing process starts from raw materials purchased from suppliers and stored in the plant. Bulk raw materials are stored in specific silos and added mostly automatically in the production mixer, according to the formula of the product. Other raw materials, supplied in bags or big bags, are stored in their warehouse

and added automatically or manually in the mixer. The production is a discontinuous process, in which all the components are mechanically mixed in batches.

The semi-finished product is then packaged in bags, put on wooden pallets, covered by stretched hoods and stored in the 'Finished Products' section LIP's warehouse. The quality of final products is controlled before the sale.

The product is supplied from production in dry form, premixed in respect of all contents but water. Water is added at the building site in the construction/ installation stage, in a defined amount and technique, in order to produce a deformable cementitious adhesive of high performance. The product is under UN CPC 3733 - Refractory cements, mortars, concretes and similar compositions N.E.C.

Table 1: Product information for the product covered by this EPD.

Product name		Article no.	Description
Danish	English		
LIP 544 Multi Let Fliseklæb	LIP 544 Multi Light Tile Mortar	24005	15 kg bags 0.7 kg/mm/m ² 0.54L water per kg

Declared Unit

The declared unit (DU) is 1 kg of dry-packed finished product. This EPD describes the environmental impact of 1 kg of dry-packed mortar. The reason for using 1kg and not 1m² is that the product consumption varies depending on the size of the tile, unevenness, grout size.

Reference service life

According to LIP Bygningsartikler A/S experience, the Reference Service Life (RSL) of premade mortar is not applicable, as B1-B7 modules are not declared and not assessed. The product does not need maintenance or replacement during its service life, if professionally used and properly installed.

Technical data

The product is designed, produced and CE marked according to EN 12004 (Adhesives for tiles. Requirements, evaluation of conformity, classification and designation).

They are classified as seen in table 2 according to EN 12004:2007+A1:2012 for interior and exterior bonding of ceramic tiles, porcelain, natural stone and mosaics on floors and walls. The CE marking information can be found directly on LIPs website here:

<https://lip.dk/produkter/klaebning-af-fliser-og-klinker/lip-multi-let-544-fliseklaeb/>

for the LIP 544 Multi Light Tile Mortar.

Table 2: Performance information for the product according to EN 12004:2007+A1:2012.

	LIP 544 Multi Light Tile Mortar
	C2-TE-S1

Initial tensile adhesion strength	≥ 1 N/mm ²
Early tensile adhesion strength after 6 hours	N/A
Tensile adhesion strength after heat aging	≥ 1 N/mm ²
Tensile adhesion strength after water immersion	≥ 1 N/mm ²
Tensile adhesion strength after freeze -thaw cycles	≥ 1 N/mm ²

Air emission

LIP 544 is covered in this EPD has low dust technology and very low emission of volatile organic compounds and documented with GEV-EMICODE EC 1^{PLUS}. Documentation for GEV-EMICODE can be found on lip.dk and can be also provided upon request.



Content declaration

Content declaration including packaging covering the LIP 544 Multi Light Tile Mortar in this EPD.

Table 3: Content declaration, which covers the LIP 544 Multi Light Tile Mortar product.

LIP 544 Multi Light Tile Mortar			
Product components		Weight%	Post-consumer material, weight-%
Silica sand		10-60	0%
Portland cement, CAS. 65997-15-1		20-60	0%
Additives		1-20	0%
Packaging materials		Weight, kg	Weight-% (versus the product)
Bags	Paper	12.2 g/kg product (for 15 kg bag)	12.2 % (for 15 kg bag)
	PE-film	0.5g/kg product	0.05 %
Transport packaging	PE-film	0.6g/kg product	0.06 %
Total:			<15%

During the life cycle of the product no hazardous substance listed in the “Candidate List of Substances of Very High Concern (SVHC) for authorization” has been used in a percentage higher than 0.1% of the weight of the product.

LCA information

Product category rules (PCR)

PCR 2019:14 Construction products (EN 15804:A2) Version 1.2.5.

Time representativeness

Data from factory (primary data) is from 2022.

Database(s) and LCA software used

LCA Software: Simapro 9.5

Database: Most processes in the LCA Software have been modelled using the EcoInvent database 3.9.1. The database was available in SimaPro as local LCI process libraries, allowing for background data integration. Instead of using generic data for the main components including cement, calcium carbonate and polymer powder, the suppliers of those raw materials were contacted and specific EPD for their raw materials were used.

EPDs used as input data along with their EPD related information i.e. EPD program, validity dates, owner, etc. are presented 'Database section' of the LCA project report, in order to preserve confidentiality of the supplier. The input EPDs are valid and approved by EPD International System, www.environdec.com.

The impact models used are the ones included in the SimaPro method named EN 15804 +A2 Method V1.00 / EF 3.0 normalization and weighting set. The chosen LCIA categories are the ones used in EN 15804+A2 as implemented in SimaPro 9.4.0.2, they are as follow:

Table 4: LCIA Categories

Impact Category	Indicator	Unit	Original reference
Climate Change - Fossil	Global Warming Potential fossil (GWP-fossil)	Kg CO ₂ eq. (Carbon dioxide)	Baseline model of 100 years of the IPCC based on IPCC 2021
Climate Change - Biogenic	Global Warming Potential biogenic (GWP-biogenic)	Kg CO ₂ eq. (Carbon dioxide)	Baseline model of 100 years of the IPCC based on IPCC 2013
Climate Change – Land Use and Land Use Change (LULUC)	Global Warming Potential Land use and land use change (GWP-LULUC)	Kg CO ₂ eq. (Carbon dioxide)	Baseline model of 100 years of the IPCC based on IPCC 2013
Climate Change - Total	Global Warming Potential total (GWP-total)	Kg CO ₂ eq. (Carbon dioxide)	Baseline model of 100 years of the IPCC based on IPCC 2021
Ozone Depletion	Depletion potential of the stratospheric ozone layer (ODP)	Kg CFC 11 eq. (Trichlorofluoromethane)	Steady-state ODPs, WMO 2014.
Acidification	Acidification potential, Accumulated Exceedance (AP)	Mol H ⁺ eq. (Hydrogen ions)	Accumulated Exceedance, Seppälä et al. 2006, Posch et al., 2008.
Eutrophication aquatic freshwater	Eutrophication potential, fraction of nutrients reaching freshwater end compartment (EP-freshwater)	Kg P eq. (Phosphorous)	EUTREND model, Struijs et al., 2009b, as implemented in ReCiPe.
Eutrophication aquatic marine	Eutrophication potential, fraction of nutrients reaching freshwater end compartment (EP-marine)	Kg N eq. (Nitrogen)	EUTREND model, Struijs et al., 2009b, as implemented in ReCiPe.
Eutrophication terrestrial	Eutrophication potential, Accumulated Exceedance (EP-Terrestrial)	Mol N eq. (Nitrogen)	Accumulated Exceedance, Seppälä et al. 2006, Posch et al.
Photochemical ozone formation	Formation potential of tropospheric ozone (POCP)	Kg NMVOC eq. (Non-methane volatile organic compounds)	LOTOS-EUROS, Van Zelm et al., as applied in ReCiPe.
Depletion of abiotic resources – Minerals and metals	Abiotic depletion potential for non-fossil resources (ADP-minerals & metals)**	Kg sb eq. (Antimony)	CML 2002, Guinée et al., 2002, and van Ooers et al. 2002
Depletion of abiotic resources – Fossil fuels	Abiotic depletion potential for fossil resources (ADP-fossil)**	MJ, net calorific value (Megajoules)	CML 2002, Guinée et al., 2002, and van Ooers et al. 2002

Water Use	Water (user) deprivation potential, deprivation-weighted water consumption (WDP)**	m ³ world eq. Deprived	Available Water Remaining (AWARE) Boulay et al., 2016.
Particulate matter emissions	Potential incidence of disease due to PM emissions (PM)	Disease incidence	SETAP-UNEP, Fantke et al 2016
Ionising radiation, human health	Potential Human exposure efficiency relative to U235 (IRP)*	kBq U235 eq. (kiloBecquerel)	Human health effect model as developed by Dreicer et al. 1995 update by Freischknecht et al., 2000
Ecotoxicity (freshwater)	Potential comparative Toxic Units for ecosystems (ETP-fw)**	CTUe (Comparative Toxic Units ecosystems)	UseTox version 2 until the modified USEtox model is available from EC-JRC
Human toxicity, cancer effects	Potential comparative Toxic Units for humans (HTP-c)**	CTUh (Comparative Toxic Units humans)	UseTox version 2 until the modified USEtox model is available from EC-JRC
Human toxicity, non-cancer effects	Potential comparative Toxic Units for humans (HTP-nc)**	CTUh (Comparative Toxic Units humans)	UseTox version 2 until the modified USEtox model is available from EC-JRC
Land use related impacts/soil quality	Potential Soil Quality index (SQP)**	Dimensionless	Soil quality index based on LANCA.

Cut-off criteria for initial inclusion of inputs and outputs

The general rules for cut-off of inputs and outputs follow the requirements in EN 15804, 6.3.5, where the total of neglected input flows per module shall be a maximum of 5 % of energy usage and mass and 1 % of energy usage and mass for unit processes. Recycling processes and benefits for recycled plastic packaging is regarded as below cut-off criterion of 1%.

Particular care should be taken to include material and energy flows known to have the potential to cause significant emissions into air and water or soil related to the environmental indicators presented in EN 15804.

The LCA study are based on known specific activity data for packing materials and 100% product prescription. Loss of product during installation is regarded below-cut off. The energy needed to break the product is less than 0,1% of the total life cycle energy, so it is part of the cut-off rules of this study.

Allocation principles and procedures

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation. In this study, as per EN 15804, allocation is conducted in the following order.

1. Allocation should be avoided.
2. Allocation should be based on physical properties (e.g. mass, volume) when the difference in revenue is small.
3. Allocation should be based on economic values.

The “Allocation, cut-off by classification” system model that has been chosen subdivides multi-product activities by allocation, based on physical, economic, mass or other properties. By-products of waste treatment processes are cut-off, as are all by-products classified as recyclable. Markets in this model include all activities in proportion to their current production volume.

However, there are no co-products, and therefore no allocation between products beside the energy.

The product is not designed for reuse, recycling or recovery. The product is expected to be disposed as landfill after end of life or granulated for road fill with other construction waste.

However, the wrapping plastic used under transport to the costumers, are expected to be recycled, as it is a pure plastic material and can easily be sorted for recycling at the recipient.

Description of system boundaries

This study covers a cradle-to-gate with options (A1-A5, C1-C4 and D) EPD.

Table 5: Life cycle stages covered by this LCA study.

	Product stage			Installation processes		Use stage							End of life 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
Module	A1-A3		Product manufacture	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	X			X	X	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	Europe		Denmark	Europe													
Process type	Upstream		Processes the manufacture has influence over	Downstream													
Data type	58 % share of specific data in % GWP-GHG		Specific	-													
Variation – products	0%			-													
Variation – sites	Manufactured in one site			-													

Figure 2 (system figure) includes the generic processes retrieved from the Ecoinvent database 3.8 and describe the ingredients in the LIP products in absence of specific data. Instead of using generic data for the main components including cement, calcium carbonate and polymer powder, the suppliers of those raw materials were contacted and specific EPD for their raw materials were used.

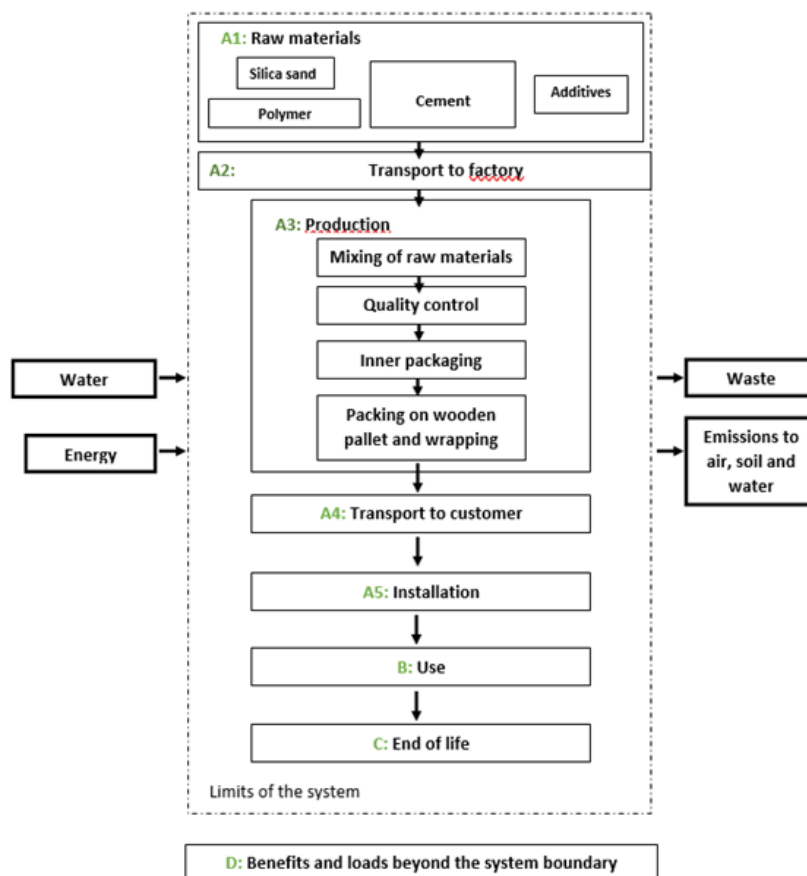


Figure 2: Limits of the system in this study

Product stage (A1-A3):

- A1-A2: extraction, supply and transport of raw materials and packaging to LIP Byggningsartikler A/S. Raw materials are purchased from European suppliers.
- A3: manufacturing process of product and its packaging and waste management from the same process. LIP Byggningsartikler A/S get all their electricity from wind energy produced at Lindø Port with >3MW onshore wind turbines. The mass allocation factor key leads to 0.0821 MJ/kg. This number is calculated by dividing the total energy consumption at the location of LIP Byggningsartikler A/S with the total production volume of all their products. After applying economic allocation by revenue, approximately 0.033 MJ is used for the production of 1 kg LIP Multi Light Tile MortrsA3 covers dosage and mixing of selected and measured raw materials and additives to ensure that the product meets desired properties and packaging material consumption. Packaging product materials consist of the bag material, wooden pallet and LDPE used as wrapping material. The wooden pallet is part of a return system, and therefore not a part of this study. A calculation has been already made that the wooden pallet can hold at least 48 bags of product and it was used to calculate how much wrapping foil is needed.

Therefore, presuming 25 use cycles is reasonable for one pallet, in average 1/25 of the manufacturing and waste handling of one pallet should be allocated to at least the 48 bags of product(s) transported in one pallet use cycle or 1/48 for 1 bag of product. Therefore, the waste from the same process is assessed to be negligible, as raw material waste, if any, will be used in subsequent process or directed to incineration.

Construction process stage (A4-A5):

- A4: distribution to typical Customer by transport of packaged product from production gate to end user (building site). The customers of LIP Bygningsartikler A/S are primarily from Denmark. About 92 percent of the products produced by LIP at the production site in Nørre Aaby in Denmark, are sold mostly in Denmark, also in Sweden, Norway, Germany and the Netherlands. The distance has in the present LCA study been estimated to be 500km via road transport by a Euro 6 lorry of 32 metric ton.
- A5: installation of product into building, including required water and its blending energy. For installation, water consumption can be found in table 1. Mixing electricity consumption is assumed to be 0.216MJ. This is equivalent to the use of a 1200-Watt handheld mixer for 3 minutes. It is estimated that if the technician has experience and uses the same bucket of tile mortar product to reduce residue, 2-4 % could be expected. This estimate is expressed in the model by 5% loss instead, as a conservative approach. 5% loss has been advised to LIPs customers and LIP offers calculator with losses on LIPs website as a guide when buying products. No industry standard exists, and PCR does not provide further guidance for any losses or spillage. The product can be used in 12 months or 18 months. To preserve the technical data and performance of the product at the working environment, storage can be set to maximum 18 months from the moment the packed product is opened. Justification comes from the product sheet: <https://lip.dk/produkter/klaebning-af-fliser-og-klinker/lip-multi-let-544-fliseklaeb/>.

The electricity mix is modelled with European residual mix, and it is considered as an adequate choice, but since more than 90% of the market is in Denmark, Danish residual mix would be a better choice to consider in this study's validity period of 5 years.

Use stage (B1-B7):

- B1 to B7 are not declared (ND) as they are not applicable: the product does not need maintenance or replacement during its RSL, if professionally used and properly installed.

End of life stage (C1-C4):

- C1: deconstruction and demolition of the product into the building. Mortars for surface use are typically not considered as part of the structure of the building. However, during the building destruction, the quantity of extra energy required to break this application can be neglected compared to the energy required to demolish the structure of the building and are therefore not included in this LCA study. The energy needed to break the product is less than 0,1% of the total life cycle energy, so it is part of cut/off rules.
- C2: transport of waste product from demolition to recycling/disposal facility that is waste collection. The distance covered is 50 km via road transport by a Euro 6 lorry of 32 metric ton.
- C3: The product is expected to be disposed in landfill after end of life, so waste processing is negligible.
- C4: Waste disposal including physical pre-treatment.

D Reuse-Recovery-Recycling potential

Module D calculates the potential environmental benefits of the recycling or reuse of materials. This product has not considerable benefits due to recycling or/and reuse.

Environmental performance

All the environmental impacts have been calculated in SimaPro and with the EN 15804 + A2 Method, which takes all the methods defined by the European Standard EN 15804 + A2 into account.

All the LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

The chosen LCIA categories are the ones used in EN 15804+A2 as implemented in SimaPro 9.4, they are as follow:

Table 6: The connection between impact categories and indicators covered in this study.

Impact Category	Indicator	Unit	Original reference
Climate Change - Fossil	Global Warming Potential fossil (GWP-fossil)	Kg CO ₂ eq. (Carbon dioxide)	Baseline model of 100 years of the IPCC based on IPCC 2021
Climate Change - Biogenic	Global Warming Potential biogenic (GWP-biogenic)	Kg CO ₂ eq. (Carbon dioxide)	Baseline model of 100 years of the IPCC based on IPCC 2013
Climate Change – Land Use and Land Use Change (LULUC)	Global Warming Potential Land use and land use change (GWP-LULUC)	Kg CO ₂ eq. (Carbon dioxide)	Baseline model of 100 years of the IPCC based on IPCC 2013
Climate Change - Total	Global Warming Potential total (GWP-total)	Kg CO ₂ eq. (Carbon dioxide)	Baseline model of 100 years of the IPCC based on IPCC 2021
Ozone Depletion	Depletion potential of the stratospheric ozone layer (ODP)	Kg CFC 11 eq. (Trichlorofluoromethane)	Steady-state ODPs, WMO 2014.
Acidification	Acidification potential, Accumulated Exceedance (AP)	Mol H ⁺ eq. (Hydrogen ions)	Accumulated Exceedance, Seppälä et al. 2006, Posch et al., 2008.
Eutrophication aquatic freshwater	Eutrophication potential, fraction of nutrients reaching freshwater end compartment (EP-freshwater)	Kg P eq. (Phosphorous)	EUTREND model, Struijs et al., 2009b, as implemented in ReCiPe.
Eutrophication aquatic marine	Eutrophication potential, fraction of nutrients reaching freshwater end compartment (EP-marine)	Kg N eq. (Nitrogen)	EUTREND model, Struijs et al., 2009b, as implemented in ReCiPe.
Eutrophication terrestrial	Eutrophication potential, Accumulated Exceedance (EP-Terrestrial)	Mol N eq. (Nitrogen)	Accumulated Exceedance, Seppälä et al. 2006, Posch et al.
Photochemical ozone formation	Formation potential of tropospheric ozone (POCP)	Kg NMVOC eq. (Non-methane volatile organic compounds)	LOTOS-EUROS, Van Zelm et al., as applied in ReCiPe.
Depletion of abiotic resources – Minerals and metals	Abiotic depletion potential for non-fossil resources (ADP-minerals & metals)**	Kg sb eq. (Antimony)	CML 2002, Guinée et al., 2002, and van Ooers et al. 2002
Depletion of abiotic resources – Fossil fuels	Abiotic depletion potential for fossil resources (ADP-fossil)**	MJ, net calorific value (Megajoules)	CML 2002, Guinée et al., 2002, and van Ooers et al. 2002
Water Use	Water (user) deprivation potential, deprivation-weighted water consumption (WDP)**	m ³ world eq. Deprived	Available Water Remaining (AWARE) Boulay et al., 2016.
Particulate matter emissions	Potential incidence of disease due to PM emissions (PM)	Disease incidence	SETAP-UNEP, Fantke et al 2016
Ionising radiation, human health	Potential Human exposure efficiency relative to U235 (IRP)*	kBq U235 eq. (kiloBecquerel)	Human health effect model as developed by Dreicer et

			al. 1995 update by Freischknecht et al., 2000
Ecotoxicity (freshwater)	Potential comparative Toxic Units for ecosystems (ETP-fw)**	CTUe (Comparative Toxic Units ecosystems)	UseTox version 2 until the modified USEtox model is available from EC-JRC
Human toxicity, cancer effects	Potential comparative Toxic Units for humans (HTP-c)**	CTUh (Comparative Toxic Units humans)	UseTox version 2 until the modified USEtox model is available from EC-JRC
Human toxicity, non-cancer effects	Potential comparative Toxic Units for humans (HTP-nc)**	CTUh (Comparative Toxic Units humans)	UseTox version 2 until the modified USEtox model is available from EC-JRC
Land use related impacts/soil quality	Potential Soil Quality index (SQP)**	Dimensionless	Soil quality index based on LANCA.

*Disclaimer: 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 nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

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

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

Core environmental impact indicators

Table 7: Core environmental impact results for the product LIP 544 Multi Tile Mortar Light.

Results per declared unit									
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP- total	kg CO ₂ eq.	6,89E-01	4,35E-02	4,51E-02	0	4,35E-03	0	5,28E-03	0
GWP-fossil	kg CO ₂ eq.	6,99E-01	4,35E-02	1,97E-02	0	4,35E-03	0	5,27E-03	0
GWP-biogenic	kg CO ₂ eq.	-1,09E-02	3,61E-05	2,54E-02	0	4,62E-06	0	5,72E-06	0
GWP- luluc	kg CO ₂ eq.	3,60E-04	1,64E-05	4,23E-06	0	1,63E-06	0	4,97E-06	0
ODP	kg CFC 11 eq.	3,17E-08	1,08E-08	1,18E-09	0	1,08E-09	0	2,13E-09	0
AP	mol H ⁺ eq.	2,40E-03	1,39E-04	5,27E-05	0	1,39E-05	0	4,95E-05	0
EP-freshwater	kg P eq.	6,59E-05	2,84E-06	7,29E-06	0	2,83E-07	0	4,82E-07	0
EP- marine	kg N eq.	3,96E-04	3,11E-05	2,12E-05	0	3,10E-06	0	1,72E-05	0
EP-terrestrial	mol N eq.	4,41E-03	3,39E-04	1,30E-04	0	3,39E-05	0	1,88E-04	0
POCP	kg NMVOC eq.	1,50E-03	1,34E-04	3,79E-05	0	1,33E-05	0	5,48E-05	0
ADP- minerals&metals**	kg Sb eq.	3,63E-06	1,04E-07	1,28E-07	0	1,04E-08	0	1,20E-08	0
ADP-fossil**	MJ	7,05E+00	7,08E-01	5,50E-01	0	7,08E-02	0	1,47E-01	0
WDP **	m ³	1,53E-01	2,44E-03	1,03E-03	0	2,43E-04	0	6,62E-03	0
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-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption								

Additional environmental impact indicators

Table 8: Additional environmental impact results for the product LIP 544 Multi Tile Mortar Light

Results per declared unit									
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-GHG	kg CO ₂ eq.	6,99E-01	4,35E-02	1,97E-02	0	4,35E-03	0	5,27E-03	0
PM	disease inc.	2,72E-08	5,05E-09	4,53E-10	0	5,05E-10	0	9,97E-10	0
IRP*	kBq U235 eq	2,18E-02	3,58E-03	2,05E-02	0	3,58E-04	0	6,53E-04	0
ETP-fw**	CTUe	8,78E+00	5,53E-01	3,76E-01	0	5,53E-02	0	9,29E-02	0
HTP-c**	CTUh	1,20E-09	1,51E-11	9,28E-12	0	1,51E-12	0	2,36E-12	0
HTP-nc**	CTUh	1,04E-08	5,83E-10	2,64E-10	0	5,83E-11	0	6,15E-11	0
SQP**	Dimensionless	4,63E+00	8,12E-01	5,99E-02	0	8,09E-02	0	3,09E-01	0
Acronyms	GWP-GHG: 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 equal to the GWP indicator originally defined in EN 15804:2012+A1:2013. PM = Particulate Matter emissions; IRP = Ionizing radiation, human health; ETP-fw = Eco-toxicity, freshwater; HTP-c = Human toxicity, cancer effects; HTP-nc = Human toxicity, non-cancer effects; SQP = Land use related impacts/Soil quality.								

Use of resources

Table 9: Resource use - LIP 544 Multi Tile Mortar Light

Results per declared unit									
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	C4
PERE	MJ	6,56E-01	9,43E-03	5,19E-02	0	9,00E-04	0	1,25E-03	1,25E-03
PERM	MJ	3,11E-01	0	0	0	0	0	0	0
PERT	MJ	9,67E-01	9,43E-03	5,19E-02	0	9,00E-04	0	1,25E-03	1,25E-03
PENRE	MJ	5,63E+00	7,52E-01	8,96E-01	0	7,52E-02	0	1,56E-01	1,56E-01
PENRM	MJ.	1,66E+00	0	0	0	0	0	0	0
PENRT	MJ	7,30E+00	7,52E-01	8,96E-01	0	7,52E-02	0	1,56E-01	1,56E-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	1,29E-01	2,45E-03	7,08E-03	0	2,45E-04	0	6,63E-03	6,63E-03
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 production

At end of use, when the hardened product is demolished, the LIP Mortars are non-hazardous building waste. The waste from packing material is also assumed to be non-hazardous waste.

Table 10: Waste - LIP 544 Multi Tile Mortar Light

Results per declared unit									
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste disposed	kg	1,27E-02	0	6,34E-04	0	0	0	0	0
Non-hazardous waste disposed	kg	2,72E-01	0	1,36E-02	0	0	0	0	0
Radioactive waste disposed	kg	3,45E-06	0	1,72E-07	0	0	0	0	0

Output flows

Table 11: Output flows - LIP 544 Multi Tile Mortar Light

Results per declared unit									
Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
Components for re-use	kg	0	0	0	0	0	0	0	0
Material for recycling	kg	0	0	6,00E-04	0	0	0	0	0
Materials for energy recovery	kg	0	0	0	0	0	0	0	0
Exported energy, electricity	MJ	0	0	0	0	0	0	0	0
Exported energy, thermal	MJ	0	0	0	0	0	0	0	0

Information on biogenic carbon content

Table 12: Biogenic Carbon - LIP 544 Multi Tile Mortar Light

	Unit	Quantity
Biogenic carbon content in product	kg C	0
Biogenic carbon content in packaging	kg C	6,00E-03

Results per functional or declared unit. Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO₂.

Additional information

Fossil free energy:

LIP Bygningsartikler A/S has used fossil free energy since 2014. Today, the energy is delivered from the wind turbine power plant at LINDØ port of Odense from Energy Fyn. The total energy consumption on the site is equivalent to 1100MWh per year.



Information related to Sector EPD

This is an individual EPD.

Differences versus previous versions

This is the first version of this EPD.

References

Project Report - LIP 544 Tile Mortar, LIP Bygningsartikler A/S, July 2023

General Programme Instruction of the International EPD® System. Version 4.

ISO 14025:2010 Environmental labels and declarations-Type III Environmental Declarations-Principles and procedures

ISO 14040:2006 Environmental Management-Life Cycle Assessment-Principles and framework

ISO 14044:2006 Environmental Management-Life Cycle Assessment-Requirements and guidelines

PCR 2019:14 Construction products (EN 15804:A2) version 1.2.3

EN 15804:2012+A2:2019 Sustainability of construction works-Environmental Product Declarations-Core rules for the product category of construction products

EN 12004:2007+A1:2012 for interior and exterior bonding of ceramic tiles, porcelain, natural stone and mosaics on floors and walls.

Programme-related information and verification

The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programs may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804.

Programme:	The International EPD® System EPD International AB Box 210 60 SE-100 31 Stockholm Sweden www.environdec.com info@environdec.com
EPD registration number:	S-P-09194
Publication date:	31-07-2023
Valid until:	31-07-2028

CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product category rules (PCR): PCR 2019:14 Construction products (EN 15804:A2) Version 1.2.5.
PCR review was conducted by: The Technical Committee of the International EPD® System. Chair: Claudia Peña. 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 verifiers: Bureau Veritas Certification Sverige AB accredited by SWEDAC with accreditation number 1236.
Procedure for follow-up of data during EPD validity involves third party verifier:
☐ Yes ☒ No



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